A MODELLING OF ZAMBIA'S MANUFACTURING FINANCE

BY

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A Thesis submitted to the University of Zambia in partial fulfilment of the requirements for the award of the Degree of Doctor of Philosophy in Business and Management

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DECLARATION

I, Wiza Ng'ambi, do hereby declare that this work is my original work achieved through personal reading and research. This work has never been submitted to the University of Zambia or any other Universities. All sources of data used and literature on related works previously done by others, used in the production of this Thesis have been duly acknowledged. If any omission has been made, it is not by choice but by error.

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APPROVAL

This Thesis by Wiza Ng'ambi is approved as a partial fulfilment of the requirements for the award of the Degree of Doctor of Philosophy in Business and Management.

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ABSTRACT

This study aims to investigate Zambia's manufacturing finance, drawing lessons from Newly Industrialised Countries (NICs), with a view to generate policy prescriptions that may navigate Zambia's manufacturing finance to its optimal level. The study has four objectives: to determine the NICs on which Zambia's manufacturing finance may be benchmarked, to benchmark Zambia against these NICs, to model Zambia based on NIC models and to optimise Zambia's demand and supply of manufacturing finance. It pursues a mixed method study composed of benchmarking, modelling and optimisation: applying relative value analysis, data envelopment analysis, structural equation modelling and multi-objective particle swarm optimisation with crowding distance on a firm- and country-level merged dataset from seven countries namely, India, Indonesia, Malaysia, Philippines, South Africa, South Korea, and Zambia. The study shows that manufacturing finance is a necessary condition for manufacturing development, which itself is an engine for economic growth. It demonstrates that manufacturing finance has strong linkages with other dimensions of the economy including the financial, legal, and political systems. At the aggregate, the study shows that while NICs such as South Korea evolved their developmental state into industrial states through instituting effective developmental structures and playing active developmental roles, Zambia did not advance to such an industrial state, as evidenced by the deficient manufacturing finance and correspondingly stagnated manufacturing development. The study statistically shows that Zambian manufacturing firms' access to finance is on the tail end of the study countries, even when only efficient firms are considered. It shows that high cost of capital, unfavourable legal climate, taxation constraints, firm size distribution, firm financial inefficiency, low firm formalization, low technology intensity, import dependence and predominance of domestic sales in Zambia negatively affect manufacturing firm access to finance. It further highlights deficiencies in the composition of manufacturing firm ownership in Zambia and the utilisation of foreign aid. The study demonstrates that similarities and differences exist between NIC and Zambian firms, and across NICs; showing variations in variable effects across contexts owing to varying political and economic conditions. While acknowledging that NICs carry the more efficient and effective manufacturing finance models, the study argues that effective policy learning requires further analyses into the functional level variations in the learning and exemplar countries. This study shows that beyond generic recommendations about how developing countries can emulate NIC manufacturing finance policy, analysis needs to offer wholistic and quantified policy options to be effective. This approach allows consideration of related policy interests and helps assess the costs and benefits of competing policy options. The study demonstrates that, holding exogenous factors such as manufacturing output constant, Zambia's prevailing manufacturing finance is below its potential. This implies that a reconfiguration on the input side may yield better outcomes, with positive ramifications on manufacturing development.

Key Words: Manufacturing, Finance, Modelling, Zambia, Newly Industrialised Countries

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DEDICATION

This thesis is dedicated to Least-Developed Country (LDC) experts that wither the hardships of contributing to LDCs from within LDCs.

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LIST OF ABBREVIATIONS

DEA	Data Envelopment Analysis
DMUs	Decision Making Units
ES	Enterprise Surveys
GFDD	Global Financial Development Database
HIPC	highly Indebted Poor Countries
IFS	International Finance Statistics
IMF	International Monetary Fund
INDECO	Industrial Development Corporation
ISI	Import Substitution Industrialisation
ISIC	International Standard Classification of All Economic Activities
MI	Mutual Information
MOPSOCD	Multi-Objective Particle Swarm Optimisation with Crowding Distance
NFSDP	Zambia National Financial Sector Development Policy
NFSDP	Zambian National Financial Sector Development Policy
NICs	Newly Industrialised Countries
SEM	Structural Equation Modelling
WB	World Bank
WDI	World Development Indicators
ZANACO	Zambia National Commercial Bank
ZIMCO	Zambia Industrial and Mining Corporation

CHAPTER I. INTRODUCTION

1.1. Introduction

Manufacturing finance is unique among the broader forms of development finance as it entails large and consistent investments in technology, capital, and labour (Das, 2015; GRZ, 2014, 2018; Lazonick & O'Sullivan, 1997a; Lee, 2019; Wu et al., 2008). Technology and capital used in manufacturing development can either be developed or adopted; necessitating costly and patient research and development in the former or hefty acquisition and adaptation in the latter (GRZ, 2014; Gui-Diby & Renard, 2015; Lee, 2019; Naudé & Szirmai, 2013; Yamfwa et al., 2002). Similarly, large and long-term training and investment system investments are required for the human capital development necessary for effective manufacturing development (GRZ, 2014; Gui-Diby & Renard, 2015). Harnessing manufacturing finance is however especially challenging for Low-Income Countries (LICs) (Fischer, 2018; Lee, 2019; Seidman, 1974; Sethi, 2018), as they are, by definition low income, and do not generate adequate savings to finance investments due to the disproportionate consumption demands on their incomes (GRZ, 2017; Lee, 2019; Rolfe & Woodward, 2004; Seidman, 1974).

Further, manufacturing finance development requires the simultaneous optimisation of its supply and demand at each stage of manufacturing development. This entails maximisation of quantity and access while minimising adverse selection and moral hazard to achieve optimal allocative and productive efficiency (Beck & Feyen, 2013). In this view, firm financial preferences and capabilities need to be optimally matched with the supplied financial products (Beck & Feyen, 2013; Briozzo et al., 2016; Fowowe, 2017; Mertzanis, 2016). The Zambian National Financial Sector Development Policy (NFSDP) however notes inadequate lending tools and lack of innovation in financial product design on one hand and low access to financial services on another in Zambia's financial sector (GRZ, 2017).

The rest of this chapter is organised as follows. The next section provides the research background, detailing the evolution of Zambia's manufacturing finance and then stating the research problem. The study objectives, questions and significance are then presented. The chapter concludes by highlighting the theoretical and conceptual frameworks, scope and organisation of the thesis.

1.2. Background of the Research

This section presents the evolution of Zambia's manufacturing finance while highlighting its key impediments. This evolution is chronologically presented in five industrial development regimes, namely: colonial model (1928 – 1963), transition from the colonial model (1964 – 1967), import substitution industrialisation (1968 – 1991), market liberalisation and privatisation (1992 – 2000) and export-oriented industrialisation (2001 – 2021).

1.2.1. Colonial Model: 1928 – 1963

Pre-independence manufacturing in Zambia was funded by colonialists with focus on sustaining the colonial system by placing domestic and external constraints on the domestic economy (Mendes et al., 2014; Seidman, 1974; Thurlow & Wobst, 2006). Such constraints included keeping the domestic economy dependent on manufacturing imports and extractive sector driven with minimal indigenous citizens holding influential roles. In alignment, the banking sector dominated financial sector mainly served the colonial system's need to export raw materials, inhibiting manufacturing finance development (Seidman, 1974).

1.2.2. Transition from the Colonial Model: 1964 – 1967

In the advent of independence, reliance was on mining revenues for investment programs while arguably perpetuating an indigenous colonial system (Beck et al., 2003; Carmody, 2009; Seidman, 1974). At independence, Zambia run a dual economy focused on copper exports with the beverages and tobacco dominated manufacturing sector contributing only 6 percent to GDP (Chansa et al., 2019; Seidman, 1974). As such, the new government sought to undertake massive developmental programs, among them building a resilient and diverse manufacturing sector while reorganising the economy with "Humanism" underpinnings that sought to promote equality and indigenous empowerment, sometimes prioritising the ideology over economic growth (Chansa et al., 2019; Mudenda, 2010; Seidman, 1974). Strong manufacturing finance became necessary for the success of this effort. Manufacturing finance was however dominated by three foreign owned commercial banks namely Barclays, Standard and National Grindlays, that for the most part served foreign owned firms; perpetuating the lopsided financial sector growth in favour of the extractive industry that only minimally reinvested into the economy (Brownbridge, 1996; Chansa et al., 2019; Seidman, 1974). Manufacturing finance targeting indigenous Zambians came through the copper

revenues powered Industrial Development Corporation (INDECO), with a private sector loan portfolio growing 700 percent between 1964 and 1967 (Chansa et al., 2019; Rolfe & Woodward, 2004), despite admittedly there being only few indigenous Zambians with the requisite skills to run successful enterprises.

With the largest banks perpetuating the colonial model, indigenous Zambians lacking saving capacity and foreign investors making minimal re-investment efforts and externalising dividends, Zambia's manufacturing finance had little success despite through the unsustainable public sector channel as powered by copper revenues. It should however be mentioned that despite the economic diversification problems, Zambia over this era enjoyed high GDP growth and positive external balances of about USD 1.1 billion when Kaunda took on the presidency owing to Zambia's large copper reserves and booming copper prices (Rolfe & Woodward, 2004).

1.2.3. Import Substitution Industrialisation: 1968 – 1991

Over this era, the state used copper revenues to finance the import substitution industrialisation strategy, manufacturing finance along with it until the collapse of these earnings in the 1970s (Chansa et al., 2019; Mudenda, 2010). This financing mechanism, accounting for about 60 percent of the total investment in the economy, led to a 9-percentage point increase in manufacturing share in GDP from 6 percent in 1964 to 18 percent in 1975 (Chansa et al., 2019; Yamfwa et al., 2002). It is however argued that while enjoying such copper earnings inspired investible funds, Zambia did not sufficiently diversify the economy to withstand shocks on this revenue stream (Simson, 1985). Further, while relying on government funds to support operations, State Owned Enterprises (SOEs) hardly invested in new capital nor produced investible funds (Chansa et al., 2019; Yamfwa et al., 2002). Specifically, over the 1985 – 1989 period, while public sector finance granted SOEs about USD 500 million, it only got back about USD 22 million in dividends, bringing into question their sustainability (Chansa et al., 2019; Rolfe & Woodward, 2004).

The mid-1970s saw a crash of copper revenues with terms of trade declining by about 50 percent in 1975 (Simson, 1985). Specifically, while copper revenues contributed about 50 percent to state resources post-independence, the 1982 – 1991 period saw this measure decline to about 10 percent (Chansa et al., 2019). With such decline, government resources could not sustain both investment and consumption along with the maintenance of state-owned enterprises, this led government to

external borrowing as this slump was understood to be temporal (Thurlow & Wobst, 2006). External debt then rapidly increased after 1977 leading to a debt rescheduling in May 1983 and further adoption of structural adjustment programmes after the mid-1980s (Mudenda, 2010; Simson, 1985). Three additional factors influencing manufacturing finance over this period are worth a little more detail, namely, institutionalised state intervention, banking system performance and foreign investment policy.

Institutionalised state intervention is synonymous with this era. President Kenneth Kaunda as with his counterparts Kwame Nkrumah (Ghana) and Julius Nyerere (Tanzania) sought to nationalise private sector companies as part of the broader imposition of government economic control underpinned by Marxist philosophies (Rolfe & Woodward, 2004). In this quest, Kaunda grew the number of state-owned enterprises to 150 in 1986 from 14 at independence, achieved through legislation and policy that ensured state control of strategic economic assets. Key in this effort was the 1968 Mulungushi Declaration whose financial clauses served to align the financial system to the government's interventionist strategy. Specifically, government sought to nationalise foreign financial firms, set up government owned financial institutions and allow government control over interest and credit allocation along with stringent financial sector entry restrictions (Brownbridge, 1996; Odhiambo, 2009).

Several institutions were created to provide manufacturing finance to the indigenous population. 1969 saw the establishment of the National Commercial Bank which later merged with the Commercial Bank of Zambia to form the Zambia National Commercial Bank (ZANACO) as a Zambia Industrial and Mining Corporation (ZIMCO), wholly owned subsidiary to principally promote indigenous entrepreneurship through credit (Brownbridge, 1996; Seidman, 1974; Simson, 1985). Other institutional establishments for the same purpose included the 1980 enactment of the Small Industrial Organisation Act and further establishment of the Small Industry Development Organisation along with the Development Bank of Zambia, Village Industries Services, Local Authority Superannuation Fund and Zambia Export and Import Bank (Mudenda, 2010; Odhiambo, 2009). As regards generation of investible funds, Seidman (1974) argued that Zambia with its then higher than average independent Sub-Saharan Africa per capita income did carry potential for investible funds. The lack of institutional mechanisms to ensure that investible funds along with tax revenues were appropriately harnessed and directed to the expansion of the manufacturing and

other productive sectors was however noted. For instance, the development of the Fiat Car assembly plant that required government to contribute 70 percent of the capital appears to have been ill advised. In the same vein, government's restriction on credit creation appeared to have resulted in the reduction of the number of smaller manufacturing firms (Seidman, 1974). In line with Seidman (1974), Mudenda (2009) notes that the established financial institutions eventually started suffering from under-funding.

Banking sector performance carries its share of blame. From the 1970s to the 1980s, interest rates were kept low with a view to induce growth following the Keynesian view that proposes that lower interest rates raise investment, this additionally served as a mechanism to keep the public sector's debt servicing low (Odhiambo, 2009). With rising inflation over this era, real interest rates increasingly became negative, affecting banking system operations and in turn negatively impacted investment, manufacturing finance along with it (Brownbridge, 1996; Thurlow & Wobst, 2006). While returning big banks, commercial bank lending did not appear to align with long term manufacturing development views but rather short-term interest gains (Seidman, 1974). Notwithstanding the foregoing, and despite being dominated by foreign firm serving banks encompassing Barclays, Standard and Grindlays, ZANACO carried on its mandate of providing credit to indigenous Zambians (Simson, 1985). Banking sector fragility however increased with the growth of local banks due to the deficiency of bank supervision and legislation which eventually led to such issues as undercapitalisation (Brownbridge, 1996).

Lastly, as with most recently independent countries, Zambia considered foreign investment a form of imperialism and pursued nationalisation instead to the extent that foreign investment in some specified strategic areas required state approval (Chansa et al., 2019; Seidman, 1974). Allowing foreign investment and transitioning away from it were however both detrimental to manufacturing finance. In the first instance, potential investible funds were removed from the economy through profits, interest, dividends and primary income while payments for share acquisition from foreign firms had the same effect in the second instance. Seidman (1974) notes that investible fund losses from both streams between 1971 and 1972 exceeded INDECO's total assets by about 40 percent, further noting that such losses generally outweighed foreign investment coming into Zambia between 1964 and the mid-1970s. As a result of foreign investment restrictions, between 1975 and 1985, Zambia received an average FDI inflow rate of USD 20 million, drying up after and

resurging only after the 1991 election of President Fredrick Chiluba, along with the adoption of the structural adjustment programs (Bwalya, 2006; Rolfe & Woodward, 2004).

Summarily, over the import substitution industrialisation era (1968 – 1991), Zambia attempted to finance manufacturing development mainly through mining revenues. Seidman (1974) approximates that about half of the investible surpluses in the economy around the early 1970s were generated through tax revenues, further noting that there had generally not been any shortage in manufacturing finance between 1964 and the early 1970s. This state led effort while initially successful was thwarted by a 1970s fall in these earnings, structural adjustment programme implementation as well as ample resource misapplication leading to a decline in manufacturing finance and manufacturing development (Carmody, 2009; Chansa et al., 2019; Gui-Diby & Renard, 2015; Liebenthal & Cheelo, 2018; Seidman, 1974). Structural adjustment programs affected manufacturing finance on two fronts. Firstly, they favoured free markets over state intervention and therefore prevented government's active participation in manufacturing finance and development. They secondly allowed market interest rates to prevail leading to prohibitive lending rates, a 63-percentage point increase can for instance be noted between 1983 and 1987 (Chansa et al., 2019; Odhiambo, 2009).

1.2.4. Market Liberalisation and Privatisation: 1992 – 2000

From the financial policy perspective, Mwenda and Mutoti (2011) create two subdivisions within this era, 1992 – 1994 and 1995 – 2002, with the former being the "Shock Treatment" that focused on a swift movement from financial repression to the free market system. Specifically, interest rate and credit supply controls were removed in 1992 followed by the 1993 introduction of the treasury bill auction system as well as the replacement of the dual exchange rate system with a unified market-based exchange rate system. 1994 later saw the removal of exchange controls through the repeal of the Exchange Control Act in February 1994. The latter phase, 1995 – 2002, focused on banking system adjustments focused on bank supervision and regulation as well as payment and settlement systems through the enhancement of the 1994 Banking and Financial Services Act. It should be stated that these IMF and World Bank inspired financial liberalisation efforts and later privatisation were reminiscent of the Kaunda era. They were however halted in his final years for

presumably political reasons and only saw full implementation in the Chiluba administration (Rolfe & Woodward, 2004).

The aforementioned policies were not without shocks to manufacturing finance and the economy as a whole. The 1992 liberalisation of interest rates saw them rise by about 107 percentage points a year later, reaching 113 percent in 1993 markedly affecting manufacturing finance (Odhiambo, 2009). Further, the repeal of the Exchange Control Act allowed investors to repatriate capital in form of dividends, interest, royalties, profits as well as management fees leading to further externalisation of investible funds from the economy (Rolfe & Woodward, 2004). In further curbing the resulting inflation from the liberalisation, monetary tightening was sought as a solution, further reducing investible funds in the economy and thereby negatively affecting manufacturing finance and development (Carmody, 2009).

As a continuation from the previous era, liberalisation also meant withdraw of manufacturing finance support to loss making state-owned enterprises, leading to privatisation (Chansa et al., 2019). Expectedly, the years leading up to privatisation were marked by low investments into new equipment due to the unprofitability of the state-owned firms (Yamfwa et al., 2002). With privatisation aimed at capital market development and broadening ownership, the December 1993 Securities Act established the Securities and Exchange Commission centred around investor protection and capital market development, with the Lusaka Stock Exchange later formally opening on 21st February 1994 (GRZ, 2017; Rolfe & Woodward, 2004). The foregoing notwithstanding, the privatisation effort while ideally intended to target indigenous Zambians was heavily dependent on foreign investment because indigenous Zambians lacked the requisite savings to undertake such investment (Rolfe & Woodward, 2004). The Privatisation Trust Fund was nonetheless established to allow for later indigenous purchase of shares in privatised companies. Management Buyouts were further encouraged in the Privatisation Act to give Zambian managers the opportunity to buy companies over an extended period (ibid.).

Over this era, while in direct competition with other developing countries for foreign investment, Zambia's FDI performance was 37 percentage points higher than the African average in the late 1990s (Rolfe & Woodward, 2004). This stellar foreign investment performance was in part due to the success of the privatisation process, that had some analysts argue was one of the most sweeping

privatisation programs in Africa (Rolfe & Woodward, 2004). Despite the privatisation inspired foreign investment success and its positive contribution to manufacturing finance, Zambia stagnated with the mining sector biased foreign investment and therefore needed to attract more foreign investment through other channels (Chansa et al., 2019; Lombe, 2018; Rolfe & Woodward, 2004). On Zambia's foreign aid receipts, Inanga and Mandah (2008) argue that Zambia has since independence received substantial amounts of aid, arguing that in this era, about 80 percent of public capital expenditure was financed by aid.

Cumulatively, this era saw the collapse of several banks, reducing the number to 16 by 2000 (Mwenda & Mutoti, 2011). Rolfe and Woodward (2004) further argue that long term funds were generally unavailable over this period, preventing investment in technology and equipment necessary to modernize operations. Summarily, copper revenues persisted as a source of manufacturing finance with support from the privatisation boosted foreign investment as well as aid, the domestic financial sector was however inconducive for optimal utilisation due in part to the liberalisation shocks (Carmody, 2009).

1.2.5. Export Oriented Industrialisation: 2001 – 2021

In this era, limited long term finance and high interest rates have been a key hinderance to manufacturing development (GRZ, 2014). Specifically, affordable long-term finance continued to be in limited supply and therefore failed to service Zambia's industrial development needs especially among SMEs (GRZ, 2018; Lombe, 2018). As regards SMEs, Fessehaie et al. (2015) go on to argue that the financing challenges faced by manufacturing SMEs have not been addressed by private microfinance institutions nor public institutions such as the Citizens Economic Empowerment Commission (CEEC) and the Development Bank of Zambia (DBZ). They further extend the argument to large manufacturing firms proposing that external finance has continuously proved to elude large firms to the extent that they resort to fund growth through internal sources. Further still, the 2017 Zambia National Financial Sector Development Policy (NFSDP) argues that the banking sector is plagued with high interest rates, high cost of financial services, high collateral requirements, inadequate lending tools and low competition (GRZ, 2017), a view supported by Fessehaie et al. (2015), stating that commercial banks rarely provide long term lending and offer high lending rates on their short-term products.

Manufacturing sector access to finance has equally persisted, with the early 2010s numbers showing that only 37 percent of manufacturing firms reported having access to financial sector funds, factors cited included poor clarity as regards collateral enforcement as well as information asymmetry for rural SMEs as well as lack of long-term capital (GRZ, 2014). This problem has further extended to the late 2010s as reported by the NFSDP (GRZ, 2017), with firms involved in international commerce noting that access to finance received the least benefit from Zambia's membership to SADC and COMESA in 2019 (BoZ et al., 2019). Fessehaie et al. (2015) further note that access to finance may be a bigger problem for domestic firms than foreign firms as the latter retain access through their parent companies. For the above reasons, government has through three cycles of financial sector development policies been implementing its financial sector development plan. The first cycle ran from 2004 – 2009, followed by 2010 – 2015 with the current one running for a ten-year period from 2017. The development plan aims to among other objectives improve market efficiency and contractual savings as well as access to finance and financial markets (GRZ, 2017).

The 2001 election of Levy Mwanawasa as Zambian President led to the continued push towards privatisation and foreign investment (Rolfe & Woodward, 2004). FDI was promoted as a key source of manufacturing finance with government withdrawing public sector direct contribution to manufacturing finance but rather focussing on creating a conducive environment for investment (Chansa et al., 2019). To boost foreign investment, 2006 saw the merger of the Zambia Privatisation Agency and Zambia Investment Centre to form the Zambia Development Agency through the Zambia Development Agency Act. The same year saw the establishment of the CEEC to provide loans to Zambian SMEs with a special focus on targeted populations such as youths and women and the 2005 introduction of Multi-Facility Economic Zones in which fiscal and tax incentives are given to investors (Mudenda, 2010). Further still, in 2014, the government reintroduced the Industrial Development Corporation to serve as a holding company for state owned enterprises as well as undertake new projects.

On attaining the highly Indebted Poor Countries (HIPC) completion point, Zambia witnessed an increase in investible funds from the debt relief, allowing government to invest in social as well as productive programs (Carmody, 2009). Public debt however quickly increased after 2011, rising to unsustainable levels after 2018. As a result, in both economic recovery plans, the first being the

Economic Stabilisation and Growth Programme "Zambia Plus" (2017 – 2019) and the Economic Recovery Programme (2020 – 2023), debt management remained a key theme due to the unsustainability of public debt and its strain on investment and social expenditure (GRZ, 2020), with evidently detrimental effects on government's manufacturing finance contributions.

Foreign aid remained a key source of manufacturing finance in this era. Inanga and Mandah (2008) note that foreign aid has been a large source of manufacturing finance using a case study of two development finance initiatives, the Enterprise Development Fund (EDF) and the Export Development Program (EDP). They cite the EDF case where manufacturing was the biggest beneficiary of the Matching Grant Scheme (MGS) and second largest beneficiary of the Multi Credit Facility (MCF), both subcomponents of the EDF, between June 2000 and August 2002.

Summarily, export oriented industrialisation (2001 – 2021) has seen wider focus on FDI, aid and mining windfalls (BoZ et al., 2019; Bwalya, 2006; GRZ, 2014, 2018), with so far lukewarm results due to the inconsistency, low liquidity, lack of depth and structure, disproportionate consumption expenditure, an underdeveloped capital market and minimal strategic direction (GRZ, 2017, 2018; Liebenthal & Cheelo, 2018; Mulimbika & Karim, 2018; Thurlow & Wobst, 2006). Additional shocks in this era came through the 2009 global financial crisis with a copper price slump that in turn affected state revenue, limiting manufacturing finance through the public sector channel (Liebenthal & Cheelo, 2018).

Putting the eras together, pre-independence manufacturing in Zambia was funded by colonialists with focus on sustaining the colonial system by placing domestic and external constraints on the economy, expectedly constraining the development of the manufacturing finance ecosystem (Mendes et al., 2014; Seidman, 1974; Thurlow & Wobst, 2006). In the advent of independence, manufacturing finance relied on mining revenues, which while successful was unsustainable (Carmody, 2009; Seidman, 1974). Over the import substitution industrialisation era (1968 – 1991), Zambia attempted to finance manufacturing development mainly through mining revenues, an initially successful effort that was thwarted by a 1970s fall in these earnings, structural adjustment programs implementation as well as ample resource misapplication (Carmody, 2009; Chansa et al., 2019; Gui-Diby & Renard, 2015; Liebenthal & Cheelo, 2018; Seidman, 1974). During market liberalisation (1992 – 2000), copper revenues persisted with support from the privatisation boosted

foreign investment and aid, the domestic financial sector was however inconducive for optimal utilisation due in part to the shocks associated with liberalisation (Carmody, 2009). Export oriented industrialisation (2001 – 2021) has seen wider focus on FDI, aid and mining windfalls (BoZ et al., 2019; Bwalya, 2006; GRZ, 2014, 2018), with so far lukewarm results due to the inconsistency, lack of structure and minimal strategic direction (GRZ, 2018; Thurlow & Wobst, 2006).

1.3. Statement of the Problem

Manufacturing finance is invaluable for manufacturing development (Amornkitvikai & Harvie, 2017; Bwalya, 2006; El-haddad, 2010; Fanta, 2012; GRZ, 2014, 2018; Lazonick & O'Sullivan, 1997a; Mesagan et al., 2018; Naidu & Chand, 2012; Wasiuzzaman et al., 2020), which itself is an engine through which external balance is achieved, industrial linkages are sustained and employment is created for economic development and its associated prosperity, as is evident in industrialised countries (Beck et al., 2003; El-haddad, 2010; GRZ, 2014; Gui-Diby & Renard, 2015; Naudé & Szirmai, 2013; Prasad & Nickow, 2016; Rajan & Subramanian, 2011; Sufian, 2011). Achievement of manufacturing development however requires three key ingredients: manufacturing finance, labour, and capital and technology as well as policy to optimise them. Of the three, manufacturing finance appears to be significantly elusive in developing countries (Fischer, 2018; Lee, 2019; Seidman, 1974; Sethi, 2018), as demonstrated above for the Zambian case. A well-developed manufacturing finance system enhances financial resource availability and allocative efficiency while simultaneously promoting manufacturing sector investment; culminating into expeditious manufacturing development (Beck & Feyen, 2013; Cihak et al., 2012; Das, 2015; GRZ, 2017; Sethi, 2018). Absence of the foregoing naturally results in lukewarm manufacturing development and its downstream virtuous cycle of underdevelopment as is evident in developing countries such as Zambia (Fowowe, 2017; Mwenda & Mutoti, 2011; Sethi, 2018; Sibanda et al., 2018; Thurlow & Wobst, 2006).

With this context, inadequate manufacturing finance in Zambia backstopped manufacturing sector stagnation during import substitution industrialisation (Mendes et al., 2014; Seidman, 1974), market liberalisation (Carmody, 2009; Chansa et al., 2019; Rolfe & Woodward, 2004) and currently export-oriented industrialisation (BoZ et al., 2019; Chitonge, 2016; Fessehaie et al., 2015; GRZ, 2014, 2018). This has been propagated by ill-conceived and unexpressed

manufacturing finance policy, resulting in insufficient and mediocre supply on one hand and unprepared and mismatched preferences on the demand side (Chitonge, 2016; Seidman, 1974). Specifically, the supply side of manufacturing finance has been dominated by, inadequate domestic savings, unfocused FDI, inconsistent aid, mismanaged copper revenues (GRZ, 2017; Liebenthal & Cheelo, 2018; Rolfe & Woodward, 2004; Seidman, 1974) and misapplied debt while low access and lack of innovation have riddled the demand side. The foregoing thus necessitates developing Zambia's manufacturing finance model that optimises the supply and demand sides, applying lessons from manufacturing finance paragons with the highest policy transferability potential (Chansa et al., 2019; El-haddad, 2010; Lee, 2019).

While extant literature has attempted some aspects of the problem, it has fallen short of adequate address. For instance, while Lee (2019) attempts a benchmarking, the study lacks sufficient statistical treatments and broadly references African countries while benchmarking to a single NIC. Cihak et al. (2012) benchmark financial systems across the world without specific reference to manufacturing nor treatments on how inefficient systems can reach the efficiency frontier. Beck and Feyen (2013), also benchmarking financial systems, introduce a financial possibility frontier without reference to manufacturing. Other work comparing industrial and financial development between NICs and developing countries without specific statistical reference to manufacturing finance can be found in Chansa et al. (2019), Yusuf (2014), Romana and Leonardo (2014), Jarungkitkul and Sukcharoensin (2016) and Asongu (2015). The manufacturing finance supply aspects of the study problem can be found in Sethi (2018), Hoxha (2013), Toby and Peterside (2014), Fischer (2018), Rajan and Subramanian (2011), Das (2015), Mesagan et al. (2018), Efobi et al. (2019), Amornkitvikai and Harvie (2017) and Svilokos et al. (2019). These studies however have little or no statistical optimisation nor demand side treatments. Demand side aspects with however inadequate statistical optimisation and relation to the supply side can be found in Wasiuzzaman et al. (2020), Naidu and Chand (2012), Fanta (2012), Panda and Nanda (2018), Yegon et al. (2014), Handriani and Robiyanto (2018), Girma and Vencappa (2014), Sutomo et al. (2019), Kadarova et al. (2015), Slavec and Prodan (2016), Musamali and Tarus (2013) and Meric et al. (2014). Lastly, the Zambia focused studies specifically lack adequate address of manufacturing finance and the relationship between its demand and supply sides. The deficiencies in the above highlighted studies thus necessitate the current study.

1.4. Study Objectives

The study aims to investigate Zambia's manufacturing finance, drawing lessons from NICs with a view to generate policy prescriptions that may navigate Zambia's manufacturing finance to its optimal level and consequently enhance manufacturing and economic development. The study carries four specific objectives, namely.

a. To determine the NICs on which Zambia's manufacturing finance may be benchmarked. This involves selecting NICs whose policy contexts are most compatible with Zambia and offer it the most policy learning and transferability.
b. To benchmark Zambia's manufacturing finance against selected NICs. This involves assessing Zambia's manufacturing finance performance, processes, and policies against NICs with a view to identify and remediate the manufacturing finance gaps.
c. To model Zambia's manufacturing finance based on NIC models. This involves modelling the demand and supply sides of NICs manufacturing finance and then applying the NICs model to the Zambian context.
d. To optimise Zambia's demand and supply of manufacturing finance. This involves heuristically optimising the Zambian manufacturing finance model, generating quantitative policy targets, and using NICs experiences to recommend policy prescriptions that achieve the policy targets.

1.5. Study Questions

Given the above objectives, the study addresses the following questions:

a. Which NICs have the most compatible policy contexts with Zambia? Which NICs offer Zambia the most manufacturing finance policy learning and transferability?
b. How has Zambia's manufacturing finance performed relative to NICs? What lessons can be drawn from the disparities?
c. What are the functional level differences and similarities between the NICs and Zambian models? Which components of the NIC models are applicable to the Zambian context?
d. What are the optimal levels of the respective demand and supply side variables of manufacturing finance in Zambia? Which NICs strategies may be most effective in attaining these optimal levels?

1.6. Significance of the Study

The study makes seven main contributions across theory, methodology and practice. It develops a multi-dimensional cascade of manufacturing finance interrelationships on which further research and analysis may be conducted. It pioneers a novel application of data envelopment and relative value analyses on firm manufacturing finance efficiency across countries, an approach that may be applied to other areas of benchmarking in which the profiles of Decision Making Units (DMUs) are comparable across aggregations. It provides the first quantitative benchmarking of Zambia's manufacturing finance against NICs, offering new insights in the field based on the Zambian case. It pioneers the comparison of econometric manufacturing finance models, allowing the investigation of functional relationships between policy instruments and targets across countries. It simultaneously analyses four disaggregations of access to finance, namely: working capital finance, investment finance, domestic private start-up investment and foreign private start-up investment. In this way, the study goes beyond the narrow definitions of access to finance in extant literature. It pioneers a novel approach to manufacturing finance policy generation in which policy makers are given numerous quantified non-dominated policy options, allowing policy makers to accurately weigh the costs and benefits of competing policy options. Lastly, it presents a customisable and optimised manufacturing finance model on which policy simulations may be conducted.

1.7. Scope of the Study

Within the broader industrial sector, focus is taken on financing manufacturing sector development in Zambia. Manufacturing here includes all firm sizes whose principal activities lie within divisions 10 to 33 of the fourth revision of the International Standard Classification of All Economic Activities (ISIC) (Gui-Diby & Renard, 2015; United Nations, 2008). The ISIC is the international standard used in national accounting (production of official economic statistics such as Gross domestic Product (GDP)) among United Nations member countries including Zambia. As such, official GDP data by the Zambia Statistics Agency and the official classification of firms by the Patents and Companies Registration Agency follow ISIC. Manufacturing finance can therefore be defined as any finance utilised within the sector, covering; pre-launch expenses, construction, working capital, research, and development as well as investment.

1.8. Theoretical and Conceptual Frameworks

1.8.1. Theoretical Framework

This section provides the theoretical support for the study. This is presented in three main sections, namely, manufacturing development, supply of manufacturing finance and demand for manufacturing finance. Manufacturing development is headlined by the big push theory with the supply of manufacturing finance carrying two sets of theories namely, Mckinnon-Shaw Hypothesis and Colonial Influence on Financial Development Theories. Lastly, the demand for manufacturing finance theories is presented through the Neoclassical and Accelerator Theories.

1.8.1.1. Manufacturing Development

1. Big Push Theory

The Big Push Theory, credited to (Rosenstein-Rodan, 1943, 1961), proposes a path to industrialisation through large and simultaneous investments in multiple sectors of an economy. It argues that overall industrialisation can be profitable to the economy by these simultaneous investments even when it is unprofitable for individual sectors to industrialise (Murphy et al., 1989; Rosenstein-Rodan, 1943, 1961). It posits that the simultaneous adoption of increasing returns to scale technology across multiple sectors stands to create income capable of generating demand for output across sectors and thereby makes industrialisation profitable at both sector and macroeconomic levels (Murphy et al., 1989; Rosenstein-Rodan, 1943). The theory is built on three indivisibilities: production, demand, and the supply of savings. The indivisibility of the production function and the associated indivisibility of social overhead capital imply that increasing returns to scale in production are motivated by indivisibilities in inputs, processes, and outputs. Specifically, substantive, and sustainable industrialisation occurs only when sufficient thresholds of inputs, processes and outputs are attained. Along with returns to scale, the indivisibility of the production function requires the availability of social overhead capital to exist prior to the attainment of increasing returns to scale technology across sectors. Secondly, the indivisibility of demand, sometimes referred to as the complementarity of demand, speaks to the importance of the investment in generating a sufficient stock of output demand in all sectors. This demand is not only indirectly generated from the increased incomes of workers but also directly through firm intermediate commodities demand. Lastly, the indivisibility of the supply of savings, a key

theoretical justification for modelling Zambia's manufacturing finance, proposes that the simultaneous investment requires a large supply of savings. In its original formulation, the indivisibility argues for a two-stage address of the required supply of savings. In the first stage, incomes need to increase to facilitate sufficient savings during the second stage. Cumulatively, a large supply of financial resources is necessary to finance the simultaneous investments across sectors.

The three indivisibilities imply that industrialisation will only sustainably occur when there's sufficient and simultaneous increases in production, demand, and finance. The foregoing further implies that small sector investments are not adequate for sustained industrialisation, refocussing the importance of manufacturing finance to developing countries attempting to industrialise (Rosenstein-Rodan, 1961). Murphy et al. (1989) explore this result and apply it to imperfectly competitive markets with special cases including, industries with factory wage premiums and industries that require non-excludable infrastructure investment and conclude in favour of big push industrialisation. They further find that the rapid productivity growth and increase in living standards in the 19th and 20th centuries can be credited to industrialisation. Specifically, the successful industrialisations by early industrialisers such as Britain and NICs such as South Korea appear to have been achieved through manufacturing and its associated economies of scale.

Murphy et al. (1989) argue that big push industrialisation serves as inspiration for the balanced growth framework with two key adjustments. In the first instance, the economy needs to internally sustain both preindustrial and post-industrial states. In this case, no external boost in endowments or technology are necessary for industrialisation but rather simultaneous investments in available technology by all sectors. In the second instance, the balanced growth framework considers general improvements in the state of affairs after industrialisation, focussing on the population benefits resulting from such industrialisation.

In the modelling of Zambia's manufacturing finance, the big push theory provides theoretical support for the need to optimise manufacturing finance within the grander framework of manufacturing development. Specifically, as big push industrialisation requires a production and demand supported financial infusion, an optimisation of manufacturing finance that relates the production informed demand for finance and supply of finance from available sources fits well

into the big push framework. The current study does not however attempt to model the entire big push model but rather the finance aspect within the larger manufacturing development context.

1.8.1.2. Supply of Manufacturing Finance

1. Mckinnon-Shaw Hypothesis

The Mckinnon-Shaw hypothesis stands at the centre of most financial liberalisation theory. The hypothesis was born from a critique of the financial repression approaches entrenched in Keynes (1936) and Tobin (1965). Keynes (1936), in his liquidity preference theory argued that the interest rate emanating from the full employment equilibrium tended to be less than the liquidity preference interest rate. As such, avoiding an income fall necessitated lowering of interest rates. Further financial repression support can be seen in Tobin (1965), from which Eschenbach (2011) concludes that financial repression stands to increase the demand for productive capital while reducing the demand for money, in turn raising the capital-labour ratio leading to economic growth. Besides the theoretical justifications, financial repression appeared attractive to developing country governments that were unable to raise sufficient tax revenue. In these situations, financial repression policy mimicked implicit financial sector taxation. Specifically, government stood to extract seignorage from placing financial restrictions such as reserve requirements and interest rate ceilings on financial institutions and instruments (Eschenbach, 2011).

The Mckinnon-Shaw hypothesis argued against Keynes (1936) and Tobin (1965), recommending instead, interest rate liberalisation and the general eradication of financial repression. The hypothesis comprises three agents: savers, intermediaries, and investors with a fixed nominal interest rate such that the real interest rate is held below the equilibrium value. With interest rate having respective positive and negative relationships with saving and investment, a decrease in interest rate due to an interest rate ceiling stands to reduce savings Eschenbach (2011). Interest rates may also be reduced through inflationary pressure when land ownership is used to hedge against inflation. Specifically, wanning interest rate make deposits less attractive compared to land ownership with the induced wealth effect leading to lower investment through the increased consumption channel. In either case, the reduction in savings creates a shortage of investible funds such that credit allocation mechanisms are reduced to inefficient criteria such as political influence

and quality of collateral (Andersen & Tarp, 2003; Eschenbach, 2011). Additionally, lower interest rates become attractive to borrowers that were previously excluded from the market at the higher interest rates, raising the number of loan applications and consequently adverse selection. Further, at sufficiently low interest rates as influenced by interest rate ceilings, the average efficiency of investments is expected to decline as lower return investments become more attractive to lenders. The reduced rates further constrain financial institutions' ability to charge risk premiums on loans, affecting profitability. The foregoing thus leads the Mckinnon-Shaw hypothesis to the recommendation that financial repression policies be eradicated to enhance financial development and stimulate economic growth.

It should be mentioned that while the hypothesis has come to be understood as a unit, McKinnon (1973) and Shaw (1973) developed their models separately with different but compatible theorisations. Specifically, Mckinnon's model assumed a self-finance system in which investors saved in order to invest, creating an intertemporal complementarity between savings and physical investment. Shaw on the other hand, did not limit investors to self-finance. The foregoing is however not contradictory as both internal and external resources may be used to finance investment. Furthermore, while Mckinnon's formulation focused on developing countries, Shaw analysed developed countries that carried sophisticated financial systems (Eschenbach, 2011).

A key critique of the hypothesis is that presented by Neo-structuralists. Neo-structuralists argued for the significance of unorganised markets in the financial liberalisation debate (Eschenbach, 2011). Specifically, they proposed that financial intermediation would only be reduced from the reserve requirements channel if the real deposit rate increases transferred financial resources from unorganised markets to formal markets. This argument is premised on the understanding that unorganised markets do not have reserve requirements, and further, their contractionary effect on the credit supply being subject to the substitutability of assets between inflation hedging and unorganised markets. While a sound argument, the neo-structuralist view is premised on unorganised markets being competitive, an assumption that may not always hold.

Critiques such as Stiglitz and Weiss (1981) as presented in Eschenbach (2011) focused on non-government interventionist sources of financial market disequilibria, arguing for instance that credit costs may distort the nature of the transaction and prevent market equilibrium. Specifically,

they argued that high equilibrium interest rates may result in the development of high-risk projects that may subsequently raise default rates. The increased default rates at the high market clearing interest rates may therefore lead lenders to keeping interest rates below the high equilibrium rate, leading to credit rationing as in the case of interest rate ceilings.

Further, Gemech and Struthers (2003) review the developments of the Mckinnon-Shaw hypothesis, noting that hundreds of empirical studies have been performed on the hypothesis in varying contexts. They make a case for the evolution of the hypothesis from the initial focus on the negative effects of financial repression on savings and investment in developing countries to the extended variation that considers the effects of financial repression on poverty, financial crises and economic growth. They further note the limitedness of financial liberalisation in the improvement of credit allocation and financial deepening in cases of government influence in the banking system through operational and lending decision interference. Eschenbach (2011) however notes that financial liberalisation as pioneered by Mckinnon and Shaw underwent criticism in part because of unsuccessful policies by governments. Gemech and Struthers (2003) further postulate that poor competition in the banking sector even in the face of deregulation may lead to lower real deposit rates but however conclude that financial liberalisation does lead to other benefits associated with financial deepening such as financial market stability.

The Mckinnon-Shaw hypothesis in this modelling of manufacturing finance provides key theoretical support for the need to optimise the supply side of manufacturing finance without undue state or structural constraints. Specifically, optimal manufacturing finance supply emanates from an unrepressed financial sector, where interest rates are free to adjust according to the market, reserve requirements are not unusually excessive and credit allocation is merit based. In this view, financial system regulators need to enhance financial system efficiency without undue influence on market equilibriums and credit allocation.

2. Colonial Influence on Financial Development Theories

Two theories assessing the effects of colonialism on financial development are worth considering, the Endowment Theory and the Law and Finance Theory. The Endowment Theory of Financial Development, sometimes referred to as the Institutional Theory of Financial Development, proposes that financial development is influenced in part by an economy's disease environment,

as encountered by colonisers and the type of institutions they established (Beck et al., 2003). It attempts to explain how initial endowments affected financial intermediation and stock market development. The endowment theory (see Acemoglu et al. (2001)) as applied to financial development by Beck et al. (2003, p. 139) encompasses three arguments. Firstly, two types of European colonisations were instituted: Extractive and Settlement. In the first instance, Europeans established institutions that enabled an elite to extract minerals while in the settlement colonisations, Europeans established institutions that supported private property rights while providing oversight on state power. The latter case includes colonisations of countries such as the United States and Australia while the former includes countries such as Congo and Zambia. Secondly, the type of colonisation was dependent on the feasibility of settlement. Colonies that were inhospitable due to disease and high mortality rates became extractive states while the relatively hospitable colonies became settlement states. Lastly, institutions and systems established by colonisers survived independence with extractive states substituting colonisers with local elites that continued extracting resources for private benefit with authoritarian tendencies. On the other hand, settlement states evolved into democratic states that emphasized the protection of private property. Further, extractive states did not favour liberalised markets as these threatened extractors while on the other hand settlement states protected property rights, fostering financial development. Empirical evidence of the endowment theory can be found in Beck et al. (2003).

Providing the background on some potential root causes of Zambia's underdeveloped financial sector and manufacturing finance subsector, the endowment theory bestows theoretical support on the political system components of a manufacturing finance model. Specifically, traces of extractive colony tendencies may potentially still impede Zambia's financial sector and the manufacturing finance subsector. A modelling of manufacturing finance therefore needs to purge or at least account for such impediments through appropriate political, legal, and financial regulatory channels.

Secondly, the Law and Finance Theory. The theory argues that legal traditions as introduced by colonial systems safeguarded the property rights of private investors with respect to the state in varying degrees and consequently have a significant bearing on financial development (Beck et al., 2003). The law and finance theory (see La Porta et al. (1998)), as presented in Beck et al. (2003, p. 138) illustrates three arguments. Firstly, prioritisation of the protection of the property

rights of private investors in relation to the state differs among legal traditions. Secondly, the protection of property rights is the basis of financial development through financial contracting. Thirdly, legal traditions were primarily developed in Europe and then spread across the globe through conquest, colonisation, and imitation. Summarily, the law and finance theory asserts that international differences in financial systems can be explained by the historically determined legal traditions. It operates within the frame of two contrasting legal traditions, British Common Law and French Civil Law. The theory argues that British common law is premised on allowing private property owners operation by insulating their private property rights from the Crown (or state). On the other hand, the theory argues that French Civil Law developed to cement state power in the face of judicial corruption and interference. It contends that French civil law countries will generally experience lesser financial development than British common law countries because the former places lesser weight on protecting private property rights. Empirical evidence of the law and finance theory can also be found in Beck et al. (2003).

The significance of the legal system in financial development through contracting, as exposed by the law and finance theory gives credence to the inclusion of legal system components in a manufacturing finance model. Further, despite having a British common law legal tradition, Zambia is also a former extractive state. With legal traditions having been adapted by region, as the law and finance theory suggests, the Zambian legal system may potentially carry financial development impeding tendencies. This is addressed by parameterising legal system indicators for diagnosis and remedy, as shown in the methodology section below.

1.8.1.3. Demand for Manufacturing Finance

1. Investment Decision Theories

Two theories are briefly discussed, namely, Neoclassical and Accelerator. The Neoclassical Theory of Investment posits that firm investment decisions are for the most part dependent on the cost of capital with the real and financial decisions being made separately (Samuel, 1998). In this theory, internal and external funds are considered substitutes, such that, the marginal cost of finance equals the shareholder's opportunity cost of capital. Further, the neoclassical approach focusses on price variables, with emphasis on the cost of capital and little regard for the quantity variables, and further prescribes reduction in the cost of capital through taxation as an investment

promotion strategy. Providing empirical support, Samuel (1998) uses time series regression analysis on US manufacturing firms and finds strong evidence of the neoclassical theory. Secondly, the Accelerator Theory of Investment. The theory argues that firm investment is determined by sales, depreciation and profit, with sales being the primary determinant (Samuel, 1998). In the accelerator framework, only quantity variables such as sales and output are considered relevant determinants of investment.

Both theories of investment are valuable to the current research in that they offer two contrasting views of manufacturing firm investment decisions. Specifically, two distinct pathways of a firm's investment decision process are isolated, giving insight on how manufacturing firms decide on whether to invest. More practically, while the neoclassical theory provides theoretical support for the relative importance of the cost of capital in the model, the accelerator theory provides theoretical support for the inclusion of sales into the model. Both variables are expectedly included in the study.

1.8.2. Conceptual Framework

1.8.2.1. Analytical Framework, Agents and Functions

Extant theories while helpful, fail to address all the relevant aspects of the current study. Similarly, the empirical literature reviewed (as will be shown) does not present any one conceptual framework sufficient for the study scope such that none can singularly be adopted in this research. This section therefore presents a custom conceptual framework that attempts to merge various pieces of extant theoretical and empirical literature while proposing new analytical formulations about manufacturing finance. Three dimensions accrue to this study; benchmarking Zambia's manufacturing finance against selected NICs, modelling the supply and demand sides of manufacturing finance in Zambia based on the NIC model, and finally optimising Zambia's model with respect to the benchmarking lessons. Benchmarking against NICs at granular manufacturing finance themes allows the consolidation of differences and similarities and consequently identification of gaps and constraints to inform remediation policy generation (Azadeh et al., 2010; Beck & Feyen, 2013; Cihak et al., 2012; Czarnowski & Jędrzejowicz, 2008; Ho & Wu, 2006; Jarungkitkul & Sukcharoensin, 2016; Lee, 2019; Maimbo & Melecky, 2016; Munda & Nardo, 2009; Paasi, 2005; Robert, 2010; Romana & Leonardo, 2014; Sufian, 2011). Further, analysis of

Zambia's financial, political, and legal systems serves to highlight their influence on manufacturing finance while revealing its key objectives and constraints (Beck et al., 2003; Fanta, 2012; Ma & Lin, 2016; Maimbo & Melecky, 2016; Melecky & Maria, 2013; Mwenda & Mutoti, 2011). Furthermore, analysis of the supply side provides insight on the key sources of manufacturing finance in Zambia along with its inherent opportunities and constraints (Aizenman & Sushko, 2011; Beck & Feyen, 2013; Beck & Levine, 2002; Behera, 2015; Bell & Rousseau, 2000; Benmamoun & Lehnert, 2013; Das, 2015; Efobi et al., 2019; Fischer, 2018; Hoxha, 2013; Kim, 2007; Lee, 2019; Maimbo & Melecky, 2016; Mesagan et al., 2018; Mikheeva, 2019; Rajan & Subramanian, 2011; Sethi, 2018; Sufian, 2011; Svilokos et al., 2019; Voghouei et al., 2011). In a similar way, analysis of the demand side provides insight on firm access to finance and start-up investment and their effects on the demand for manufacturing finance (Ayodeji & Balcioglu, 2010; Briozzo et al., 2016; Fowowe, 2017; Girma & Vencappa, 2014; Handriani & Robiyanto, 2018; Hovakimian et al., 2002; Margaritis & Psillaki, 2010; Mertzanis, 2016; Musamali & Tarus, 2013; Nadeem & Sheikh, 2011; Naidu & Chand, 2012; Panda & Nanda, 2018; Rasiah, 2011; Slavec & Prodan, 2016; Tyson, 2017; Wasiuzzaman et al., 2020). The foregoing additionally exposes manufacturing firm objectives and constraints, aiding optimisation problem generation. Cumulatively, these insights lead to the generation and solving of a multi-objective optimisation problem that links and optimises the supply and demand sides of manufacturing finance while taking into account the NICs model and Zambia's prevailing situation (Attanasio & Paiella, 2011; Beck & Feyen, 2013; Bernard et al., 2015; Briza & Naval, 2011; Bruhn & Steffensen, 2011; Gilli & Schumann, 2012; Hsu et al., 2016; Krink & Paterlini, 2011; Livanas, 2011; Mamanis & Anagnostopoulos, 2011; Marín-solano & Navas, 2010). The optimal solutions (which may serve as quantitative policy targets), representing Zambia's manufacturing finance potential, are then weighed against its performance and the industrialisation and industrialised stage NICs, and policy pathways to achieve the policy targets recommended. A methodological visualisation of this conceptual framework is presented in figure 1 below.

Further, seven agents and three systems exist in this framework, Domestic Banks, Domestic non-Bank Financial Institutions, Foreign Investors, Foreign Donors, Public Sector, Households, Manufacturing Firms, and Financial, Legal and Political Systems. The first six agents channel finance to manufacturing firms under the stewardship of optimal equilibriums motivated financial

system regulators, all operating within the prevailing political and legal systems. The financial, legal, and political systems provide an environment in which the seven agents may optimise their positions with the systems themselves facing short term rigidity but long-term evolution. Within the context of manufacturing finance, all eight agents have well defined objectives and face fairly quantifiable limitations, consequently leading to well defined utility functions and constraints. The domestic banks, domestic non-bank financial institutions, foreign investors and households are primarily motivated by return on their investments but may carry other objectives. The public sector and foreign donors are further not only focused on return on investment but broader development goals such as firm growth and employment as well. Furthermore, regulators are primarily concerned about financial sector growth and stability while manufacturing firms are principally motivated by maximising shareholder value. See the graphical representation of the foregoing agent focused conceptual framework in figure 2 below. In this figure, the arrows represent the flow of financial resources, either as investment flows or returns on investment.

The conceptual framework may also be illustrated by function. In this illustration, manufacturing development is influenced by manufacturing finance, labour, capital and policy with the latter three treated as exogenous variables and the research focusing on manufacturing finance. Manufacturing finance as with labour, capital and policy has a bidirectional causal relationship with manufacturing development, such that growth in manufacturing finance has supply push effects on manufacturing development and similarly, manufacturing development has demand pull growth effects on manufacturing finance. Further, manufacturing finance is itself influenced by systems, the supply of manufacturing finance as well as the demand for manufacturing finance. The system component is further subdivided into three: financial, political, and legal systems while the supply component is subdivided into the six sources of manufacturing finance namely, domestic banking, domestic non-banking, foreign investment, foreign aid, public sector, and households. Furthermore, the demand side is influenced by access to finance and domestic start-up investment. See figure 3 below for the graphical illustration of the function focused conceptual framework. The next section details the specific study variables, their operational definitions, categories and data sources.

Figure 1: Conceptual Framework by Methodology

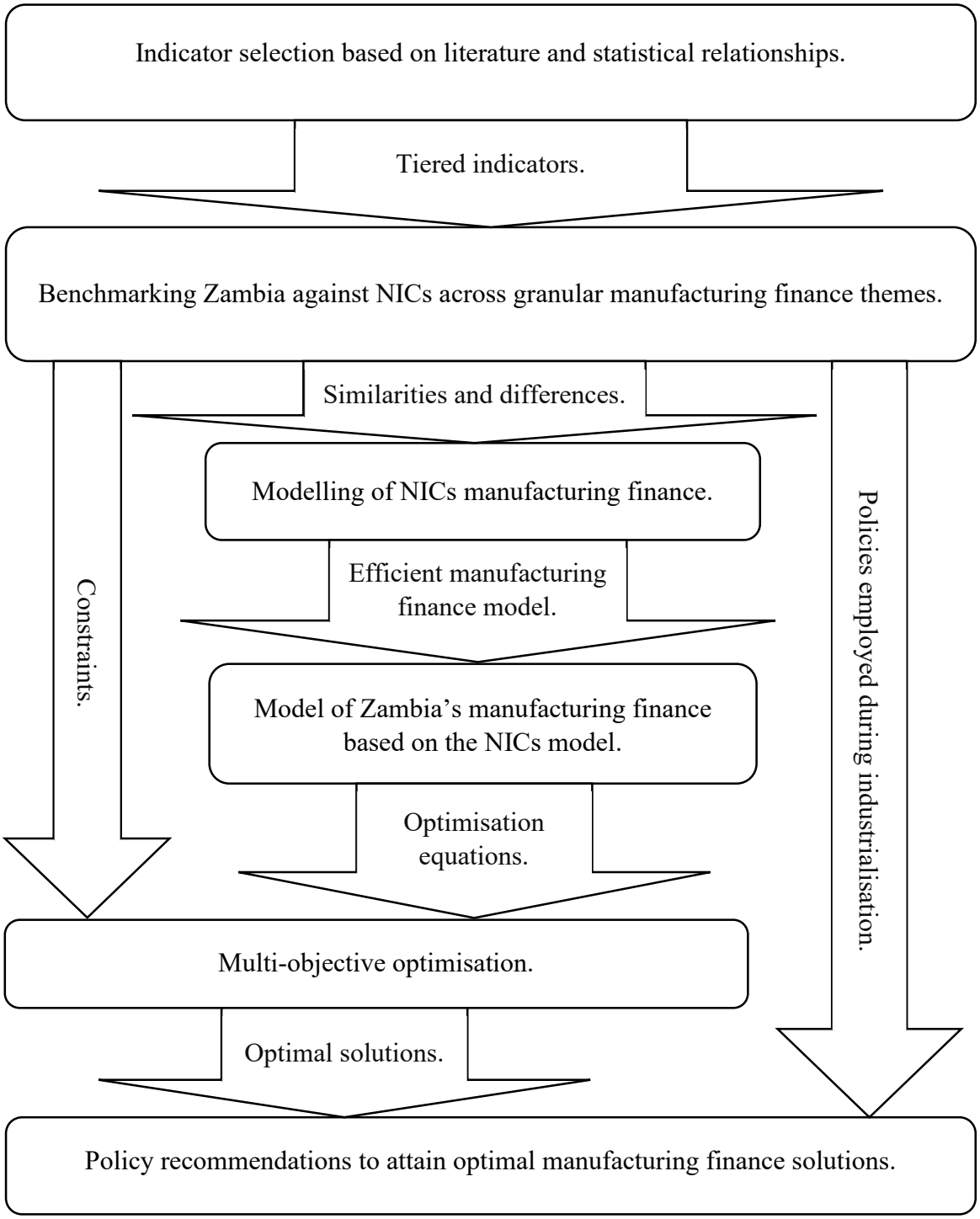


Figure 2: Conceptual Framework by Agents

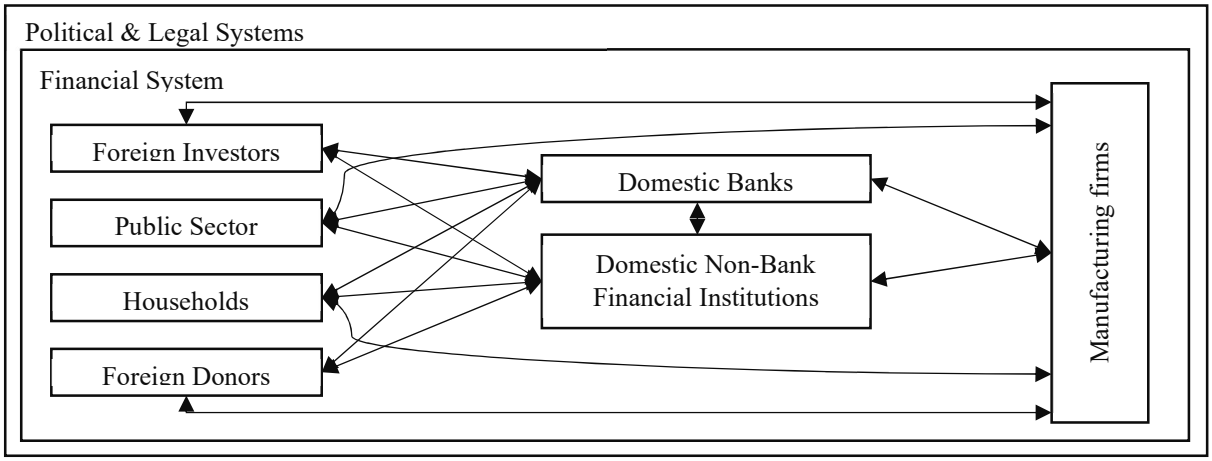
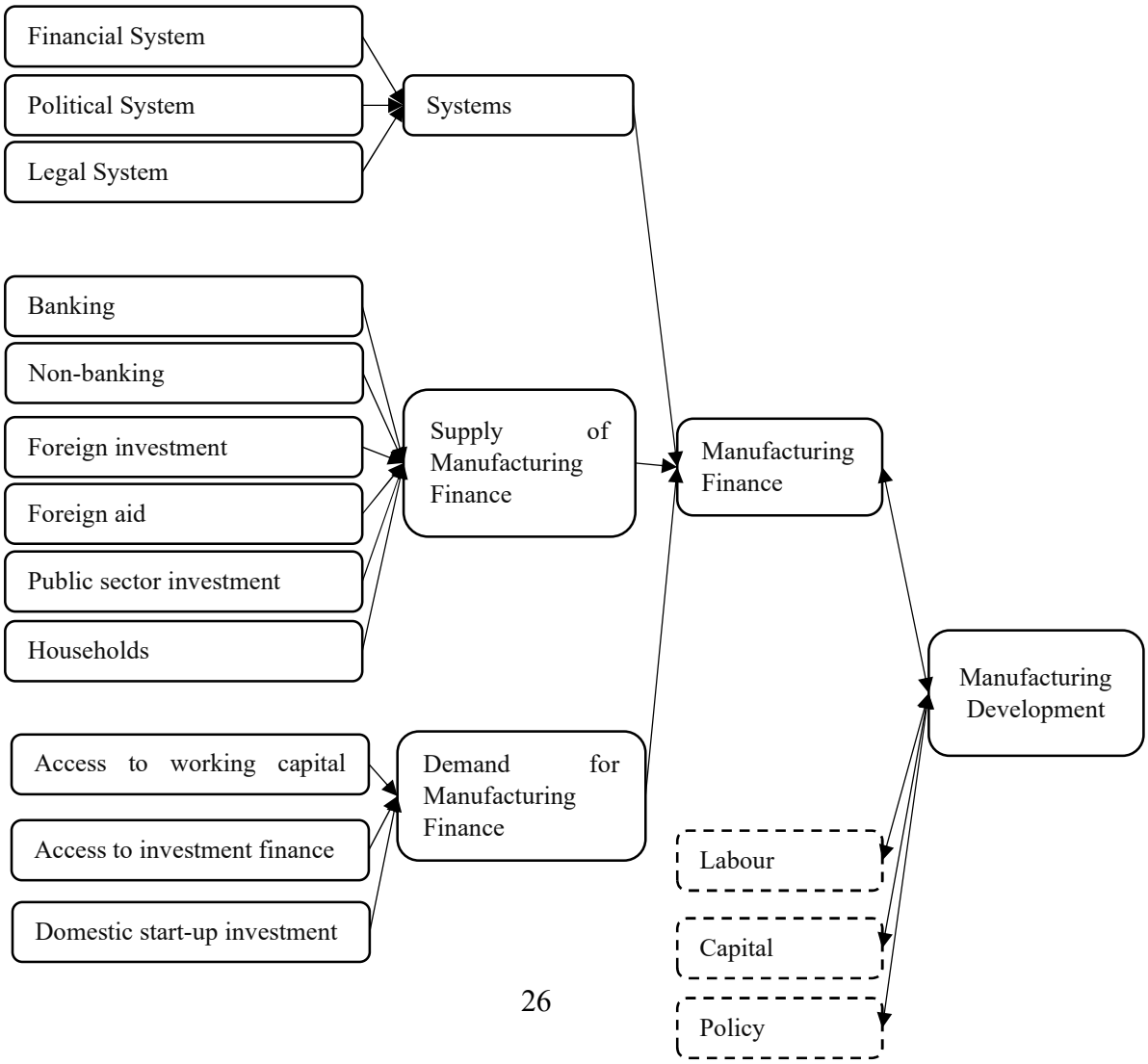


Figure 3: Conceptual Framework by Function



1.8.2.2. Variable Definitions

This section catalogues the study variables by function. It presents the category, definition, and data source for each variable, however deferring the justification and literature support to appendix A for a leaner in-text presentation. Two types of variables are presented, dependent and independent. Dependent variables are the outcome variables for each function while independent variables are those that influence the outcome variables. The section is divided into five subsections: manufacturing development, manufacturing finance systems, supply of manufacturing finance and demand for manufacturing finance. Seemingly similar variables are in some cases presented under the same theme to preserve as much analytical information as possible. Redundant variables are later removed during the data reduction analytical stage, preserving only the most analytically suitable variables.

1. Manufacturing Development

Table 1: Manufacturing Development Variables

S/n	Category	Variable Name	Variable Definition	Source
1	Dependent	Annual sales	Weighted price updated annual sales in USD	WB/IMF
2	Dependent	MVA per capita	Manufacturing value added per capita (constant 2015 US)	WB/IMF
3	Independent	Domestic market capitalisation	Market capitalization of listed domestic companies (% of GDP)	WB/IMF
4	Independent	Banking sector credit	Domestic credit to private sector by banks (% of GDP)	WB/IMF
5	Independent	ODA per capita	Net ODA received per capita (current US$)	WB/IMF
6	Independent	Lending interest rate	Lending interest rate (%)	WB/IMF
7	Independent	Access to working capital finance	Bank and non-bank financed working capital	WB/IMF
8	Independent	Taxation as a constraint	Taxation as a constraint	WB/IMF
9	Independent	Domestic private ownership	Proportion of private domestic ownership in a firm (%)	WB/IMF
10	Independent	Access to investment finance	Bank and non-bank financed investment	WB/IMF
11	Independent	Foreign private ownership	Proportion of private foreign ownership in a firm (%)	WB/IMF
12	Independent	Courts as a constraint	Courts as a constraint	WB/IMF
13	Independent	Government ownership	Proportion of government/state ownership in a firm (%)	WB/IMF

2. Manufacturing Finance Systems
    a. Financial System

Table 2: Financial System Variables

S/n	Type	Variable Name	Variable Definition	Source
1	Dependent	Lending interest rate	Lending interest rate (%)	WB/IMF
2	Independent	Central bank assets	Central bank assets to GDP (%)	WB/IMF
3	Independent	Broad money to reserves	Broad money to total reserves ratio	WB/IMF
4	Independent	Claims on private sector	Claims on private sector (annual growth as % of broad money)	WB/IMF
5	Independent	Domestic bank credit	Domestic credit to private sector by banks (% of GDP)	WB/IMF
6	Independent	Monetary sector credit	Monetary Sector credit to private sector (% GDP)	WB/IMF
7	Independent	Real effective exchange rate	Real effective exchange rate index (2010 = 100)	WB/IMF
8	Independent	Foreign direct investment	Foreign direct investment, net inflows (% of GDP)	WB/IMF
9	Independent	Liquid liabilities	Liquid liabilities to GDP (%)	WB/IMF
10	Independent	Gross savings	Gross savings (% of GNI)	WB/IMF
11	Independent	Inflation	Inflation, consumer prices (annual %)	WB/IMF
12	Independent	Domestic market capitalisation	Market capitalization of listed domestic companies (% of GDP)	WB/IMF
13	Independent	Financial system deposits	Financial System deposits to GDP (%)	WB/IMF
14	Independent	Access to working capital finance	Bank and non-bank financed working capital	WB/IMF
15	Independent	External auditor	Percent of firms with annual financial statement reviewed by external auditor	WB/IMF
16	Independent	Capacity utilisation	Capacity utilization (%)	WB/IMF
17	Independent	Access to investment finance	Bank and non-bank financed investment	WB/IMF
18	Independent	Taxation as a constraint	Taxation as a constraint	
19	Independent	Courts as a constraint	Courts as a constraint	WB/IMF

    b. Political System

Table 3:Political System Variables

S/n	Type	Variable Name	Variable Definition	Source
1	Dependent	Taxation as a constraint	Taxation as a constraint	WB/IMF
2	Independent	Corruption as major constraint	Percent of firms identifying corruption as a major constraint	WB/IMF

S/n	Type	Variable Name	Variable Definition	Source
3	Independent	Region	Region Of The Establishment	WB/IMF
4	Independent	Domestic market capitalisation	Market capitalization of listed domestic companies (% of GDP)	WB/IMF
5	Independent	Age dependency ratio	Age dependency ratio, young (% of working-age population)	WB/IMF
6	Independent	Rural population	Rural population (% of total population)	WB/IMF
7	Independent	Taxes on exports	Taxes on exports (% of tax revenue)	WB/IMF
8	Independent	Claims on central government	Claims on central government, etc. (% GDP)	WB/IMF
9	Independent	Urban population	Urban population (% of total population)	WB/IMF
10	Independent	Political instability as major constraint	Percent of firms identifying political instability as a major constraint	WB/IMF
11	Independent	Compensation of employees	Compensation of employees (% of expense)	WB/IMF
12	Independent	Bank domestic credit	Domestic credit to private sector by banks (% of GDP)	WB/IMF
13	Independent	Total natural resources rents	Total natural resources rents (% of GDP)	WB/IMF
14	Independent	Labour regulations as major constraint	Percent of firms identifying labour regulations as a major constraint	WB/IMF
15	Independent	Tax and contribution rate	Total tax and contribution rate (% of profit)	WB/IMF
16	Independent	Access to working capital finance	Bank and non-bank financed working capital	WB/IMF
17	Independent	Capacity utilisation	Capacity utilization (%)	WB/IMF
18	Independent	ISIC code	ISIC code	WB/IMF
19	Independent	Access to investment finance	Bank and non-bank financed investment	WB/IMF

c. Legal System

Table 4: Legal System Variables

S/n	Type	Variable Name	Variable Definition	Source
1	Dependent	Courts as a constraint	Courts as a constraint	WB/IMF
2	Independent	Use of intellectual property	Charges for the use of intellectual property, payments (BoP, current US$)	WB/IMF
3	Independent	Lending interest rate	Lending interest rate (%)	WB/IMF
4	Independent	Employment to population ratio	Employment to population ratio, 15+, total (%) (national estimate)	WB/IMF
5	Independent	Number of heads of state	Number of Heads of State Since Independence	WB/IMF
6	Independent	Bank domestic credit	Domestic credit to private sector by banks (% of GDP)	WB/IMF

S/n	Type	Variable Name	Variable Definition	Source
7	Independent	Years of independence	Years of Independence	WB/IMF
8	Independent	Access to working capital finance	Bank and non-bank financed working capital	WB/IMF
9	Independent	Domestic market capitalisation	Market capitalization of listed domestic companies (% of GDP)	WB/IMF
10	Independent	Exported directly	Proportion of total sales that are exported directly (%)	WB/IMF
11	Independent	Domestic private ownership	Proportion of private domestic ownership in a firm (%)	WB/IMF
12	Independent	Access to investment finance	Bank and non-bank financed investment	WB/IMF

3. Supply of Manufacturing Finance

a. Domestic Banking Sector

Table 5: Banking Sector Variables

S/n	Type	Variable Name	Variable Definition	Source
1	Dependent	Domestic bank credit	Domestic credit to private sector by banks (% of GDP)	WB/IMF
2	Independent	Liquid liabilities	Liquid liabilities to GDP (%)	WB/IMF
3	Independent	Broad money to GDP	Broad money (% of GDP)	WB/IMF
4	Independent	Bank deposits to GDP	Bank deposits to GDP (%)	WB/IMF
5	Independent	Bank credit to deposits	Bank credit to bank deposits (%)	WB/IMF
6	Independent	Bank non-interest income	Bank noninterest income to total income (%)	WB/IMF
7	Independent	Bank cost to income	Bank cost to income ratio (%)	WB/IMF
8	Independent	Inflation	Inflation, consumer prices (annual %)	WB/IMF
9	Independent	Real effective exchange rate	Real effective exchange rate index (2010 = 100)	WB/IMF
10	Independent	Insurance and financial services	Insurance and financial services (% of service imports, BoP)	WB/IMF
11	Independent	Commercial bank branches	Commercial bank branches (per 100,000 adults)	WB/IMF
12	Independent	Bank Z-score	Bank Z-score	WB/IMF
13	Independent	Bank concentration	5-bank asset concentration	WB/IMF
14	Independent	Bank non-performing loans	Bank non-performing loans to gross loans (%)	WB/IMF

S/n	Type	Variable Name	Variable Definition	Source
15	Independent	Lending interest rate	Lending interest rate (%)	WB/IMF
16	Independent	Bank regulatory capital	Bank regulatory capital to risk-weighted assets (%)	WB/IMF
17	Independent	Value of collateral	Value of collateral needed for a loan (% of the loan amount)	WB/IMF
18	Independent	Region	Region Of the Establishment	WB/IMF
19	Independent	Firm type	Legal status of the firm	WB/IMF
20	Independent	ISIC code	ISIC code	WB/IMF
21	Independent	Imported inputs	Proportion of total inputs that are of foreign origin (%)	WB/IMF
22	Independent	External auditor	Percent of firms with annual financial statement reviewed by external auditor	WB/IMF
23	Independent	Number of workers	Number of workers	WB/IMF
24	Independent	Domestic private ownership	Proportion of private domestic ownership in a firm (%)	WB/IMF
25	Independent	Capacity utilisation	Capacity utilization (%)	WB/IMF
26	Independent	Foreign private ownership	Proportion of private foreign ownership in a firm (%)	WB/IMF
27	Independent	Domestic sales	Proportion of total sales that are domestic sales (%)	WB/IMF
28	Independent	Manager's experience	Years of the top manager's experience working in the firm's sector	WB/IMF
29	Independent	Firm age	Age (years)	WB/IMF
30	Independent	Exported directly	Proportion of total sales that are exported directly (%)	WB/IMF
31	Independent	Loans requiring collateral	Proportion of loans requiring collateral (%)	WB/IMF
32	Independent	Taxation as a constraint	Taxation as a constraint	WB/IMF

b. Domestic Non-Banking Sector

Table 6: Non-Banking Sector Variables

S/n	Type	Variable Name	Variable Definition	Source
1	Dependent	Dependent	Domestic market capitalisation	WB/IMF
2	Dependent	Independent	Direct debt investments	WB/IMF
3	Independent	Independent	High tech in manufacturing	WB/IMF
4	Independent	Independent	Direct liabilities investment	WB/IMF
5	Independent	Independent	Value of stocks traded	WB/IMF

S/n	Type	Variable Name	Variable Definition	Source
6	Independent	Independent	Broad money to GDP	WB/IMF
7	Independent	Independent	Real effective exchange rate	WB/IMF
8	Independent	Independent	Equity and investment fund shares	WB/IMF
9	Independent	Independent	Total reserves	WB/IMF
10	Independent	Independent	Inflation	WB/IMF
11	Independent	Independent	Lending interest rate	WB/IMF
12	Independent	Independent	Portfolio debt liabilities	WB/IMF
13	Independent	Independent	Insurance company assets	WB/IMF
14	Independent	Independent	Portfolio equity inflows	WB/IMF
15	Independent	Independent	Profit tax	WB/IMF
16	Independent	Independent	Annual sales	WB/IMF
17	Independent	Independent	Capacity utilisation	WB/IMF
18	Independent	Independent	ISIC code	WB/IMF
19	Independent	Independent	Manager's experience	WB/IMF
20	Independent	Independent	Imported inputs	WB/IMF
21	Independent	Independent	Firm type	WB/IMF
22	Independent	Independent	Firm age	WB/IMF
23	Independent	Independent	Foreign private ownership	WB/IMF
24	Independent	Independent	Number of workers	WB/IMF
25	Independent	Independent	External auditor	WB/IMF
26	Independent	Independent	Foreign technology	WB/IMF
27	Independent	Independent	Domestic listed firms	WB/IMF
28	Independent	Independent	Taxation as a constraint	WB/IMF
29	Independent	Independent	Introduced new product	WB/IMF
30	Independent	Independent	Not needing a loan	WB/IMF
31	Independent	Independent	Courts as a constraint	WB/IMF

c. Foreign Investment

Table 7: Foreign Investment Variables

S/n	Type	Variable Name	Variable Definition	Source
1	Dependent	Foreign private ownership	Proportion of private foreign ownership in a firm (%)	WB/IMF
2	Independent	Manufactures imports	Manufactures imports (% of merchandise imports)	WB/IMF
3	Independent	Domestic market capitalisation	Market capitalization of listed domestic companies (% of GDP)	WB/IMF
4	Independent	Reserves in months	Total reserves in months of imports	WB/IMF
5	Independent	Domestic bank credit	Domestic credit to private sector by banks (% of GDP)	WB/IMF
6	Independent	Unemployment rate	Unemployment, total (% of total labour force) (modelled ILO estimate)	WB/IMF
7	Independent	Real interest rate	Real interest rate (%)	WB/IMF
8	Independent	Non-resident banks	Loans from non-resident banks (amounts outstanding) to GDP (%)	WB/IMF
9	Independent	Final consumption expenditure	Final consumption expenditure (% of GDP)	WB/IMF
10	Independent	Export unit value	Export unit value index (2000 = 100)	WB/IMF
11	Independent	Inflation	Inflation, consumer prices (annual %)	WB/IMF
12	Independent	Remittance inflows	Remittance inflows to GDP (%)	WB/IMF
13	Independent	Taxes on trade	Taxes on international trade (% of revenue)	WB/IMF
14	Independent	Real effective exchange rate	Real effective exchange rate index (2010 = 100)	WB/IMF
15	Independent	Trade openness	Trade (% of GDP)	WB/IMF
16	Independent	Lending interest rate	Lending interest rate (%)	WB/IMF
17	Independent	Imported inputs	Proportion of total inputs that are of foreign origin (%)	WB/IMF
18	Independent	Profit tax	Profit tax (% of commercial profits)	WB/IMF
19	Independent	Firm type	Legal status of the firm	WB/IMF
20	Independent	Domestic sales	Proportion of total sales that are domestic sales (%)	WB/IMF
21	Independent	Number of workers	Number of workers	WB/IMF
22	Independent	Exported directly	Proportion of total sales that are exported directly (%)	WB/IMF
23	Independent	ISIC code	ISIC code	WB/IMF

S/n	Type	Variable Name	Variable Definition	Source
24	Independent	Foreign technology	Percent of firms using technology licensed from foreign companies	WB/IMF
25	Independent	Taxation as a constraint	Taxation as a constraint	WB/IMF
26	Independent	Manager's experience	Years of the top manager's experience working in the firm's sector	WB/IMF
27	Independent	Courts as a constraint	Courts as a constraint	WB/IMF

d. Foreign Aid

Table 8: Foreign Aid Variables

S/n	Type	Variable Name	Variable Definition	Source
1	Independent	ODA per capita	Net ODA received per capita (current US$)	WB/IMF
2	Independent	Claims on central government	Claims on central government, etc. (% GDP)	WB/IMF
3	Independent	Domestic bank credit	Domestic credit to private sector by banks (% of GDP)	WB/IMF
4	Independent	Reserves in months	Total reserves in months of imports	WB/IMF
5	Independent	Population growth	Population growth (annual %)	WB/IMF
6	Independent	HH and NPISHs consumption	Households and NPISHs final consumption expenditure (% of GDP)	WB/IMF
7	Independent	Remittance inflows	Remittance inflows to GDP (%)	WB/IMF
8	Independent	Inflation	Inflation, consumer prices (annual %)	WB/IMF
9	Independent	Real effective exchange rate	Real effective exchange rate index (2010 = 100)	WB/IMF
10	Independent	Imports	Imports of goods and services (% of GDP)	WB/IMF
11	Independent	Foreign direct investment	Foreign direct investment, net inflows (% of GDP)	WB/IMF
12	Independent	Employment to population ratio	Employment to population ratio, 15+, total (%) (national estimate)	WB/IMF
13	Independent	Export unit value	Export unit value index (2000 = 100)	WB/IMF
14	Independent	Total natural resources rents	Total natural resources rents (% of GDP)	WB/IMF
15	Independent	Labour force participation rate	Labor force participation rate for ages 15-24, total (%) (modelled ILO estimate)	WB/IMF
16	Independent	Unemployment rate	Unemployment, total (% of total labour force) (modelled ILO estimate)	WB/IMF

S/n	Type	Variable Name	Variable Definition	Source
17	Independent	MVA per capita	Manufacturing value added per capita (constant 2015 US)	WB/IMF
18	Independent	Compensation of employees	Compensation of employees (% of expense)	WB/IMF
19	Independent	Lending interest rate	Lending interest rate (%)	WB/IMF
20	Independent	Domestic market capitalisation	Market capitalization of listed domestic companies (% of GDP)	WB/IMF
21	Independent	Years of independence	Years of Independence	WB/IMF
22	Independent	Life expectancy	Life expectancy at birth, total (years)	WB/IMF
23	Independent	Number of heads of state	Number of Heads of State Since Independence	WB/IMF
24	Independent	Annual sales	Weighted price updated annual sales in USD	WB/IMF
25	Independent	Firm type	Legal status of the firm	WB/IMF

e. Public Sector

Table 9: Public Sector Variables

S/n	Type	Variable Name	Variable Definition	Source
1	Dependent	Government ownership	Proportion of government/state ownership in a firm (%)	WB/IMF
2	Independent	Real interest rate	Real interest rate (%)	WB/IMF
3	Independent	Manufacturing value added	Manufacturing, value added (% of GDP)	WB/IMF
4	Independent	Employment to population	Employment to population ratio, 15+, total (%) (modelled ILO estimate)	WB/IMF
5	Independent	ODA to GNI	Net ODA received (% of GNI)	WB/IMF
6	Independent	Reserves in months	Total reserves in months of imports	WB/IMF
7	Independent	Technical cooperation grants	Technical cooperation grants (BoP, current US$)	WB/IMF
8	Independent	Tax and contribution rate	Total tax and contribution rate (% of profit)	WB/IMF
9	Independent	Total natural resources rents	Total natural resources rents (% of GDP)	WB/IMF
10	Independent	ODA to government expense	Net ODA received (% of central government expense)	WB/IMF
11	Independent	Urban population	Urban population (% of total population)	WB/IMF
12	Independent	Number of heads of state	Number of Heads of State Since Independence	WB/IMF
13	Independent	ODA per capita	Net ODA received per capita (current US$)	WB/IMF

S/n	Type	Variable Name	Variable Definition	Source
14	Independent	Number of workers	Number of workers	WB/IMF
15	Independent	Foreign direct investment	Foreign direct investment, net inflows (% of GDP)	WB/IMF
16	Independent	Capacity utilisation	Capacity utilization (%)	WB/IMF
17	Independent	Unemployment rate	Unemployment, total (% of total labour force) (modelled ILO estimate)	WB/IMF
18	Independent	Lending interest rate	Lending interest rate (%)	WB/IMF

f. Households

Table 10: Households Variables

S/n	Type	Variable Name	Variable Definition	Source
1	Dependent	Domestic private ownership	Proportion of private domestic ownership in a firm (%)	WB/IMF
2	Independent	Largest owner proportion	Proportion of a firm held by the largest owner(s) (%)	WB/IMF
3	Independent	Employment to population ratio	Employment to population ratio, 15+, total (%) (national estimate)	WB/IMF
4	Independent	Domestic market capitalisation	Market capitalization of listed domestic companies (% of GDP)	WB/IMF
5	Independent	Labour force participation rate	Labor force participation rate for ages 15-24, total (%) (modelled ILO estimate)	WB/IMF
6	Independent	Real interest rate	Real interest rate (%)	WB/IMF
7	Independent	Urban population	Urban population (% of total population)	WB/IMF
8	Independent	Other business taxes	Other taxes payable by businesses (% of commercial profits)	WB/IMF
9	Independent	Tax and contribution rate	Total tax and contribution rate (% of profit)	WB/IMF
10	Independent	Inflation	Inflation, consumer prices (annual %)	WB/IMF
11	Independent	Domestic bank credit	Domestic credit to private sector by banks (% of GDP)	WB/IMF
12	Independent	Unemployment rate	Unemployment, total (% of total labour force) (modelled ILO estimate)	WB/IMF
13	Independent	Age dependency ratio	Age dependency ratio (% of working-age population)	WB/IMF
14	Independent	Taxes on trade	Taxes on international trade (% of revenue)	WB/IMF
15	Independent	Remittance inflows	Remittance inflows to GDP (%)	WB/IMF
16	Independent	Commercial bank branches	Commercial bank branches (per 100,000 adults)	WB/IMF

S/n	Type	Variable Name	Variable Definition	Source
17	Independent	Lending interest rate	Lending interest rate (%)	WB/IMF
18	Independent	Real effective exchange rate	Real effective exchange rate index (2010 = 100)	WB/IMF
19	Independent	Profit tax	Profit tax (% of commercial profits)	WB/IMF
20	Independent	Firm type	Legal status of the firm	WB/IMF
21	Independent	Region	Region Of the Establishment	WB/IMF
22	Independent	Domestic sales	Proportion of total sales that are domestic sales (%)	WB/IMF
23	Independent	Number of workers	Number of workers	WB/IMF
24	Independent	Not needing a loan	Percent of firms not needing a loan	WB/IMF
25	Independent	ISIC code	ISIC code	WB/IMF
26	Independent	Foreign technology	Percent of firms using technology licensed from foreign companies	WB/IMF
27	Independent	Taxation as a constraint	Taxation as a constraint	WB/IMF

4. Demand for Manufacturing Finance

a. Access to Working Capital Finance

Table 11: Access to Working Capital Finance Variables

S/n	Type	Variable Name	Variable Definition	Source
1	Dependent	Access to working capital finance	Bank and non-bank financed working capital	WB/IMF
2	Independent	Region	Region f the Establishment	WB/IMF
3	Independent	Real effective exchange rate	Real effective exchange rate index (2010 = 100)	WB/IMF
4	Independent	Lending interest rate	Lending interest rate (%)	WB/IMF
5	Independent	Reserves in months	Total reserves in months of imports	WB/IMF
6	Independent	Commercial bank branches	Commercial bank branches (per 100,000 adults)	WB/IMF
7	Independent	Domestic bank credit	Domestic credit to private sector by banks (% of GDP)	WB/IMF
8	Independent	Broad money to GDP	Broad money (% of GDP)	WB/IMF
9	Independent	Liquid liabilities	Liquid liabilities to GDP (%)	WB/IMF
10	Independent	Foreign direct investment	Foreign direct investment, net inflows (% of GDP)	WB/IMF

S/n	Type	Variable Name	Variable Definition	Source
11	Independent	Financial system deposits	Financial System deposits to GDP (%)	WB/IMF
12	Independent	Domestic market capitalisation	Market capitalization of listed domestic companies (% of GDP)	WB/IMF
13	Independent	Total natural resources rents	Total natural resources rents (% of GDP)	WB/IMF
14	Independent	ATMs	Automated teller machines (ATMs) (per 100,000 adults)	WB/IMF
15	Independent	Remittance inflows	Remittance inflows to GDP (%)	WB/IMF
16	Independent	ISIC code	ISIC code	WB/IMF
17	Independent	Firm age	Age (years)	WB/IMF
18	Independent	Number of workers	Number of workers	WB/IMF
19	Independent	Capacity utilisation	Capacity utilization (%)	WB/IMF
20	Independent	Firm type	Legal status of the firm	WB/IMF
21	Independent	Annual sales	Weighted price updated annual sales in USD	WB/IMF
22	Independent	Legal origin	Legal Origin	WB/IMF
23	Independent	Imported inputs	Proportion of total inputs that are of foreign origin (%)	WB/IMF
24	Independent	Domestic sales	Proportion of total sales that are domestic sales (%)	WB/IMF
25	Independent	Exported directly	Proportion of total sales that are exported directly (%)	WB/IMF
26	Independent	Domestic private ownership	Proportion of private domestic ownership in a firm (%)	WB/IMF
27	Independent	External auditor	Percent of firms with annual financial statement reviewed by external auditor	WB/IMF
28	Independent	Corruption as obstacle	Corruption	WB/IMF
29	Independent	Taxation as a constraint	Taxation as a constraint	WB/IMF
30	Independent	Courts as a constraint	Courts as a constraint	WB/IMF

b. Access to Investment Finance

Table 12: Access to Investment Finance Variables

S/n	Type	Variable Name	Variable Definition	Source
1	Dependent	Access to investment finance	Bank and non-bank financed investment	WB/IMF
2	Independent	Real effective exchange rate	Real effective exchange rate index (2010 = 100)	WB/IMF
3	Independent	Firm age	Age (years)	WB/IMF

S/n	Type	Variable Name	Variable Definition	Source
4	Independent	Commercial bank branches	Commercial bank branches (per 100,000 adults)	WB/IMF
5	Independent	ISIC code	ISIC code	WB/IMF
6	Independent	Lending interest rate	Lending interest rate (%)	WB/IMF
7	Independent	Reserves in months	Total reserves in months of imports	WB/IMF
8	Independent	Region	Region Of The Establishment	WB/IMF
9	Independent	Broad money to GDP	Broad money (% of GDP)	WB/IMF
10	Independent	Liquid liabilities	Liquid liabilities to GDP (%)	WB/IMF
11	Independent	Number of workers	Number of workers	WB/IMF
12	Independent	Financial system deposits	Financial System deposits to GDP (%)	WB/IMF
13	Independent	Foreign direct investment	Foreign direct investment, net inflows (% of GDP)	WB/IMF
14	Independent	Domestic bank credit	Domestic credit to private sector by banks (% of GDP)	WB/IMF
15	Independent	Total natural resources rents	Total natural resources rents (% of GDP)	WB/IMF
16	Independent	Capacity utilisation	Capacity utilization (%)	WB/IMF
17	Independent	Domestic market capitalisation	Market capitalization of listed domestic companies (% of GDP)	WB/IMF
18	Independent	Remittance inflows	Remittance inflows to GDP (%)	WB/IMF
19	Independent	ATMs	Automated teller machines (ATMs) (per 100,000 adults)	WB/IMF
20	Independent	Firm type	Legal status of the firm	WB/IMF
21	Independent	Domestic sales	Proportion of total sales that are domestic sales (%)	WB/IMF
22	Independent	Imported inputs	Proportion of total inputs that are of foreign origin (%)	WB/IMF
23	Independent	Exported directly	Proportion of total sales that are exported directly (%)	WB/IMF
24	Independent	Annual sales	Weighted price updated annual sales in USD	WB/IMF
25	Independent	Domestic private ownership	Proportion of private domestic ownership in a firm (%)	WB/IMF
26	Independent	Corruption as obstacle	Corruption	WB/IMF
27	Independent	Taxation as a constraint	Taxation as a constraint	WB/IMF
28	Independent	External auditor	Percent of firms with annual financial statement reviewed by external auditor	WB/IMF
29	Independent	Legal origin	Legal Origin	WB/IMF
30	Independent	Foreign technology	Percent of firms using technology licensed from foreign companies	WB/IMF

S/n	Type	Variable Name	Variable Definition	Source
31	Independent	Courts as a constraint	Courts as a constraint	WB/IMF

c. Start-Up Investment

See tables 7 and 10.

1.9. Organisation of the Thesis

This thesis is organised into six chapters. The rest of the chapters are arranged as follows. Chapter Two presents the literature review detailing the definitional framework and current knowledge on manufacturing finance and the synthesis therefrom. Chapter three follows with the methodology, highlighting the mathematical and empirical models, data as well as the estimation techniques. Chapter four then presents the data analysis and interpretation of the results with Chapter five discussing these results. Chapter six then concludes, presenting an objective conclusion along with policy recommendations and study limitations.

CHAPTER II. LITERATURE REVIEW

2.1. Introduction

This section presents the study literature review, divided into six sections: overview of manufacturing finance, comparative analysis between Zambia and NICs, empirical review, critique of existing literature, lessons learnt and a chapter summary. The overview of manufacturing finance gives the scope and context in which manufacturing finance is used. The comparative analysis juxtapositions Zambia and NICs to expose the policy contextual similarities and differences. The empirical review presents studies on manufacturing finance with the critique thereafter highlighting its shortcomings. The empirical review is presented in three main themes: manufacturing development, supply of manufacturing finance and demand for manufacturing finance. The supply and demand aspects are presented in further subsections. Specifically, the supply side studies are presented in nine dimensions, the system aspects: financial, political and legal systems, and the sources: banking sector, non-banking sector, public sector, foreign investment, foreign aid and households. The demand side presents studies focused on manufacturing firm access to finance. The lessons learnt section then presents the key takeaways from extant literature with a chapter summary following thereafter.

2.2. Overview of Manufacturing Finance

2.2.1. Structural Transformation, Industrialisation and Manufacturing Development

Three related but distinct terms are sometimes confused in literature, structural transformation, industrialisation, and manufacturing development. Structural transformation is "the reallocation of economic activity across the broad sectors agriculture, manufacturing, and services" (Herrendorf et al., 2014, p. 855), whereas industrialisation "refers to the sustained structural transformation of a traditional economy into a modern economy driven by high-productivity activities in manufacturing" (Naudé & Szirmai, 2013, p. 3). Further, manufacturing may be defined as "the act of transforming, on a commercial scale, raw materials into finished or semi-finished products and includes the assembly of inputs into finished or semi-finished products" (GRZ, 2018, p. 6). In this view, manufacturing development may be seen as a narrower component within industrialisation that involves an increase in output, intersectoral linkages and depth in manufacturing sectors.

Manufacturing sectors here, as in mainstream literature, includes firms whose principal activities lie within divisions 10 to 33 of the fourth revision of the International Standard Classification of All Economic Activities (ISIC) (Gui-Diby & Renard, 2015; United Nations, 2008).

2.2.2. Financial Systems, Financial Development and Manufacturing Finance

Financial systems may be defined as "institutional arrangements designed to transfer savings from those who generate them to those who are willing to make use of them, above all wishing to invest, on terms and conditions inclusive of the degree of percentage risk mutually acceptable to both parties" (Rybczynski, 1983, p. 2). The financial sector may further be defined as the "subsector of the economy concerned with and related to financial, banking , and monetary matters and provision of banking and financial services to commercial and retail customers, including banks, investment funds, and capital markets" (GRZ, 2017, p. x). There are notably three parts to a financial system: collection of financial resources in form of savings and deposits, issue and trade in securities as well as supporting functions such as those providing hedging facilities (Rybczynski, 1983). Examples of financial resource collection institutions are deposit taking and investment establishments, securities trading institutions include stock exchanges and brokerage firms while support institutions include futures markets and financial advisories.

The growth of such financial systems, normally referred to as financial development can be seen as a gradual and multidimensional process involving political processes and strong institutional frameworks to increase the size, depth and participation in the financial sector (Beck & Feyen, 2013). Closely related to financial development is financial liberalisation, which refers to the deregulation of financial markets. The two terms have become indistinguishable to the extent that they are used synonymously in the literature, as strong cases have been made that financial development is necessary for financial liberalisation (Odhiambo, 2007). Financing for manufacturing development, here on, manufacturing finance, refers to mechanisms and systems used to channel financial resources to the development of the manufacturing sector. It therefore includes any finance utilised within manufacturing, covering; pre-launch expenses, construction, working capital, research and development and investment.

2.2.3. Types and Sources of Manufacturing Finance

Manufacturing finance can be categorized into two types: working capital and investment finance. The former is used to finance current assets for operational purposes while the latter relates to the procurement of fixed assets or capital goods (Kadarova et al., 2015). Working capital and investment finance may further be distinguished by tenor and size. While working capital finance carries shorter tenors, is associated with the production cycle and wields relatively smaller amounts, investment finance carries longer tenors and relatively larger amounts (Kadarova et al., 2015). Typical uses of working capital finance include, purchase of inputs, rent payments and payments of salaries among others while investment finance may be used to purchase assets such as land, machinery and buildings.

As shown in table 13 below, literature identifies nine sources of manufacturing finance, namely: foreign aid, foreign direct investment, foreign debt, domestic credit, sovereign wealth funds, capital markets, internal (firm) and household savings, public sector development finance and remittances.(Benmamoun & Lehnert, 2013; Cho, 2002; El-haddad, 2010; Fischer, 2018; Inanga & Mandah, 2008; Lee, 2019; Mendes et al., 2014)(Aizenman & Sushko, 2011; Aziakpono, 2011; Benmamoun & Lehnert, 2013; Fischer, 2018; Lee, 2019; Mendes et al., 2014; Tyson, 2017; Weiss, 2005)(Cho, 2002; Fischer, 2018; Lee, 2019; Mendes et al., 2014; Tyson, 2017)(Cho, 2002; Das, 2015; El-haddad, 2010; Lazonick & O'Sullivan, 1997a; Lee, 2019; Tyson, 2017; Weiss, 2005)(Chen, 2019; Hove, 2016; Reddy, 2019; Santiso, 2008)(Das, 2015; El-haddad, 2010; Lazonick & O'Sullivan, 1997b, 1997a; Levine, 2005; Tyson, 2017)(Lazonick & O'Sullivan, 1997a; Lee, 2019)(Cho, 2002; Das, 2015; Lazonick & O'Sullivan, 1997a; Lee, 2019; Mendes et al., 2014; Tyson, 2017)(Benmamoun & Lehnert, 2013; Tyson, 2017)

Table 13: Sources of Manufacturing Finance

S/n	Source	Supporting Literature
1	Foreign aid	Benmamoun and Lehnert (2013), Cho (2002), El-haddad (2010), Fischer (2018), Inanga and Mandah (2008), Lee (2019) and Mendes et al. (2014).
2	Foreign direct investment	Aizenman and Sushko (2011) Aziakpono (2011), Benmamoun and Lehnert (2013), Fischer (2018), Lee

S/n	Source	Supporting Literature
		(2019), Mendes et al. (2014), Tyson (2017) and Weiss (2005).
3	Foreign debt	((Cho, 2002; Fischer, 2018; Lee, 2019; Mendes et al., 2014; Tyson, 2017).
4	Domestic credit	Cho (2002), Das (2015), El-haddad (2010), Lazonick and O'Sullivan (1997a), Lee (2019), Tyson (2017) and Weiss (2005).
5	Sovereign wealth funds	Chen (2019), Hove (2016), Reddy (2019) and Santiso (2008).
6	Capital markets	Das (2015), El-haddad (2010), Lazonick and O'Sullivan (1997b), Lazonick and O'Sullivan (1997a), Levine (2005) and Tyson (2017).
7	Internal (firm) and household savings	Lazonick and O'Sullivan (1997a) and Lee (2019).
8	Public sector development finance	Cho (2002), Das (2015), Lazonick and O'Sullivan (1997a), Lee (2019), Mendes et al. (2014) and Tyson (2017).
9	Remittances	Benmamoun and Lehnert (2013) and Tyson (2017).

2.3. Zambia Vs NICs

Three categories of industrialised countries may be benchmarked on for policy learning and adoption: early industrialisers such as Britain, NICs such as South Korea and "Partially Industrialised" countries such as Egypt. By elimination, the "Partially Industrialised" countries present the most flaws of the three categories as they do not sufficiently cross into the "Optimal Economic Systems" threshold. The early industrialisers industrialised in an era significantly different from the prevailing one and as such do not provide benchmark lessons directly applicable to modern era industrialisation efforts. Such differences include the emergence of multilateral trade agreements and stricter global financial standards and regulation. This returns NICs as the best option on which to benchmark Zambia (Chansa et al., 2019; El-haddad, 2010; Lee, 2019; Romana

& Leonardo, 2014; Weiss, 2005). An equally strong case can be made that NICs present a more recent and quicker industrialisation model relative to both early industrialisers and the partially industrialised countries (Behera, 2015; Tsaurai, 2018).

NICs may be defined as countries that have outpaced developing countries through accelerated industrialisation but have not yet reached full developed country status (Behera, 2015). They may also be defined as rapidly growing export-oriented economies. Such countries include South Korea, Thailand, Turkey, Philippines, Indonesia, South Africa, Mexico, Brazil, India and Malaysia and can be selected based on various criteria but should possess the property of having experienced accelerated industrialisation and transformation (Behera, 2015; Tsaurai, 2018). Specific NICs on which to benchmark should further be selected based on similarities and compatibility for policy transferability. Special attention is generally given to South Korea as it is viewed as a paragon not just in industrialisation but overall development as well, with some scholars going so far as to argue that all economic development theory over the last half century be matched against South Korea to prove validity (Lindauer & Pritchett, 2002). A historical account of South Korea's multidimensional development can be found in Lew (2000).

In this view, this section presents a prima facie comparative analysis between Zambia and NICs to understand the similarities and compatibilities and highlight the performance gaps. Specifically, the section provides the historical performances and characteristics of Zambia and selected NICs under the previously highlighted eleven manufacturing finance themes. While background analysis involved a broader spectrum of NICs, only seven are presented for a more focused illustration, selected based on their similarity and policy context transferability. These include, India, Indonesia, Malaysia, Philippines, Singapore, South Africa and South Korea, with South Korea receiving special attention as proposed by Lindauer and Pritchett (2002).

2.3.1. Economic Growth and Manufacturing Development

2.3.1.1. Economic Growth

At independence, Zambia's GDP per capita in 2010 USD constant prices stood at 1,519; with a rank of fourth among the eight countries, carried 77.7 percent of the group average and was 37.5 percent greater than South Korea. This ranking however changed halfway into independence with

Zambia reporting the second worst GDP per capita at USD 975, carrying only 16 percent of the group average with South Korea now 10 times greater than Zambia. A further 27 years and Zambia reported the worst statistic among the eight countries carrying only 11 percent of the group's average with USD 1,653.8 and now 17 times lesser than South Korea. Over the sample period, Zambia ranked seventh among the eight countries with USD 1,310 and carried 18.6 percent of the group average (World Bank, 2021b). Panel (a) of figure 4 below highlights the trends over the period 1964 – 2019.

The progression of developing countries relative to developed ones can be analysed in two ways: sigma convergence and beta catchup. Beta catch up is when less developed countries grow faster than developed countries with the beta coefficient showing the percentage distance covered towards the steady state in each period (Rapacki & Próchniak, 2009). Sigma convergence on the other hand occurs when the difference in incomes between two countries reduces over time, measured by the standard deviation between two countries (Rapacki & Próchniak, 2009). With Lamperti & Mattei (2018) arguing that stable growth is rare in developing countries due to the generally equal alternations between long expansions and long recessions, sigma convergence is naturally limited. This limitation is further exacerbated in resource rich countries such as Zambia due to commodity price booms and busts (Stuermer, 2017).

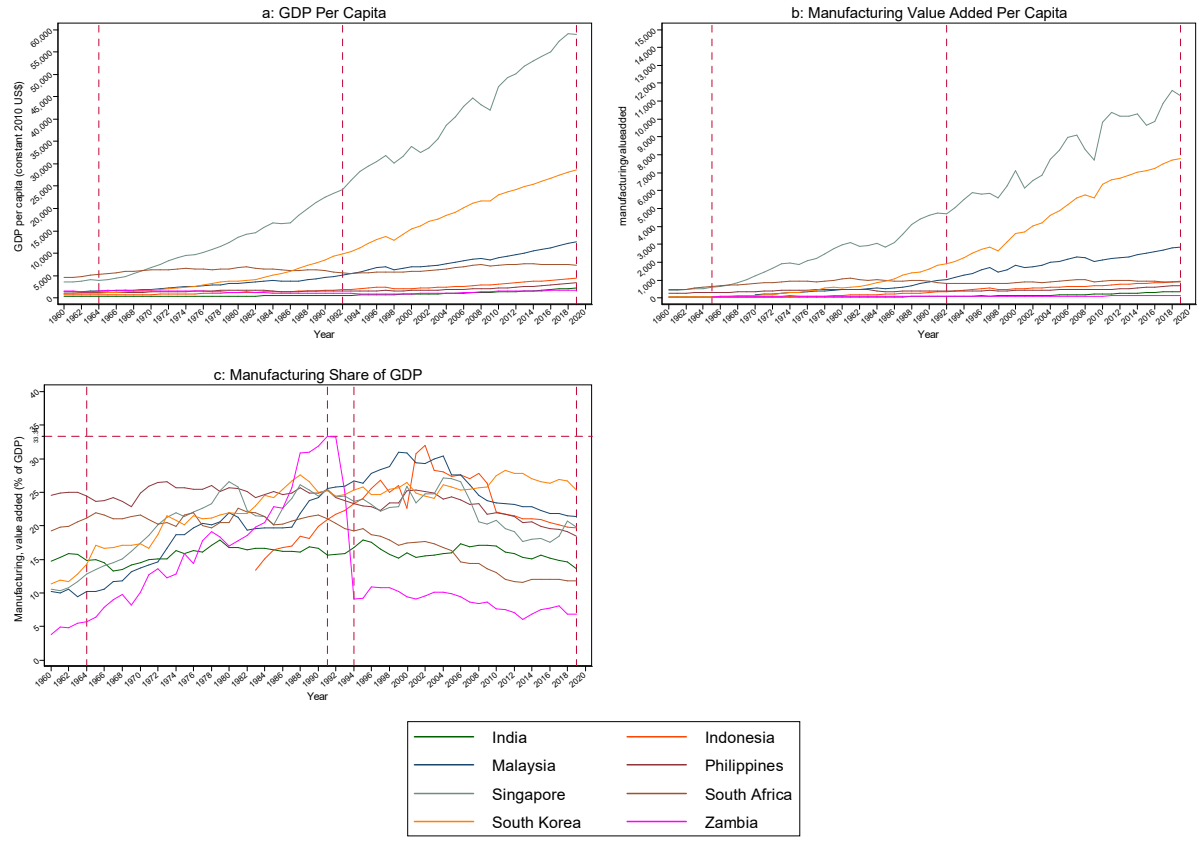
Furthermore, new structural economics in its comparative advantage following case argues that latecomers can catchup only through their comparative advantage. Specifically, while following a lead goose that has a similar income level and endowment structure, latecomers can use their comparative advantage while reducing the costs of innovation (Chandra et al., 2013). In support, Rekiso (2017) argues that no country has ever industrialised through static comparative advantage but rather through dynamic comparative advantage. Further still, while East Asian countries followed their comparative advantage, some African and Latin American countries attempted comparative advantage defying industrialisation that prioritised capital intensive industries when capital was in limited supply, leading to the lukewarm Import Substitution Industrialisation (ISI) performance (Chandra et al., 2013). In addition, with China losing its comparative advantage in part due to wage increases, developing countries with this property can expand their manufacturing sector through labour intensive technology (Chandra et al., 2013). The foregoing thus generates a case for benchmarking Zambia against NICs for expedient sigma convergence.

2.3.1.2. Manufacturing Development

As regards manufacturing, a year after independence, Zambia's manufacturing value added per capita in 2010 USD constant prices ranked fifth among the selected NICs (excluding Malaysia, missing data) with USD 65 carrying about 26 percent of the average and only USD 4.41 behind South Korea. By 1992, Zambia's rank shifted to seventh out of the eight with USD 111.45 carrying less than 10 percent of the group average with South Korea now 17 times greater than Zambia. By 2019, Zambia's rank deteriorated to eighth with USD 134, representing 4.33 percent of the group average with South Korea now more than 57 times Zambia's performance. Over the sample period, 1965 – 2019, Zambia ranked eighth with USD 103, representing 7 percent of the group average (World Bank, 2021b). Panel (b) of figure 4 below summarises these trends.

Another commonly used measure of manufacturing development is the share of manufacturing value added in GDP. By this measure, at independence, Zambia recorded the worst performance among the selected countries (Indonesia data missing), with 5.7 percent, carrying 38.5 percent of the average and 2.5 times less than South Korea. By 1991, Zambia's share of manufacturing in GDP rose to 33.3 percent, ranked first among the eight countries, carrying 138.5 percent of the group average and was 32 percent greater than South Korea. Zambia's 1991 performance was by 2019 the highest recorded among the eight countries. Due to the privatisation process however, by 1994, Zambia's rank had slipped to eighth with manufacturing carrying 9.1 percent of its GDP, carrying 43.5 percent of the group average and 2.8 times less than South Korea. Zambia's performance has undulated since, slumping to 6.8 percent in 2019, maintaining the eighth seed, carrying 39.7 percent of the group average and the South Korea differential declining to 3.7 times less. Over the analysis period, Zambia averaged 13.7 percent, retaining the worst rank and carrying 68 percent of the group average (World Bank, 2021b). Panel (c) of figure 4 below shows the trends over the sample period.

Figure 4: Zambia Vs NICs: GDP & Manufacturing



Zambia Vs NICs: GDP & Manufacturing, Data Source: World Bank (2021)

It is well established that dynamic upgrading of the industrial sector is necessary for economic development (Chandra et al., 2013; Rekiso, 2017). Specifically, the manufacturing sector acts as a centre piece for national development because it carries features necessary for well-founded and deep-rooted development (Rekiso, 2017), these include: (1) high division of labour, (2) room for innovation, (3) high growth, (4) capacity for technological development, (5) increasing returns to scale and (6) strong sectoral linkages. Evidently, among NICs, manufacturing received most of the rents with Weiss (2005) calling the creation of such rents to promote manufacturing and exports, industrial policy. As such, industrialisation in late comers requires transformative industrial policy that moves the economic structure from low quality output to higher quality output (Rekiso, 2017). Chandra et al. (2013) reproduce Kuznets' facts on structural transformation, noting firstly observed increases in the non-agricultural share of the economy which is then mirrored by the employment structure shift. Further, rural-urban migration follows, coupled with an increase in the capital-labour ratio in the non-agricultural sector. It has conversely also been argued that resource rich

countries that attain middle income status without manufacturing development rarely sustain such growth (Chandra et al., 2013).

As regards technology's influence on industrial development, Landini et al. (2017) and Lee et al. (2016), find that industrial catchup is partly determined by the sectoral technological regimes with government and firm policies playing significant roles in harnessing technology into global industry leadership. Further, industrial leadership changes among countries occur because of the capitalism inspired creative destruction (Landini et al., 2017), with incumbent industry leaders generally not sharing the latest technologies with latecomers that threaten their standing (Lee et al., 2016). The 1700s UK industrial revolution did for instance not spread due to laws prohibiting skill and technology transfer (Chandra et al., 2013).

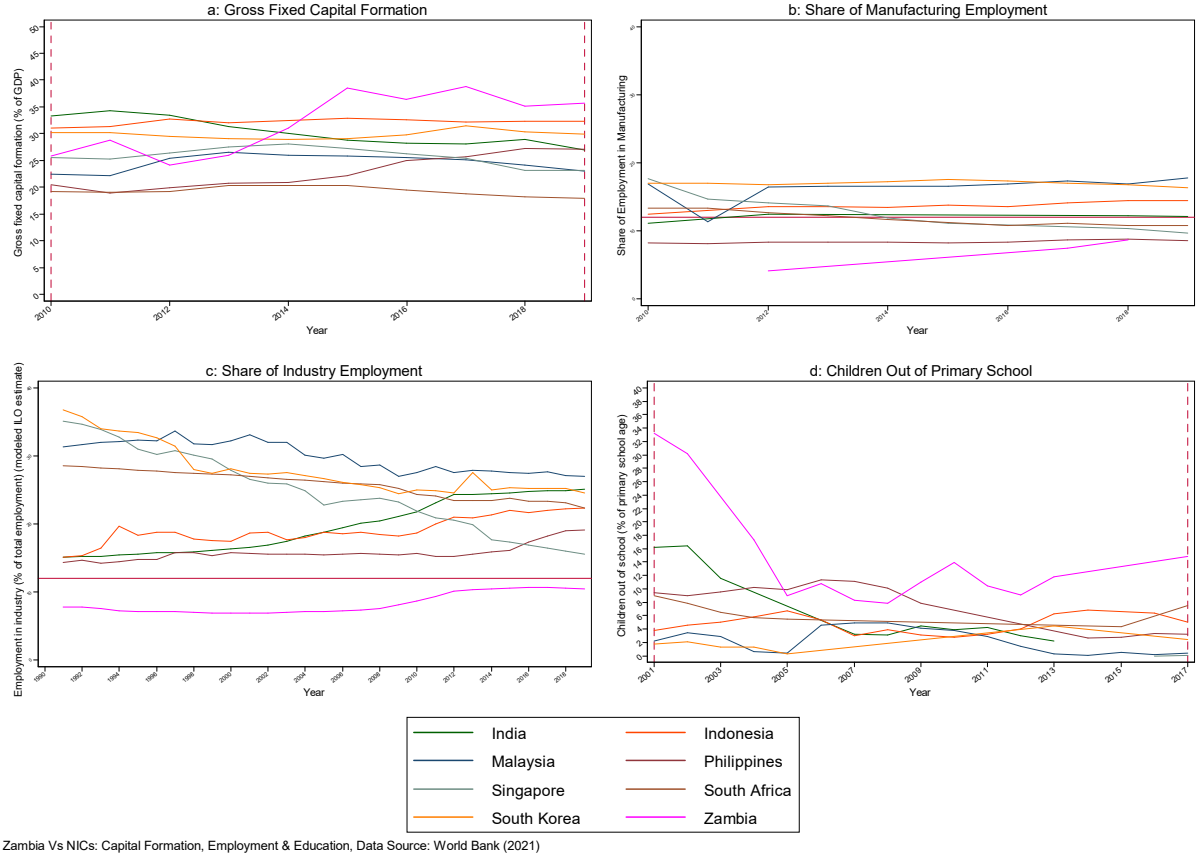
2.3.1.3. Capital Formation, Employment and Education

As regards capital formation (or simply capital), data on gross fixed capital formation on Zambia was at the time of writing only available from 2010 – 2019. In 2010, Zambia's gross fixed capital formation share of GDP stood at 25.9 percent with a rank of four, carrying 99.6 percent of the group average and 86 percent that of South Korea. In 2019, Zambia's rank improved to first place with 35.8 percent, carrying 132.4 percent of the group average and 1.2 times that of South Korea. Over the reference period, 2010 – 2019, Zambia averaged 32 percent with a rank of second and carried 118 percent of the group mean. It can however be presumed that Zambia's relatively smaller GDP contributed to this stellar relative performance (World Bank, 2021). Panel (a) of figure 5 below shows these trends for the reference period.

With reference to the share of manufacturing employment in total employment, over the period 2012 – 2018 for which data was available for all eight countries, Zambia had the least performance with 4.12 percent in 2012, carrying 33.5 percent of the group average and four times lesser than South Korea. While seeing improvement in 2018 with 8.7 percent, Zambia only carried 70 percent of the group average and was about two times lesser than South Korea. In looking at broad industry, including mining and quarrying, construction, electricity, gas and water, over the period 1991 – 2019 for which data was available for all eight countries; Zambia's broad industry share of employment stood at 7.86 percent in 1991, carrying 23.1 percent of the group mean and 4.7 times lesser than South Korea. In 2019, seeing some mild improvement, Zambia's statistic stood at 10.5

percent, carried 50.6 percent of the group average and was 2.3 times lesser than South Korea. Over the respective reference periods, Zambia averaged 7.6 percent in manufacturing share of total employment and 8.3 percent in broad industry, representing 12 percent and 21 percent of the group averages respectively but retained the worst rank in both cases (World Bank, 2021). These trends clearly show that Zambia lagged significantly in the manufacturing and industry employment levels, presumably inhibiting further manufacturing and industry growth but certainly pointing to the need to learn from NICs. Panels (b) and (c) of figure 5 below show the trends of the two indicators over the period 1991 – 2019.

Figure 5: Zambia Vs NICs: Capital, Employment & Education



Zambia Vs NICs: Capital Formation, Employment & Education, Data Source: World Bank (2021)

The most appropriate measure of labour for this study may be the share of the labour force with basic education, due to data incompleteness however children out of primary school as a share of primary school age is used, albeit with some missing data in between years. In 2001, Zambia's children out of primary school share ranked seventh (Singapore data missing) with 33 percent,

representing 307.4 percent of the group average and 18 times that of South Korea. By 2017, Zambia's performance had worsened to 44 percent, maintained the rank of seventh (India data missing), carried 310 percent of the group average and was 6 times that of South Korea. Over the reference period, 2001 – 2017, Zambia averaged 14.5 percent, ranked eighth and carried 259 percent of the group average (World Bank, 2021). As in the case of manufacturing and industry employment, the level of education in Zambia appears significantly lower than NICs, necessitating policy learning efforts for enhanced manufacturing development and its associated manufacturing finance. Panel (d) of figure 5 above shows the trends over the reference period.

2.3.2. Financial Systems

In comparing financial system effects on manufacturing finance, five aspects are considered: inflation, real effective exchange rate, real interest rate, credit to the private sector and financial sector reach.

In 1986, Zambia recorded 55.8 percent inflation, ranking the highest among the eight countries, carrying 483 percent of the group average and 20 times that of South Korea. Seven years later during liberalisation, inflation rose to 183 percent, maintained highest rank and rose to 38 times that of South Korea. While still maintaining the highest rank, 2019 inflation in Zambia dropped to 9.2 percent, carrying 260.9 percent of the group average and 23.9 times that of South Korea. Over the reference period 1986 – 2019, Zambia averaged 45 percent and was 5 times the group average (World Bank, 2021). Expectedly, inflation this high and unstable has been detrimental to Zambia's manufacturing finance especially through the domestic sources channel. Panel (a) of figure 6 below highlights the trends over the reference period.

As regards exchange rate, in 1990, Zambia's real effective exchange rate stood at 53, ranking sixth (India and Indonesia missing data), carrying 52 percent of the average and 2.5 lesser than South Korea. In 2008, Zambia moved to the top of the pack with 112.6, carried 113.8 percent of the group average and was about 4 percent greater than South Korea. In 2019, Zambia ranked fifth with 79.4, carrying 78.9 percent of the group average and 1.9 times lesser than South Korea. Over the reference period, 1990 – 2019, Zambia's real effective exchange rate volatility ranked Second, 1.4 times more volatile than the group average (World Bank, 2021). The foregoing has evidently

destabilised Zambia's manufacturing finance, especially through the international sources channel. Panel (b) of figure 6 below shows the trends over the reference period.

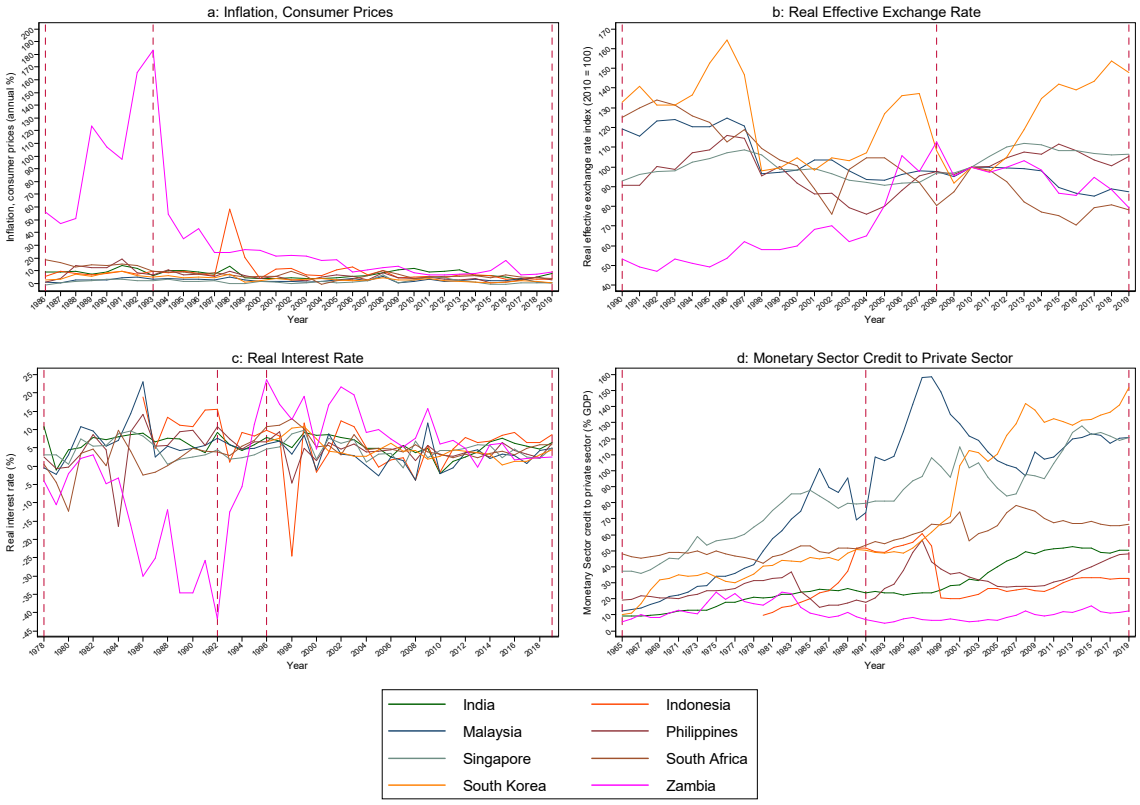
With reference to real interest rate, in 1978, Zambia's rate stood at -3.9 percent, ranked sixth (South Korea and Indonesia data missing) and carried -191.9 percent of the group average. In 1992, Zambia's rate slipped to -41.8 with the seventh rank (South Korea data missing) and carried -3, 079.1 percent of the group average. Two years later, Zambia's rate shot to 23.8 percent ranking first, carrying 249 percent of the group average and 3.5 times greater than South Korea. By 2019, Zambia had slipped to eighth rank with 2.5 percent, carrying 44.9 percent of the group average and 1.8 times lesser than South Korea. Over this reference period, for which all countries had data, 1996 – 2019, Zambia's volatility ranked second, 1.8 times more volatile than the group average (World Bank, 2021). As expected, unstable and high domestic interest rates discourage savings and investment and have thus been detrimental to Zambia's manufacturing finance. Panel (c) of figure 6 below shows the trends over the period, 1978 – 2019.

In assessing credit to the private sector, a year after independence, Zambia's monetary sector credit to the private sector as a share of GDP stood at 5.6 percent, retained the seventh rank (Indonesia data missing), carried 27.8 percent of the group average and was 1.8 times lesser than South Korea. In 1991, Zambia's rank was maintained at seventh (South Africa data missing) with 7.3 percent, carrying 16.7 percent of the group average and 6.9 times lesser than South Korea. In 2019, Zambia's rank slipped to eighth with 12.5 percent, carrying 16.6 percent of the group average and now 12 times lesser than South Korea. Over the reference period, 1965 – 2019, Zambia averaged 11.4 percent with a rank of eighth and carried 23 percent of the group average, directly negatively affecting the amount of credit going to the manufacturing sector (World Bank, 2021). Panel (d) of figure 6 below shows the trend over the reference period.

As regards Commercial Bank accessibility, in 2004, Zambia had about 3.03 Bank branches for every 100,000 adults, ranking eighth, carrying 33.5 percent of the group average and was 5.5 times lesser than South Korea. In 2019, Zambia maintained the worst rank, carrying 10.7 percent of the group average with 3.29 Bank branches and now 4.6 times lesser than South Korea. Over the reference period, 2004 – 2019, Zambia averaged 3.9 branches, maintained a rank of eighth and carried 38.1 percent of the group average (World Bank, 2021). This outcome too negatively

affected manufacturing finance as Zambia's financial sector is bank dominated. With limited bank accessibility, savers and borrowers are unable to contribute to manufacturing finance growth. Panel (a) of figure 7 below highlights the trends over the reference period.

Figure 6: Zambia Vs NICs: Inflation, REER, RIR & Monetary Sector Credit

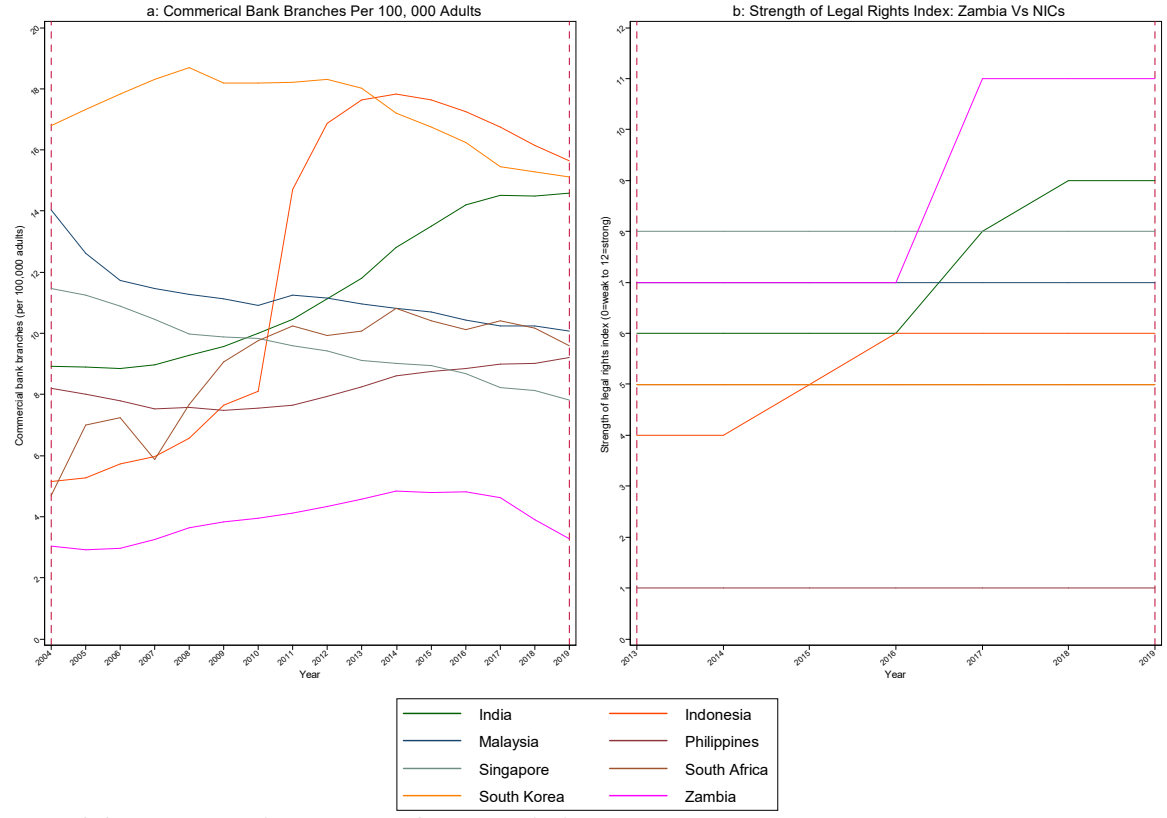


Zambia Vs NICs: Inflation, REER, RIR & Monetary Sector Credit, Data Source: World Bank (2021)

Based on the above trends, Zambia's financial system and its associated policies have not yield positive effects on manufacturing finance and its associated manufacturing development. The effectiveness of this system may be disaggregated into two components: the structure of the financial system and financial sector policies. Financial structure and development however have direct effects on the effectiveness of financial sector policy on output and inflation (Ma & Lin, 2016). Further, the structure of financial services supervision, a subcomponent of financial structure, has significant effects on the quality of financial services as well as financial development and stability (Melecky & Maria, 2013). Furthermore, the effectiveness of financial sector policy is itself reliant on financial market liquidity and depth (Beck & Feyen, 2013). It is also worth noting that, financial globalisation too has effects on the effectiveness of financial sector

policy in two opposing directions, external balance sheet valuation and global financial cycles (Georgiadis & Mehl, 2016).

Figure 7: Zambia Vs NICs: Commercial Bank Branches & Legal Rights Index



Zambia Vs NICs: Commercial Bank Branches & Legal RIghts Index, Data Source: World Bank (2021)

While generally positive, the financial system pursuit of financial development is not without problems as this non-linear development process is filled with risks and contingencies (Beck & Feyen, 2013; Maimbo & Melecky, 2016), a key area of concern for policy makers. Further, ensuring sustainable financial development and the resultant increases in investment requires the optimisation of both demand and supply side efficiencies (Beck & Feyen, 2013). It should also be noted that the demand side through financial inclusion stands to enhance the supply side aspects such as stability by offering greater and diversified domestic savings (Maimbo & Melecky, 2016), the converse is also true – supply side factors stand to enhance demand. On the contrary, self-exclusion and lack of investible projects on the demand side and idiosyncratic risks and high costs on the supply side serve to reduce financial sector efficiency, manufacturing finance along with it (Beck & Feyen, 2013).

Resource rich developing countries, such as Zambia pose additional challenges in financial sector regulation as a tool for financial development. Specifically, the volatility of commodity prices increases financial sector risks, high costs of capital inhibit access to finance and further, increased foreign ownership of the banking system enhances the policy trade-off between financial development and risk management (Beck & Feyen, 2013; Maimbo & Melecky, 2016). The foregoing notwithstanding, effective financing of new industries and technology requires evolution of financing mechanisms (Mikheeva, 2019).

2.3.3. Political Systems

Political structures in most countries provide strategic economic direction. This is true for NICs and Zambia where, elected officials be it presidents, heads of state or parliamentary type bodies guide fiscal policy and appoint heads of monetary policy institutions. In this way, political systems are critical to manufacturing finance due to their influence on taxation and financial sector policy. As such, political systems play a significant role in policy context transferability. What follows are therefore high-level political system snippets on each of the eight study countries aimed to expose the system differences and similarities.

Zambia got independence from British colonial rule in 1964, maintained a one-party system thereafter until a switch to multi-party politics in 1991. The country has had seven democratically elected presidents over a 57-year period. South Korea got its independence from Japanese occupation in 1945 and then underwent the Korean War with its counterpart, North Korea over the period 1950 – 1953. The country has alternated between democratic and autocratic politics, culminating into six republics and twelve heads of state over the 73-year period. India got its independence from British rule in 1947, has maintained a parliamentary democratic republic composed of a President headed State and Prime Minister headed government. The country has had 14 Presidents and 15 Prime Ministers over the 74-year period. Indonesia got its independence from the Netherlands in 1945, has maintained a multi-party system in which the president is both head of state and head of government. The country has had 7 presidents over the 76-year period. Philippines got its independence from the United States in 1946, has maintained a multi-party system in which the president is both head of state and head of government. The country has had 12 presidents over the 75-year period. Malaysia got its independence from the United Kingdom in

1957, has maintained a constitutional monarchy and representative democracy in which the Monarch is the head of state, and his/her appointed prime minister is the head of government. The country has had 8 prime ministers over the 64-year period. Singapore got its independence from British rule in 1963 and became an independent republic after expulsion from the Federation of Malaysia in 1965. The country maintains a parliamentary system with a President heading the State and Prime minister heading government. The country has had 8 presidents and 3 prime ministers over the 56-year period. South Africa got its independence from British rule in 1961 and later ended Apartheid in 1994. The country maintains a parliamentary representative democracy in which the president serving as both head of state and head of government is elected by the national assembly. The country has had 9 ceremonial state presidents, two executive state presidents and 5 presidents over the 60-year period.

The foregoing exposition shows the similarities and differences between Zambia and the NIC political systems, highlighting that the two sets of countries are generally politically similar. These political system similarities thus enhance the policy context transferability and learning.

2.3.4. Legal Systems

In 2013, Zambia's strength of legal rights index stood at 7 out of a possible 12 ranking second jointly with Malaysia. The index assesses collateral and bankruptcy laws and how they protect creditors and debtors with a view to enhancing access to credit, with an index of 12 representing the best designed laws. By 2019 Zambia's index stood at 11 and ranked first, a considerable improvement with perceived trickle-down effects on manufacturing finance (World Bank, 2021). Panel (b) of figure 7 above illustrates the foregoing trends.

Legal systems play a significant role in manufacturing finance and the broader financial development. Specifically, legal protection of shareholders and debtors as well as central bank independence have significant effects on the effectiveness of financial sector policy (Ma & Lin, 2016). Further, based on the prevailing legal tradition, specifically, common law, civil law and mixed law, the legal system has effects on financial development and its priorities (Maimbo & Melecky, 2016). Specifically, French civil law countries generally experience lesser financial development than English common law countries because the former places lesser weight on protecting private property rights (Beck et al., 2003). Asongu (2015) additionally notes that

English common law African countries are associated with higher government quality. Introducing Beck et al. (2003)'s endowment theory into this analysis suggests that while the Zambian legal system is based on English common law, its weaker property rights from the colonial model have significantly affected financial development and manufacturing finance.

2.3.5. Domestic Banking Sectors

In comparing banking sector contributions to manufacturing finance, banking sector credit, bank assets and efficiency are analysed.

A year after independence, Zambia's banking sector domestic credit to the private sector share of GDP stood at 5.6 percent, carried 27.5 percent of the group average, was 1.8 times less than that of South Korea and returned seventh rank (Indonesia data missing). In 1991, Zambia maintained the seventh position (South Africa data missing), with 7.1 percent, carrying 16.5 percent of the group average and was 6.6 times less than that of South Korea. By 2019, Zambia's absolute performance had increased to 12.5 percent but slipped to eighth position carrying 16.6 percent of the group average and now 12 times worse than South Korea. Over the reference period, 1996 – 2017, Zambia averaged 10.4 percent, ranked eighth and carried 21.2 percent of the group average (World Bank, 2021). Panel (a) of figure 8 below shows the trend over the reference period.

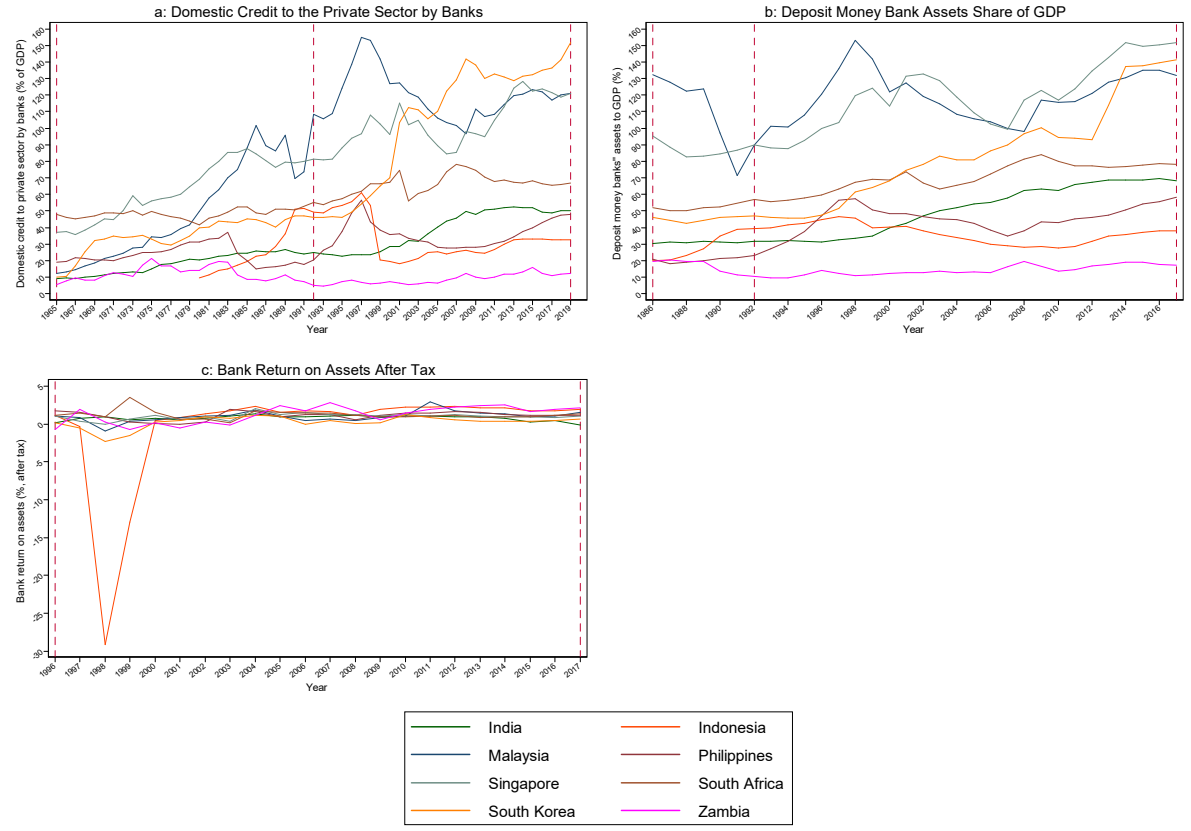
As regards bank assets, Zambia's deposit taking financial institutions' assets share of GDP stood at 19.6 percent in 1986. In this year, Zambia ranked eighth among the eight countries, carried 37.7 percent of the group average and was 2.3 times lesser than South Korea. In 1992, Zambia's performance deteriorated to 10.5 percent, maintained the eighth position, carried just 21.7 percent of the group average and was 4.5 times lesser than South Korea. By 2017, Zambia reported 17.4 percent, maintained the eighth position, carried 20.3 percent of the group average and was 8 times lesser than South Korea. Over the reference period, 1986 – 2017, Zambia averaged 14.7 percent, maintained the eighth position, and carried 23 percent of the group average (World Bank, 2021). Panel (b) of figure 8 below shows the trends for the reference period.

Measuring bank efficiency as percentage return on assets, in 1996, Zambia reported -0.7 percent, ranked eighth, carried -99 percent of the group average and was 5.5 times lesser than South Korea. By 2017, Zambia had improved to best ranked with 2.1 percent, carried 174.8 percent of the group

average and was 3.4 times better than South Korea. Over the reference period, 1996 – 2017, Zambia averaged 1.2 percent, was best ranked, and carried 159.5 percent of the group average (World Bank, 2021). It should be noted that banking sector inefficiency may also originate from non-optimal scales of production and not exclusively from non-optimal utilisation of resources (Sufian, 2011). In this view, individual banks need to operate at the correct size because when too big they risk being scale inefficient while too small risks not benefiting from economies of scale, potentially explaining Zambia's relative stellar performance against NICs. Panel (c) of figure 8 below highlights the trend of this period.

Save for efficiency, Zambia's banking sector performed poorly on the metrics analysed above, outcomes plainly detrimental to manufacturing finance, as Zambia's financial system is banking sector dominated. Further, the banking system is historically important in new technology financing, with Mikheeva (2019) noting that the banking system financed the larger component of East Asian industrialisation. Beck and Feyen (2013) note that foreign bank entry enhances financial development with Hall and Simper (2013) highlighting that the Korean banking sector has a history of over reliance on foreign funding despite their expansion prospects. Further, its banking, generally categorised as a perfect competition, can be divided into commercial and specialised banking, of which the latter are government policy focused institutions with primary emphasis on financing SMEs, funding export and technology sectors as well as offering standard banking services (Hall & Simper, 2013), a strategy that significantly fostered manufacturing finance and consequently manufacturing development in South Korea (Lee, 2019). In improving banking sector performance, benchmarking banking sectors against best performers has been noted to enhance performance (Mukherjee et al., 2002), a key objective in this study.

Figure 8: Zambia Vs NICs: Domestic Bank Credit, Bank Assets & Bank Return



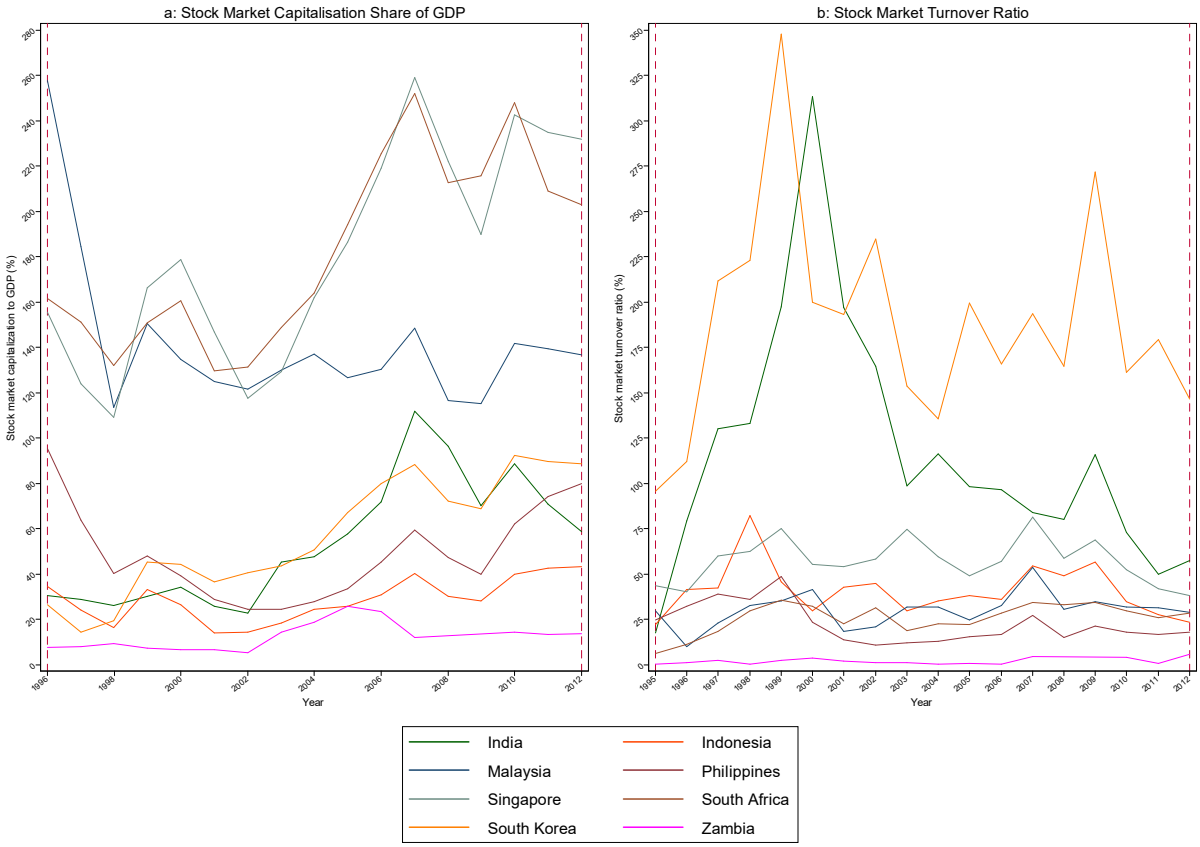
Zambia Vs NICs: Domestic Bank Credit,Bank Assets & Bank Return, Data Source: World Bank (2021)

2.3.6. Domestic Non-Banking Sector

The comparison of the non-bank sources of manufacturing finance below focuses on the stock market capitalisation and stock market turnover ratio.

In 1996, Zambia's domestic firm market capitalisation to GDP in real terms stood at 7.7 percent, taking the eighth rank, carrying 8.1 percent of the group average and 3.4 times lesser than South Korea. In 2012, Zambia reported 12.8 percent, maintained the least rank, carried 12.9 percent of the group average and was 6.4 times lesser than South Korea. Over the reference period, 1996 – 2012, Zambia averaged 12.4 percent, maintained the eighth rank, and carried 14 percent of the group average (World Bank, 2021). Evidently, Zambia's stock market capitalisation has significantly underperformed relative to NICs to the detriment of non-banking sector sources of manufacturing finance, a typically large contributor in industrialised countries. Panel (a) of figure 9 below shows the trends over the reference period.

Figure 9: Zambia Vs NICs: Stock Market Capitalisation & Turnover Ratio



Zambia Vs NICs: Stock Market Capitalisation & Turnover Ratio, Data Source: World Bank (2021)

Stock market turnover ratio refers to the ease with which shares can be sold on the stock market. In 1995, Zambia had a stock market turnover of 0.06, ranked eighth, carried only 0.2 percent of the group average and was 1,552 times lesser than South Korea. In 2012, Zambia reported 5.7 percent, maintained the eighth rank, carrying 13 percent of the group average and was 25 times lesser than South Korea. Over the reference period, 1995 – 2012, Zambia averaged 1.8 percent, ranked the least and carried 3 percent of the group average (World Bank, 2021). Panel (b) of figure 9 above highlights the reference period trends. As with stock market capitalisation, Zambia's performance relative to NICs was dismal with significant negative effects on non-banking sector sources of manufacturing finance.

2.3.7. Foreign Investment

In comparing foreign investment sources of manufacturing finance, foreign loans, foreign debt securities, foreign portfolio investment as well as foreign direct investments are explored.

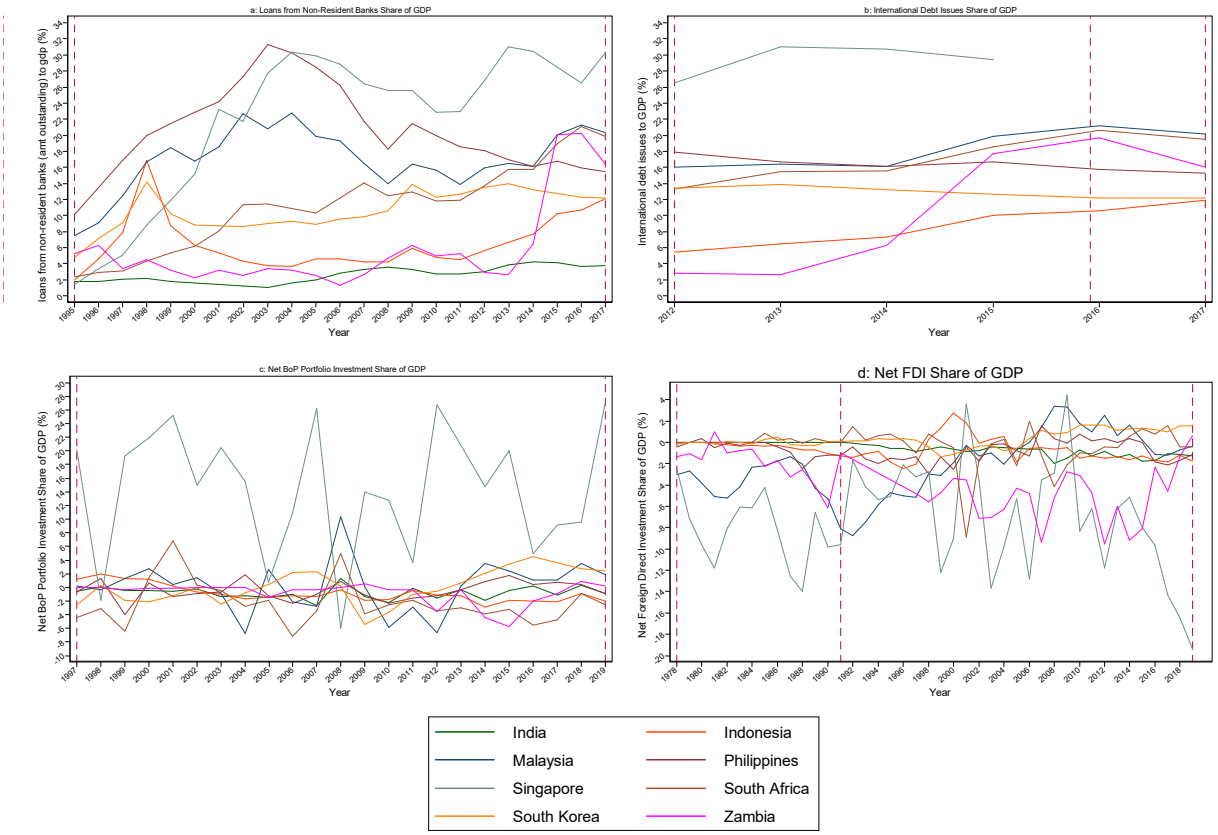
In 1995, Zambia's loans from non-resident banks as share of GDP stood at 5 percent, with a rank of third among the eight countries, representing 118 percent of the group average and 92 percent that of South Korea. By 2017, Zambia took the fourth rank with 16 percent, equated the group average and was 74 percent that of South Korea. Over the reference period, 1995 – 2017, Zambia averaged 5.8 percent with a rank of seventh with 48 percent of the group average (World Bank, 2021). Panel (a) of figure 10 below shows the trend over the reference period.

In 2012, Zambia's international debt issues share of GDP stood at 2.8 percent, ranking seventh (India data missing), representing 21 percent of the group average and 2.7 times lesser than South Korea. In 2017, Zambia reported 16 percent, with a rank of third (Singapore data missing), carrying 113.5 percent of the group average and 76 percent the South Korean value. Over the reference period, 2012 – 2017, Zambia averaged 1.6 percent, ranked sixth and carried 73.9 percent of the group average (World Bank, 2021). Panel (b) of figure 10 below shows the trend over the reference period.

Portfolio investment implies the stock, bonds or other financial asset ownership with a view to earn returns over time. In 1997, Zambia's net portfolio investment share of GDP stood at -0.03 percent with a rank of fourth, carrying -1.9 percent of the group average and 78 times greater than South Korea. In 2019, Zambia maintained the fourth rank with 0.22 percent, carrying 7.1 percent of the group average and 11 times lesser than South Korea. Over the review period, 1997 – 2019, Zambia averaged -0.8 percent with a rank of sixth and carried -69 percent of the group average (World Bank, 2021). Panel (c) of figure 10 below shows the trends over the review period.

As regards net direct investment share of GDP, Zambia reported -1.4 percent, with a fifth rank, carrying 128.6 percent of the group average and 12 times lesser than South Korea. In 1991, Zambia recorded -1.02 percent with a rank of fourth and carried 38 percent of the group average. By 2019, Zambia reported 0.6 percent, was ranked second with -54 percent of the group average and 2.4 times lesser than South Korea. Over the reference period, 1978 – 2019, Zambia averaged -3.9 percent, ranked seventh and carried 201 percent of the group average (World Bank, 2021). Panel (d) of figure 10 below shows the foregoing trends.

Figure 10: Zambia Vs NICs: Foreign Loans, International Debt Issues, Portfolio Investment & FDI



Zambia Vs NICs: Foreign Loans, International Debt Issues, Portfolio Investment & FDI, Data Source: World Bank (2021)

From the above metrics, Zambia's international finance was dismal in all categories to the detriment of manufacturing finance as the foreign sources of manufacturing finance are expected to be large contributors. In support of the foregoing findings, while NICs pursue policies that increase international capital inflows (Behera, 2016), Keskinsoy (2017) notes that international capital flows to developing countries may not always be positive. Behera (2015) finds high international capital mobility in NICs between 1970-1980 and 2001- 2010, despite Kónya (2015) finding imperfect international capital mobility in the BRICS (Brazil, Russia, India, China and South Africa). It should thus be highlighted that even among the NICs, some countries experience more international mobility than others, Kónya (2015) for instance, finds that Russia and South Africa generally have higher capital mobility than India, Brazil and China.

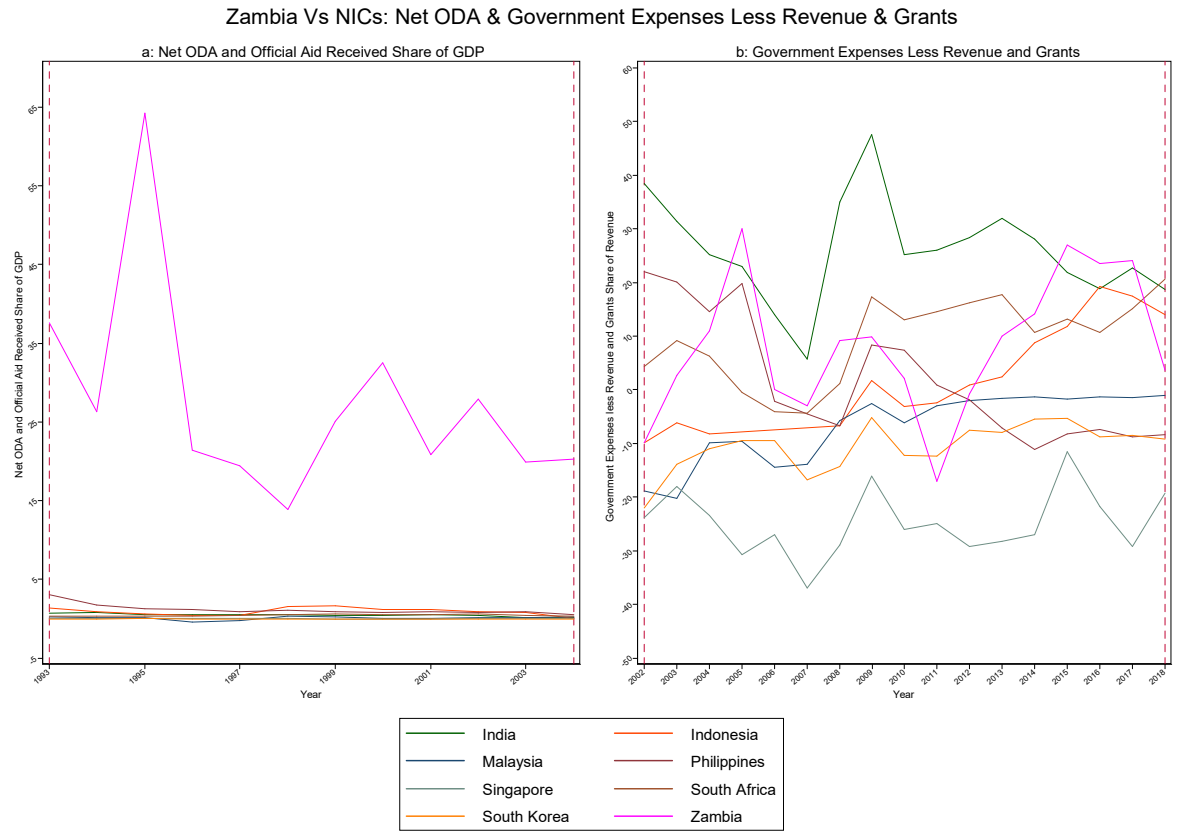
Further, foreign investment such as FDI not only increases manufacturing finance but also provides a technology transfer avenue (Andersson & Djeflat, 2013c). Furthermore, FDI aides

regional development in multiple ways, including the enhancement of industry forward and backward linkages, competition and demonstration effects as well as knowledge spill overs (Zhu et al., 2017). Reliance on FDI for catch up may however be benign as expedient catchup requires indigenous firm growth (Lee et al., 2016).

2.3.8. Foreign Aid

Zambia's net Official Development Assistance (ODA) and official aid received share of GDP stood at 37.6 in 1993 taking the top seed, carrying 695 percent of the group average and 37.6 percentage points greater than South Korea. In 2004, Zambia maintained the top seed with 20 percent, carrying 751 percent of the group average and 20.1 percentage points greater than South Korea. Over the reference period, 1993 – 2004, Zambia averaged 27 percent, ranked first, and carried 719 percent of the group average (World Bank, 2021). Panel (a) of figure 11 below shows the trends of the reference period.

Figure 11: Zambia Vs NICs: Net ODA & Government Expenses Less Revenue & Grants



Data Source: World Bank (2021)

Despite the staller performance on foreign aid receipts, Zambia's manufacturing development has been sub-optimal. In line with the foregoing, substantive literature exists that argues that foreign aid hinders development. Analysis should nonetheless go beyond the perceived negative effects of foreign aid into how aid is seen to hinder development in some countries while others excel with it (Prasad & Nickow, 2016). South Korea's comparative advantage was for instance heavily funded by foreign funds and aid (Prasad & Nickow, 2016), despite such inflows yielding dismal manufacturing development in Zambia.

2.3.9. Public Sectors

In comparing public sector performance as a source of manufacturing finance, government expenses less revenue and grants as a share of revenue is used. This can be interpreted as the shortfall in meeting expenses. On this front, Zambia recorded -9.9 percent in 2002 with a rank of fourth, carrying 400 percent of the group average and twice as much as South Korea. In 2018, Zambia reported 3.6 percent, carrying the rank of fifth with 150 percent of the group average and 12.8 percentage points higher than South Korea. Over the reference period, 2002 – 2018, Zambia averaged 8 percent, with a rank of sixth worst and carried 1,305 percent of the group average (World Bank, 2021). Panel (b) of figure 11 above highlights these trends.

Zambia's performance on this metric is evidently poor relative to NICs, implying that the public sector generally failed to meet its expenses, potentially affecting public sector investment expenditures – manufacturing finance along with it. Priority sector industrialisation and deliberate government efforts to channel financing to manufacturing played a key role in East Asian industrialisation. Policy loans and development banks for instance played a key role in South Korean industrialisation (Lee, 2019; Mikheeva, 2019). Based on the above analysis, achieving the foregoing in the Zambian case would be inhibited by government's financial constraints. Further, the continuous evolution of East Asian national development banks allowed for the customisation of finance to the needs of industrial development at each stage.

2.3.10. Household Sectors

In comparing households' participation in the financial sector, account at a formal financial institution, savings at financial institutions and remittances are used, all three acting as proxies for household contribution to manufacturing finance.

Zambia reported that 21 percent of people aged 15 and older had accounts with a formal financial institution in 2011, this ranked Zambia seventh, carrying 41 percent of the group average and was 4.4 times lesser than South Korea. In 2017, Zambia reported 35.8 percent but maintained the seventh rank, carrying 53 percent of the group average while being 2.6 times lesser than South Korea. Over the review period, 2011 – 2017, Zambia averaged 34.6 percent, carried 49 percent of the group average and ranked seventh (World Bank, 2021). Panel (a) of figure 12 below highlights the foregoing trends.

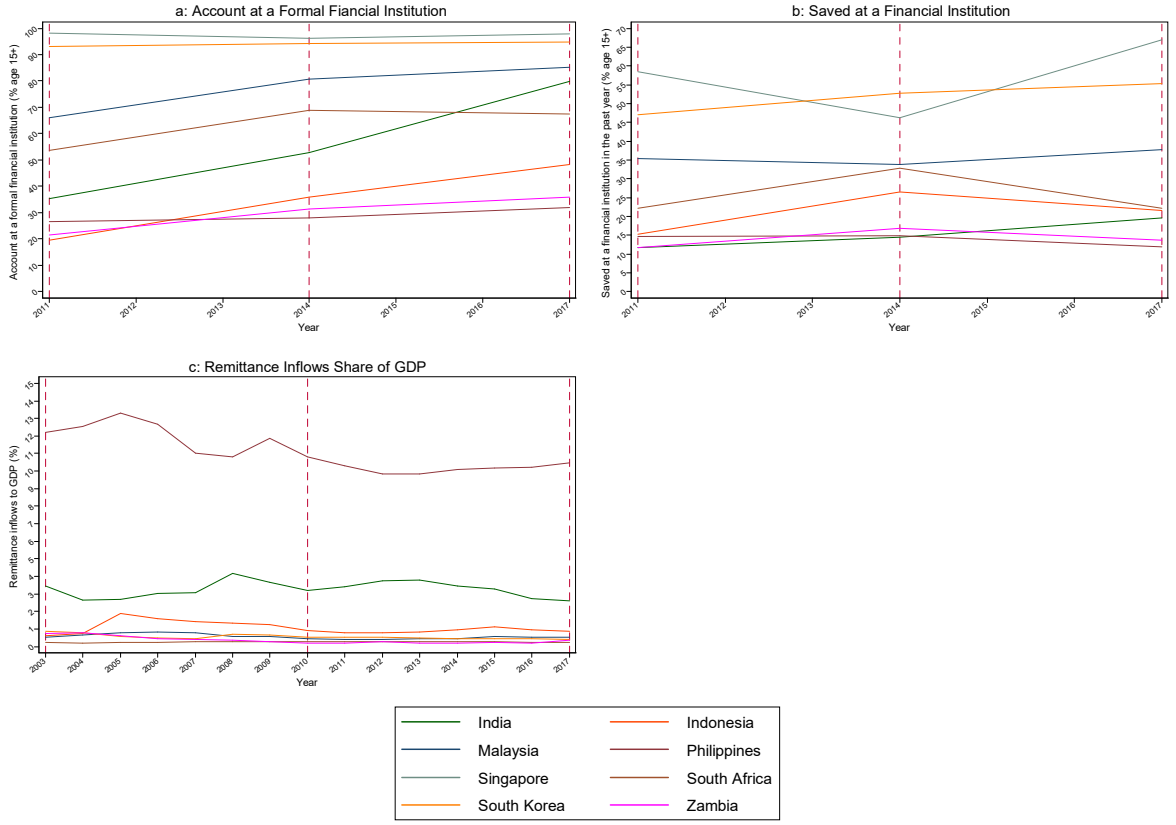
Turning attention to saving at financial institutions, in 2011, Zambia reported that 11.8 percent of people aged 15 and older saved at a financial institution in the previous year, this ranked the country seventh among the eight countries representing 46.9 percent of the group average and 4 times lesser than South Korea. By 2017, Zambia maintained the seventh rank with 13.6 percent, carrying 43.6 percent of the group average and 4.1 times lesser than South Korea. Over the reference period, 2011 – 2017, Zambia averaged 14.1 percent, ranked seventh and carried 48 percent of the group average (World Bank, 2021). Panel (b) of figure 12 below highlights these trends.

As regards remittance inflow share of GDP, Zambia ranked second (Singapore data missing) with 0.7 percent, carrying 27 percent of the group average and 16 percent lesser than South Korea in 2003. In 2017, Zambia reported 0.4 percent carrying the sixth rank (Singapore data missing) and 18 percent lesser than South Korea. Over the review period, 2003 – 2017, Zambia averaged 0.4 percent, ranking sixth (Singapore data missing) and carried 15 percent of the group average (World Bank, 2021). Panel (c) of figure 12 below highlights these trends.

In all three proxies of household contributions to manufacturing finance, Zambia had near worst performance, implying relatively subpar contributions of households to manufacturing finance. This finding is supported by literature that argues that households in developing countries are

typically more preoccupied with consumption than saving and investment (GRZ, 2017; Lee, 2019; Rolfe & Woodward, 2004; Rybczynski, 1983; Seidman, 1974; Sibanda et al., 2018), necessitating the reinforcement of foreign as well as institutional sources of manufacturing finance.

Figure 12: Zambia Vs NICs: Account at a Formal Institution, Saved at a Financial Institution & Remittances



Zambia Vs NICs: Account at a Formal Institution, Saved at a Financial Institution & Remittances, Data Source: World Bank (2021)

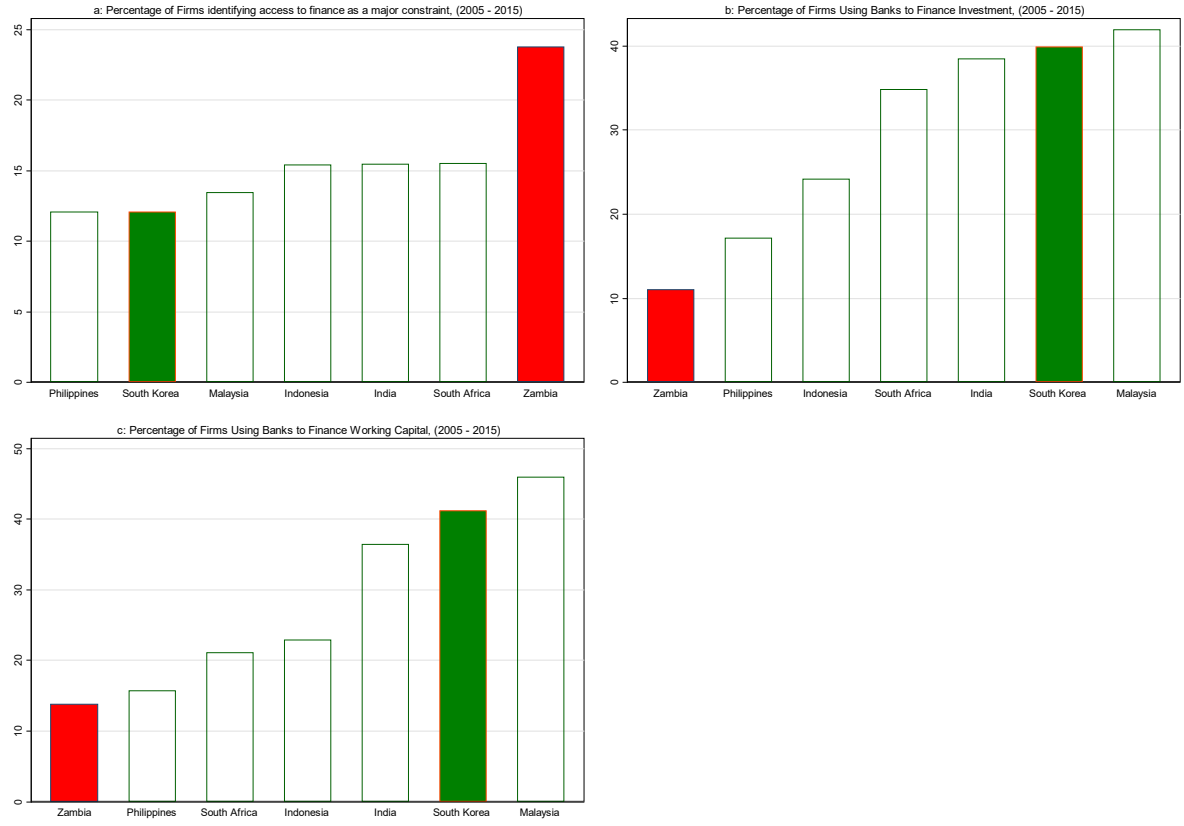
2.3.11. Manufacturing Firms

In comparing manufacturing firm interactions with manufacturing finance, firms identifying access to finance as a major constraint, firms using banks to finance investment and firms using banks to finance working capital are assessed.

Over the period 2005 – 2015, an average of 23.8 percent Zambian manufacturing and service sector firms identified access to finance as a major constraint, giving it the worst rank (Singapore data missing) and 154 percent of the group average (World Bank, 2021). This outcome provides

evidence that Zambia's manufacturing finance has been poor relative to NICs. Panel (a) of figure 13 below presents this data.

Figure 13: Zambia Vs NICs: Finance as a Major Constraint and Banks to Finance Investment & Working Capital



Zambia Vs NICs: Finance as a Major Constraint and Banks to Finance Investment & Working Capital, Data Source: World Bank (2021)

Over the period 2005 – 2015, the percentage of manufacturing and service sector firms using banks to finance investment in Zambia stood at 11 percent carrying the rank of seventh (Singapore data missing) with 37.8 percent of the group average (World Bank, 2021). In a financial sector dominated by banking, this outcome is evidently detrimental to manufacturing finance access and utilisation and consequently manufacturing development. In support, Beck and Feyen (2013) argue that access to long term finance promotes investment and research and development, additionally noting that poor collateral requirements and enforcement tend to inhibit access. Panel (b) of figure 13 above highlights the foregoing. Turning to the financing of working capital, over the period 2005 – 2015, the average percentage of manufacturing and service sector firms using banks to finance working capital in Zambia stood at 12.5 percent with a rank of seventh while carrying 44.5

percent of the group average (World Bank, 2021). As in the previous case, this finding is concerning for a financial sector dominated by banks. Panel (c) of figure 13 above summarises the foregoing.

This section has presented a prima facie exposition of Zambia's performance relative to NICs with respect to manufacturing finance and its related socio-economic dimensions, highlighting the policy contexts in which the benchmarking was implemented. The next section presents the empirical review of manufacturing finance and its related socio-economic dimensions, paying particular attention to how developing countries such as Zambia can move to more efficient manufacturing finance trajectories while making special reference to the evolution of manufacturing finance in NICs.

2.4. Empirical Review

2.4.1. Manufacturing Development

Chansa et al. (2019) present a comparative study of the industrial development of Zambia and South Korea. In their policy focused study, they argue that while Zambia's import substitution industrialisation was stifled in part by the World Bank and IMF policies, South Korea's industrial policy and developmental state approach led to rapid industrialisation. With a similar approach, El-haddad (2010) studied the divergent paths to industrial development between South Korea and Egypt and found remarkable similarities in their industrial policies with however significantly different results. The study attributes this to the inherent differences in the focus of implementation and perceived goals, arguing that while South Korea pursued a policy-based incentive structure, Egypt opted to prioritise social goals in contrast to enhancing competitiveness, a feature also found by Chansa et al. (2019) in the Zambian case. Similarly, seeking to draw lessons from South Korea's industrialisation, Romana and Leonardo (2014) recommend export promotion, gradual ascend on the comparative advantage ladder and deliberate state management and coordination of the industrialisation effort.

With an industrial exports focus, Weiss (2005) presents a case for the importance of exports and industrial policy and attempts to draw lessons from the East Asian experience. The study argues that the global economy has evolved significantly since the 1960's growth of manufacturing

exports from the first tier NICs, proposing that the global economy through globalisation, growth of multinational and global value chains are much stronger influences of exports and industrial policy. The study further presents an antithesis that prevents the application of the East Asian practices to modern industrialisation in three points; (1) the absence of the bureaucratic efficiency experienced in East Asia, (2) World Trade Organisation membership limiting the application of some protectionist practices and (3) the complexity of research and development vis-a-vis technology prevents creation of winners as practiced in East Asia. The foregoing notwithstanding, the study recommends the following; (1) promotion of competition among exporters with careful manipulation of rents in the manufacturing sector, (2) implementation of WTO allowed protectionist strategies for lower income countries, (3) while benchmarking as practised in South Korea relative to Japan may not be feasible, a carefully structured vision of the domestic manufacturing sector's place on the international scene is required, (4) focusing on diversifying the export structure in ways that allow production and export of output higher on the comparative advantage scale (a result shared with Romana and Leonardo (2014)) and (5) pursuing infrastructure as well as human capital development.

In a similar way, Yusuf (2014) presents a comparative analysis of the export performance of four NICs against four African countries. Specifically, China, India, Brazil, and South Africa are compared with Ivory Coast, Gabon, Egypt, and Kenya. The study finds that African countries face similar obstacles as NICs in export performance but unlike NICs are unable to overcome such challenges. The study argues that while their NICs counterparts design and implement working policies, their African counterparts rarely fully implement their policies however theoretically sound. Further, while NICs set up strong institutional frameworks to implement programs, this feature lacks in African countries. The author further cites corruption, inadequate human resource capacity and poor utilisation of received FDI as further barriers to performance among African countries.

Zeroing in on a specific manufacturing development strategy, Mendes et al. (2014) present a critical analysis of the import substitution industrialisation as implemented in Sub-Saharan African with reference to its implementation in Latin America. They argue that industrial development in SSA occurred in two stages; during colonial regimes, around the 1920s – 1940s and after independence, upwards of 1950s. They argue that import substitution industrialization in SSA was

implemented after its implementation in Latin America and that SSA countries followed the Latin American blueprint. They further argue that the domestic structural constraints and external hurdles were stronger in the SSA case and thus chances of failure much stronger. The authors assert that prior to independence, colonialists structurally prevented industrialisation in SSA as a way to keep the African market captive to European manufactured goods. Post-independence, the authors propose that import substitution industrialisation failed due to structural constraints on the domestic market coupled with external restrictions. Specifically, low physical and human capital stocks, low quality of labour and domestic savings as well as declining terms of trade. The foregoing constellated into a paradoxical increase of Africa's dependence on developed countries instead of a decrease. The authors conclude that these problems were mostly a result of actions and choices made by the political elite. Specifically, industrialisation and a push for strong manufacturing were premised on asserting political legitimacy rather than rational economic policy.

Covering industrial policy tenets, Rodrik (2009) makes a case for the importance of effective implementation of industrial policy having argued that the importance of industrial policy itself is irrefutable. He presents a case for the significance of embedding industrial policy in every fabric of society unlike imposing a top-down framework. He also argues that industrial policy should have rewards ("carrots") for investment and innovation and punishments ("sticks") for failure. He lastly also makes a case for the importance of accountability between bureaucrats and policy makers and the private sector to ensure sustainability of the relationship and effective implementation of industrial policy. Studying similar phenomenon but with specific countries in review, Kapunda (2005) attempts to assess the importance, performance as well as the rationalization for the industrial sector's current underweighting in Sub-Saharan Africa with a specific reference to Botswana, Tanzania and Zambia. He argues that industrial development performance has been poor in Sub-Saharan Africa despite clear acknowledgement of its importance. He refers to the 17 percent stagnated manufacturing contribution to GDP since 1980 with countries such as Botswana, Tanzania and Zambia showing declines. He further proposes that the source of underweighting is the result of overemphasising comparative advantage in ways that favour agriculture and mining in the long term, concluding against the misapplication and overuse of comparative advantage to industrialise Africa.

Addressing the more general catch-up problem between developing and developed countries, Asongu and Nwachukwu (2017), provide a growth quality comparative analysis using beta and sigma estimation in 93 developing countries over the period 1990 – 2011. The growth quality analysis is provided through the lens of among other factors income levels, resource-wealth as well as state fragility. Two key conclusions may be drawn from this study, upper middle-income countries have low growth quality differences and resource rich and non-fragile states have higher growth quality differences than resource poor and fragile countries. Extending this view while linking resource wealth with industrialisation, Stuermer (2017) studies the derived demand effects of industrialisation on mineral commodities and finds that a percentage increase in manufacturing output per capita increases aluminium and copper demand by 1.5 and 1 percent respectively. Reading the preceding conclusions together, Zambia being resource rich and non-fragile creates an opportunity for high growth. Chitonge (2016) however examines Zambia's structural transformation trajectory over the period 1964 – 2014 and finds that productivity gaps across the sectors have prevented the inducement of structural transformation.

Narrowing the discussion down to manufacturing development, Yamfwa et al. (2002) pursuing an industry of origin methodology benchmarked Zambia's manufacturing sector to that of the United States. The study found that the Zambian manufacturing sector encountered inefficiencies during import substitution industrialisation and state intervention after 1974. Further, in 1990, Zambia's labour productivity was 5.9 percent that of US with 16.7 percent of the US level of total factor productivity, the former declining to 3.2 percent by 1998. Furthermore, the 1991 – 1995 liberalisation phase marked a dramatic reduction in output, a collapse of total factor productivity with labour productivity continuing to decline. With similar conclusions, Mudenda (2009) tracks Zambia's trade and industrial policies from independence to 2009 and observes detrimental inefficiencies during import substitution industrialisation and a further decline in manufacturing after the 1990s implementation of structural adjustment programs and privatisation. In the same way, Seidman (1974) takes a closer examination of the causes of Zambia's apparent expansion of manufacturing during the import substitution industrialisation and finds manufacturing growth and its contribution to the economy stale. She argues that manufacturing in this era appeared to perpetuate the dualist economy inherited at independence, arguing that critical institutional changes were deficient in the economy to actualise manufacturing growth that would substantively

contribute to economic development in Zambia. She points to poor harnessing of financing for industrial development, poor external trade strategies, mismanagement of SOEs and poor policy coordination as critical factors to the distorted import-substitution strategy.

In search of alternative approaches to manufacturing development, Mulimbika and Karim (2018) make a case for local content development in the mining sector as an alternative to industrial development. They argue that the mining sector has failed to sustainably and impactfully aid industrialisation and economic diversification, noting that local content development provides an innovative way to reap the maximum benefits from the extractive sector. In the same vein, Lombe (2018) makes a case for local content in mining as a means to promote industrialisation and economic diversification in Zambia. From a critical analysis of the import substitution industrialisation era and its associated productive linkages and competitiveness in the manufacturing sector, the study generates various conclusions. Firstly, it argues that while the import substitution era may be credited with reduced productivity and export competitiveness, it was successful in domestically manufacturing mining goods. Further, the study asserts that the 1991 privatisation and liberalisation negatively affected local content efforts as well as slowed down industrial development and economic diversification. Furthermore, post 2000, success in the pursuit of local content development and competitiveness in exports has been dependant on enhancing the regulatory environment, strengthening human and technological capital, promoting endogenous entrepreneurship, and creating an enabling macroeconomic environment.

Having understood the manufacturing development nuances, the next subsection presents the supply side aspects of manufacturing finance necessary to achieve the manufacturing development covered in this section. The supply side empirical review is presented in nine themes, the system aspects: financial, legal, and political systems as well as the external sources of manufacturing finance namely: banking, non-banking, public, foreign investment, foreign aid, and households.

2.4.2. Supply of Manufacturing Finance

2.4.2.1. Financial Systems

Mesagan et al. (2018) study the effect of financial development on manufacturing in Nigeria over the period 1981 – 2015. They use three proxies for manufacturing namely, capacity utilisation, output and value added on one hand and using liquidity ratio, money supply and domestic credit

to the private sector as proxies for financial development on the other hand. The study found no significant relationship between manufacturing and financial development in Nigeria, noting that while the country has experienced financial development, its ability to support the manufacturing sector has remained weak. The study went on to recommend the institution of commercial bank policy that ensures the allocation of a predetermined percentage of financial resources to manufacturing. From a developed country perspective, Svilokos et al. (2019) investigate the importance of the financial sector in the industrialisation of eastern and central European countries. They find that the financial sector was very significant to the industrialisation process in the analysed countries. Specifically, they argue that real interest rate, real effective exchange rate and trade openness are significant industrialisation enablers.

From a NICs perspective, Bell and Rousseau (2000) attempted to examine whether financial intermediaries played a leading role in India's industrialisation. Using vector autoregressive and vector error correction models, they make three key findings. Firstly, they argue that while India's steady industrialisation was key to development, the financial sector played an instrumental role in enhancing investment and output. Secondly, they found that debt accumulation rather than total factor productivity improvements was the operating channel through which industrialisation occurred. Lastly, they assert that the financial sector's contribution to industrialisation went beyond passive fiscal policy support. Still within the Indian context, Das (2015), investigated the relationship between industry and finance and identified finance to be a significant impediment to industrial development. While also studying the post financial liberalisation financial sector, the study assessed the asymmetries between the financial and industrial sector and how it affected industrial finance. In this regard, the study makes four key conclusions; (1) financial liberalisation did not resolve industrial financing, (2) size and location of firms are key determinants to access to adequate finance, (3) long term finance is critical to industrial sector development and (4) infrastructure is key for industrial development.

The foregoing exposition of the significance of manufacturing finance to manufacturing development appears country setting invariant. It can thus be hypothesised that manufacturing finance having had positive effects on manufacturing development in the Nigerian, Central and Eastern European and Indian cases would be effective in the Zambian case as well.

Moving to the more general interaction between finance and economic growth with clear effects on manufacturing development, Demirguc-Kunt and Levine (2001b) attempt to understand the relationship between financial structure and economic growth. They find that financial systems develop and drift towards market-based systems as countries develop and that financial development is associated with new firm creation, enhances access to external finance, boosts firm growth and accelerates overall economic growth. Lastly, the study finds that financial structure based on the bank or market-based categorisation does not affect economic growth nor firm performance. Later, Levine(2005) carries out a review of both theoretical and empirical evidence on the connections between financial systems and economic growth. He finds that both financial intermediaries and financial markets are relevant for economic growth. He argues further that developed financial systems aide firms in acquiring external finance. Further, Eschenbach (2011) in a review of empirical and theoretical literature on the association between domestic financial development and economic growth finds a generally positive association but however highlights enormous heterogeneity across dimensions such as countries and regions as well as financial factors and causal direction.

Turning to economic growth and financial integration, Aziakpono (2011) presented a review of the theoretical and empirical work on the relationship between economic growth and financial integration. The study argues that theory shows both direct and indirect channels through which financial integration can have positive effects on economic growth. Specifically, the study proposes that financial integration leads to stronger domestic investment and thus reduces the cost of capital and thereby enhances investment and consequently stimulates economic growth. The study further argues that financial integration may lead to investment quality improvements through international risk sharing and diversification. Furthermore, the author proposes indirect channels through which financial integration leads to economic growth. Specifically, he argues that signalling effects, macroeconomic discipline and institutional development are enhanced by financial integration, further contributing to economic growth. The author additionally presents an anti-thesis to the foregoing in the capital flow volatility, procyclicality of short-term flow, macroeconomic instability, lack of small country access to funds and domestic misallocation of funds as counteracting factors. On prevailing empirical literature, he argues that studies reviewed

cumulatively present an inconclusive picture, arguing that the varying methodologies and frameworks are sources of incoherency in results on the finance-growth nexus.

Focussing attention to intersectoral linkages within the finance-growth discussion, Fisman and Love (2003) in their re-examination of the effect of financial development on intersectoral allocation of resources in the finance-growth nexus find that financial development allows firms to capitalise on global growth opportunities, when commonalities and differences in opportunities are tested across countries. In the same vein, Manganelli and Popov (2015), investigate the impact of financial development on growth through sectoral reallocation and find that financial development is pareto-improving as regards reduction of volatility in output. Specifically, the study finds that volatility is reduced by resource reallocation from high output volatile sectors to sectors that have lower output volatility. In this view, if output and consumption volatility are correlated, the results imply that financial development may have positive welfare effects due to the reduction in volatility. Furthermore, Fisman and Love (2007) revisit the seminal work of Rajan and Zingales (1998), with the inclusion of US industry growth in the original work and maintain the importance of finance in the allocation of resources. Specifically, they reiterate that financial development enhances growth in sectors with good growth opportunities. In addition, they find that in the finance-growth nexus, emphasis needs to shift from financial dependence to the global growth opportunities transmission of financial development to economic growth. Troubleshooting the resilience of financial sector resource allocation, Boyd et al. (2001) test whether inflation negatively affects the financial sector's allocative efficiency and find a nonlinear negative relationship between inflation and banking development and equity market activity, concluding that the marginal impact of inflation decreases rapidly as inflation increases. They further highlight the existence of a threshold with regard to financial sector performance such that when inflation exceeds 15 percent a discrete decline in financial sector performance is observed.

From a developing country context, Odhiambo (2007) empirically investigates the direction of causality in the finance-growth nexus in Sub-Saharan Africa. He in effect attempts to determine whether supply-leading or demand-following is dominant, the former implies supply of finance leads to economic growth while the latter implies economic growth leads to the demand for finance. The study uses Kenya, South Africa and Tanzania to test the hypothesis and finds in execution that the choice of proxy used for financial development affects the results and overall

results vary over time and country to country. The study concludes that while demand following is dominant in Kenya and South Africa, the supply-leading hypothesis is stronger in Tanzania. Further, Odhiambo (2009) studies the dynamic effects of interest rate liberalisation on economic growth in Zambia. Undertaking the study in stepwise fashion composed of a financial deepening model initially and a tri-variate causality model incorporating savings and financial depth to succeed it. The study finds that interest rate liberalisation had positive effects on financial deepening and further that the former granger caused economic growth. Andersen and Tarp (2003) while introducing informational asymmetry to financial markets however obtain a contrary result and question the appropriateness of financial liberalisation in developing countries (a similar argument is presented by Law and Habibullah (2009)), despite assenting to the importance of well-functioning financial systems to economic growth. They argue that increased competition in the banking sector due to financial liberalisation may not lead to efficient financial intermediation in part due to information asymmetry. They propose that increased competition would likely lead to instability in the sector with prevalence of gambling behaviour among banks. They conclude that the benefits of financial liberalisation have been exaggerated while the costs have been underestimated and therefore recommend discretion and the need to find middle ground on financial sector reform. Odhiambo (2009) nonetheless finds bidirectional causality between savings and economic growth, directional causality running from financial development to savings with prima facie (short-run) feedback of the converse. In a similar way, Egbetunde et al. (2017) study the interest rate liberalisation and growth nexus on Sub-Saharan African countries over the period 1980 – 2012. They find that other variables such as trade openness and price stability are key determinants to the interest rate liberalisation – growth nexus in Sub-Saharan Africa. They further argue that institutional quality is a significant inhibitor of growth in the region, concluding that effective policy on financial development, price stability and institutions needs implementation to enhance the growth emanating from interest rate liberalisation.

Refocussing on Zambia while referencing specific policies, Mwenda and Mutoti (2011) attempted to analyse Zambia's financial sector reforms and their impact on economic growth. Specifically, they assessed three phases of financial sector reforms over the periods 1992 – 1994, 1995 – 2002 and 2003 – 2008 in relation to bank efficiency and competitiveness and their impact on economic growth. The study found that phases two (financial infrastructure development) and three

(comprehensive financial sector development) were significant contributors to bank cost efficiency. Further, phases two and three, financial depth, bank cost efficiency, inflation and economic openness were found to be strong determinants of economic growth. The study went on to recommend; (1) reinforcing of financial market competition with the promotion of non-bank financial intermediaries and capital markets as well as enforcement of competition through regulation, (2) enhancement of cost efficiency of PPP banks, (3) calculated and well timed enforcement of financial liberalisation agendas to prevent instability, (4) implementation of only well researched and adapted financial liberalisation policies and (5) implementation of financial policies that take into account the holistic nature of the financial sector.

From a NICs perspective, Kim (2007) attempts to study the finance-growth nexus for the South Korean economy of the period 1960 – 2004. The study finds successive alternations between financial repression and liberations over the study period, stating however that economic growth ensued irrespective of the financial regime. Further, the study finds that financial deepening and diversification of financial instruments accompanied economic growth. Furthermore, the study observes that the peak of trade growth lagged behind that of investments by around eight to ten years, finding that financial distresses occurred over the interval of the two peaks. In the same vein, Mahendra (2014) attempted to test whether higher interest rate and its associated financial liberalisation in India led to increased financial intermediation and further whether this intermediation translated into economic growth. The foregoing is principally an empirical test of the McKinnon-Shaw complementarity hypothesis. The study results were consistent with the hypothesis, finding that liberalisation increased savings, enhanced allocative efficiency of financial resources to investment projects and led to economic growth.

While the results appear mixed on the effects of financial development on economic growth, the potential positive effects of financial development on economic growth are evident. Specifically, the foregoing review appears to suggest that when well-designed, financial development can have positive effects on economic growth with further downstream effects on manufacturing development.

Shifting attention to financial sector structures, Beck and Demirguc-Kunt (2013) study the relationship between financial structure and firm access to finance. They combine multiple

manufacturing and service sector datasets to estimate a probit model that measures financial structure in view of the different types of financial institutions and their relative sizes. The study finds that the dominance of banks in the financial system is associated with low-end financial service provision and lesser utilisation of financial services in general, additionally noting that specialised lenders enhance access to financial services in low-income countries. Further, Demirguc-Kunt and Levine (2001b) using a conglomerate index studying ratios of the banking sector development relative to stock market development construct three categories of financial market systems namely, Bank-Based, Market-Based and Underdeveloped Financial Systems. Within this framework and additional indicators, they go on to categorise India and Indonesia as Bank based and underdeveloped while Malaysia, Singapore, South Africa and South Korea are categorised as Market based and developed with Philippines categorised as Market based and underdeveloped. By extension Zambia may be categorised as an underdeveloped bank based financial system. While consensus is non-existent among scholars on which financial system yields the most development, Demirguc-Kunt and Levine (2001a, p. 83) argue among other conclusions that financial systems are more developed in richer countries with stock markets being more active and efficient than banks. Extending financial sector structures to supervision, Melecky and Maria, 2013) study the determinants of financial sector supervision structures using 98 high- and low-income countries over the period 1999 – 2010. They find that experience with financial crises led to the integration of supervision, the independence of the central bank may lead to lesser integration of prudential supervision without necessarily incorporating business conduct supervision and business conduct integration may be affected by lobbying from concentrated and profitable banking actors.

Turning to the determinants of financial development itself, using data from 27 countries over the period 1980 – 2001, Law and Habibullah (2009) investigate the determinants of financial development and find that institutional quality, trade openness, stock market liberalisation and real income are strong determinants of banking sector as well as capital market development. In a similar way, Voghouei et al. (2011) survey the literature on the factors determining the financial development and find institutional quality, trade openness, financial market openness, legal tradition as well as political economy factors as key determinants with the political economy being tagged the major determinant. In the same vein, Beck and Feyen (2013) introduce a financial

system possibility frontier in form of a financial development constrained optimum. Specifically, the frontier presents the efficient financial sector development arising from the interaction of the demand and supply sides of finance amidst structural factors. They contend that only a systemic collection of multidimensional data from various sectors can generate the frontier for effective policy making. Specifically, they argue that the frontier creates the 'too little against too much frontier' and that partial analysis stands to misrepresent it, arguing for utilising both micro and macro data simultaneously. The study identifies both supply and demand side constraints and notes that African SMEs finance is inhibited by institutional deficiency inspired application complexities, prohibitive collateral requirements and high interest rates on the supply side while lack of viable projects and self-exclusion plague the demand side.

Making an extension to the broader financial development discussion, Guiso et al. (2002) attempt to determine whether local financial market development is important in financially integrated markets. The study answers the question in the affirmative, additionally noting that larger firms increasingly become indifferent to local financial development with financial integration while smaller firms rely on it. Rajan and Zingales (2003) create a further extension and propose in their interest group theory of financial development that incumbents and large market actors oppose financial development as it propagates competition. They note however that such opposition declines with increased trade openness and capital mobility.

Looking towards financial sector strategies that would yield financial development, Maimbo and Melecky (2016) assessed the comprehensiveness of financial sector strategies across 78 countries against predefined attributes of sound financial sector development. They use attributes such as target definition, identification and management of systemic risks, assessment of policy trade-offs as well as exposition of implementation plans. The study found that while 85 percent of the countries identify the government agencies responsible for financial sector strategy implementation, only 53 percent clearly assigned responsibility on the implementation of measures aimed at achieving prescribed goals and a further 54 to manage systemic risk. Further, only 26 percent of the countries addressed the trade-offs between development and systemic risk in the financial development strategies with 42 percent advancing both without addressing the trade-offs. Further still, the study found that 65 percent of the countries meet the set criterion on goal

identification with however only 27 percent found to have had quantifiable indicators in set objectives. Furthermore, 56 percent of the strategies had policy tools to facilitate implementation.

Finally, shifting to the effectiveness of policies that would yield financial development, Ma and Lin (2016) investigate the relationship between the effectiveness of monetary policy and financial development. They perform this investigation on a panel of 41 economies and find that monetary policy effectiveness depends more on financial intermediary development than stock market development. They further note that the effectiveness of monetary policy on output decreases with financial development in developing countries while monetary policy effectiveness on inflation is strengthened with financial development in developed countries. In the same vein, Georgiadis and Mehl (2016) study the theoretically ambiguous effect of financial globalisation on the effectiveness of monetary policy. They argue that global financial integration can theoretically reduce monetary policy effectiveness due to the global financial cycle dampening of the output effect of tight monetary policy. They further argue that financial globalisation has effects on the effectiveness of monetary policy in two opposing directions, external balance sheet valuation and global financial cycles. They find that net long foreign currency economies experience stronger monetary effects through external balance sheet valuation losses and wealth effects due to exchange rate gains through tight monetary policy. The study further finds that the foreign currency channel has outpaced the global financial cycles since the 1990s. Further, Chuku (2009) uses structural vector autoregression methods to conduct a controlled experiment on the effects of monetary policy on output and prices and finds modest and expedient effects, results shared by Fernald et al. (2014).

Having addressed six manufacturing finance sub themes under financial systems, it appears clear that manufacturing finance has positive effects on manufacturing development either directly or indirectly through the financial development – economic growth channel. Further, the structure of the financial system is key in ensuring allocative efficiency within the financial sector in ways that prioritise manufacturing development or the policy preferred sectors. Furthermore, financial development has clear determinants that policy may exploit, the financial development strategies are however not without hinderances, and policy makers need to ensure their preferred strategies and instruments are effective for effective and expedient financial development.

2.4.2.2. Political Systems

A theoretical exposition of political system influence on manufacturing finance may be done through the Endowment Theory. The key facets of the Endowment Theory (Acemoglu et al., 2001) as applied to financial development by Beck et al. (2003) encompass three arguments. Firstly, two types of European colonies existed, extractive and settlement. In the first instance, Europe set up institutions that enabled an elite to extract minerals while in the settlement colonies, Europe set up institutions that supported private property rights while providing oversight on state power. The former case includes colonisations of countries such as the United States and Australia while the latter includes countries such as Congo and Zambia. Secondly, the type of colonisation was dependent on the feasibility of settlement. Colonies that were inhospitable due to disease and high mortality rates became extractive states while the relatively hospitable colonies were settlement states. Lastly, Institutions and systems established by colonisers survived post-independence and extractive states substituted colonisers with local elites that continued extracting resources for private benefit with authoritarian tendencies. On the other hand, settlement states evolved into democratic states that emphasized the protection of private property. While Endowment theory focuses on overall institutional development, its application to financial development follows naturally. Specifically, extractive states did not favour liberalized markets as these threatened extractors while settlement states protected property rights which fostered financial development (Beck et al., 2003).

Evidently, poor institutional capacity affects economic development in African countries, manufacturing finance along with it in part due to the multidimensionality of financial development and its associated political processes (Asongu, 2017; Beck & Feyen, 2013; D'Erasmo & Boedo, 2012). Rekiso (2017) notes that late comer industrialisation requires moving away from legacy colonial models, further noting that such colonial structures have led to it generally being cheaper for an African country to export to external markets relative to its African counterparts. Furthermore, Beck and Feyen (2013) argue that macroeconomic uncertainty with weak property rights protection are detrimental for financial sector development, an outcome reinforced in previously extractive states to the detriment of manufacturing finance. Political processes additionally play a critical role in how innovation and technology for manufacturing development are generated. Specifically, the politically determined economic openness and level of local

industry protectionism have a significant bearing on whether technology is generated internally through domestic research and development or assimilated through technology transfer (Rekiso, 2017; Zhu et al., 2017). It is further evident that NICs such as South Korea required strong direct and indirect state intervention for accelerated manufacturing finance growth and subsequent manufacturing development (Lee, 2019). Furthermore, while South Korea experienced corruption during its formative industrialisation years, the prevalence of corruption did not inhibit development due to its political system and institutional structures (Prasad & Nickow, 2016).

Addressing the much bigger politically influenced system of economy, Asongu (2017) presents a comparative analysis of the state of knowledge economies in Africa. Knowledge economies are systems of economy designed and governed by intellectual capital and scientific research. Using the five dimensions used in the constructing the World Bank's Knowledge Economy Index and data from 53 African countries over the period 1996 – 2010, the study finds that lower levels of knowledge economy are prevalent in French civil law, low income, conflict prone, landlocked, nonoil exporting sub-Saharan African countries. On the other than English common law, peaceful, sea access, middle income north African countries have higher knowledge economies. Further, Voghouei et al. (2011) survey the literature on the factors determining the financial development and conclude that among the key determinants of financial development, political economy is the major determinant.

The above review highlights that political systems have a critical role to play in manufacturing finance and the broader structural transformation agenda. Specifically, former colonies such as Zambia need to firstly shed the extractive state shackles imposed on its economy by colonial systems and further transform into knowledge economies through improved institutional and bureaucratic capacities, leading to a manufacturing development aided structural transformation as enabled by manufacturing finance.

2.4.2.3. Legal Systems

Beck et al. (2003) assess the law-finance and endowment theories of financial development using a sample of 70 previously colonised countries. In this analysis, the law-finance theory proposes that legal traditions as established by colonizers with their associated investor treatments and private property rights persist and influence financial development and systems in previously

colonised countries. The endowment theory on the other hand argues that financial development is influenced by the type of institutions the colonisers set up in colonies based on the disease environment they encountered. The study finds that empirical evidence for both theories with the endowment theory explaining more cross-country variations. Further, Beck and Levine (2004) survey the literature on the role of legal institutions in financial system operations and find theoretical and empirical support of the law and finance theory. Within the same context, La Porta et al. (1998) categorises, India, Malaysia, Singapore and South Africa as English law origin legal system countries, with Indonesia and Philippines being French law Origin and South Korea having a German law legal origin. Zambia by extension may be categorised as an English law legal origin country.

Further, in their analysis of bank versus market-based systems, Demirguc-Kunt and Levine (2001a), find that countries that feature common law tradition, stronger shareholder rights protection, high accounting standards, lower corruption and low emphasis on deposit insurance tend to be market-based. On the other hand, countries that feature French civil law, lower protection of shareholder and creditor rights, weaker contract enforcement, higher prevalence of corruption, lower accounting standards, restrictions on the banking sector and high inflation tend to possess underdeveloped financial systems. Further, Beck and Levine (2002) in attempting to establish whether a market or bank based financial system is key to industrial development find that neither is especially fit for this purpose. They however establish that the efficiency of the legal system and overall financial development have positive effects on industrial development.

The foregoing review highlights the importance of legal systems on manufacturing finance and the broader financial development. As in the political systems case, colonial influence is evident in legal systems, and Zambia, as other former colonies, needs to continually restructure property rights and investor protection laws to fit its development agenda.

2.4.2.4. Domestic Banking Sectors

Now focusing on the banking sector – manufacturing finance interaction. Hoxha (2013) explores the relationship between banking sector structure and manufacturing sector performance. Using a panel dataset of 37 countries (including: India, Philippines, South Korea and South Africa) while combining various databases including BANKSCOPE, INDSTAT4 2008 and IFS, the study finds

that higher bank concentration and lower bank competition promote higher manufacturing for sub-sectors that require external finance with capital market development having further positive effects on such sub-sectors.

In a developing country context, Fanta (2012) studied the effect of banking reform as regards concentration, competition, efficiency and liquidity on Ethiopian manufacturing SME financing. The study found that banking reform did not resolve SME access to financing in the manufacturing sector due to the insufficiency of the resulting competition and efficiency despite the concentration and liquidity improvements. On the demand side, the study analysed SME access to bank financing in tandem with SME age, ownership type and stage of development and found that ownership type and availability of collateral were key enhancers of access to bank financing. Specifically, Public Limited Companies represented 68 percent of companies that ever had a loan relative to 25 percent of sole proprietors with a further 96.3 percent of the loans being backed by collateral. Further, A Nigerian study by Toby and Peterside (2014) assessed the effectiveness of bank financing on manufacturing and agriculture over the period 1981 – 2010 and found a positive correlation between merchant bank lending and manufacturing but a negative correlation between commercial bank lending and manufacturing contribution to GDP. The study concluded that bank financing towards manufacturing and agriculture for overall economic growth remained significantly limited, concluding that Nigerian banks exhibited risk aversion to the two sectors, an outcome accredited to liquidity and funding shortages. The study further recommended priority lending to agriculture and manufacturing through a monetary policy incentivised mandatory allocation of credit to the two sectors.

Looking at a NICs perspective, Sethi (2018) examines the effects of financial development on external finance dependant manufacturing firms in India paying due attention to the banking structure. The author finds that financial development has positive growth effects by reducing costs of external finance which banking sector reliant manufacturing firms in this context grow faster. The study however finds a negative relationship between bank concentration and growth of manufacturing firms, adding that risk averse behaviour by the banks has inhibited manufacturing sector growth. Further, Hall and Simper (2013) study the efficiency and competitiveness of the South Korean banking sector over the period 2007 – 2011. Using a translog cost function and dividing the banks between national and regional banks and commercial and specialised

(government policy focused banks) banks, the study finds that all national banks operated with economies of scale and that perfect competition prevailed in the Korean banking sector. On the foregoing co-existence between private and government banks, Fisman and Love (2003) argue that financial sector performance is better when private banks exist, as opposed to a government banking dominated sector, Mukherjee et al. (2002) for the Indian case however found that public sector banks were more efficient than private and foreign banks. Still within the South Korean case, Sufian (2011) examined Korean banking sector efficiency using data envelopment analysis for the period 1992-2003 and found that the inefficiency in the sector over the period was a result of scale in the operating and value addition approach while pure technical inefficiency domineered in the intermediation approach.

The banking sector empirical review above highlights the importance of banking sector sourced manufacturing finance and how it has been instrumental for NICs. It further shows the significance of ensuring an optimal mix among the government, foreign and private subsectors within the banking sector. In this view, Zambia's manufacturing finance not only needs a strong banking sector, but an efficiently composed one as well.

2.4.2.5. Domestic Non-Banking Sectors

Turning to non-banking sectors, Jarungkitkul & Sukcharoensin (2016) studied the competitiveness of five ASEAN stock markets namely, Stock Exchange of Thailand, Singapore Exchange, Bursa Malaysia, Indonesia Stock Exchange and Philippine Stock Exchange, the latter four of which are part of the current study. The study used Porter's diamond model, applying five dimensions namely: factor conditions, demand conditions, related and supporting industries, firm specific factors and the roles of government and further utilised relative values to ascertain the competitive ranking of the five stock exchanges. The study found that Singapore had overwhelmingly the most competitive exchange followed by Malaysia and then Thailand, Indonesia and Philippine respectively. Among other recommendations, the paper argues for the promotion of venture capital and private equity for enhanced financing sources. Taking a more theoretical approach, Allen & Santomero (1996) present an analysis of the theory of financial intermediation and make a case for its evolution. Specifically, they argue that while traditional theories of intermediation are premised on transaction costs and information asymmetry, these factors have seen declines with intermediation itself experiencing growth. They go on to propose that the emergence of new

markets such as futures and options has facilitated this outcome as such markets are dominated by financial intermediaries. The authors further analyse the new risk management focused financial intermediation framework and argue for the integration of asset pricing theories in financial intermediation theory.

The foregoing review proposes that traditional financing sources such as banks and stock exchanges need to be augmented by venture capital and private equity as well as strong financial intermediaries to provide ancillary services as hedging and financial advisory. In this view, Zambia not only needs traditional sources of finance but financial intermediation as well for efficient manufacturing finance.

2.4.2.6. Public Sectors

Focusing on the public sector participation in manufacturing finance, Lee (2019) presents an analytical study of the financing mechanisms that went into the industrial development of South Korea using specific cases of industrial firms and sectors. With this base he draws comparisons between African countries and South Korea in terms of industrial policy and financing with a view to generate best practices for application in African countries. He argues that financing through state-controlled institutions played a critical role through the supply of growth financing at affordable rates to priority sectors of which manufacturing received special focus. In the Zambian case, Liebenthal and Cheelo (2018) in understanding the boom-bust cycles of global copper prices in the Zambian context find that successive governments have not productively used copper booms. Specifically, the authors argue that copper revenues instead of being used for investment were spent on consumption subsidies and sustenance of State-Owned Enterprises (SOEs).

Now turning attention to the public debt and fiscal deficit interactions, Ehigiamusoe and Lean (2020) used the west African region to investigate the effects of public debt and fiscal deficits in the finance-growth nexus. The study found that the level of debt and deficits matter in determining their impact on the finance-growth nexus. Specifically, the study found that the effects of financial development on growth became negative after debt and deficit exceeded 48.6 percent and -13.5 percent of GDP respectively. The study thus concluded that the positive effects of financial development on growth relied on the levels of debt and deficits lying within stipulated thresholds.

The foregoing analysis is especially critical in the Zambian context as both public debt and fiscal deficits have plagued the Zambian economy since the crash of import substitution industrialisation. Further, the demonstrated strong public sector impact on manufacturing finance in the South Korean case necessitates a work around in the Zambian case as its public sector is consistently facing fiscal deficits. In support, Mulimbika and Karim (2018) note that the Fifth and Sixth national development plans faced among other implementation challenges inadequate financial resources.

2.4.2.7. Foreign Investment

Turning to foreign investment, A 99 country study across 37 manufacturing sub-sectors over a 17-year period by Aizenman and Sushko (2011) sought to analyse the differential effects of debt, equity and FDI. The study found that debt and equity did not have a clear positive effect on industrial growth, asserting further that in surge periods, debt and equity appeared to have negative growth effects. On FDI, the study found positive correlations with the manufacturing sector, further highlighting it as the most stable of the three private capital flows. The study went on to note that unregulated financial flows demonstrate mixed growth effects on real sector performance in emerging markets. In the same vein, a study by Benmamoun and Lehnert (2013) attempted to compare the effectiveness of FDI, foreign aid and international remittances on economic growth. Using the generalised method of moments technique and a panel dataset over the period 1990 – 2006, the study found that international remittances had the greatest impact on economic growth even in FDI reliant countries. Further, in an analysis of the role of external debt finance in industrialisation, Fischer (2018) compares South Korea and Brazil. He argues that despite the positive geopolitical and industrial policy efforts of South Korea, post-war late industrial development required external finance, proposing that positive internal efforts would not yield industrial development without external finance. He further illustrates this point by contrasting Brazil and South Korea in their respective absorption of trade deficits through external finance.

In the Zambian context, Bwalya (2006) investigates FDI technology spill overs in Zambia using 125 manufacturing firms. He applies Generalised Method of Moments estimation on an augmented Cobb-Douglas production function and finds little evidence of horizontal productivity spill overs running from foreign to local firms. Specifically, as foreign firms overwhelm a sector, the productivity of local firms decreases. The study however finds evidence of vertical technology

spill overs, such that knowledge from foreign firms in upstream sectors moving to downstream local firms. Within the same context, Rolfe and Woodward (2004) explore foreign and local firm ownership patterns in the wake of privatisation in Zambia. Using Zambia Privatisation Agency data, the study argues that while privatisation had immediate wins, it risked being a long-term failure due to the inefficiencies with which the new owners operated firms as well as lack of reinvestments. Addressing Chinese investment in Zambia, Haglund (2008) examines Zambia's competency in its regulation of Chinese FDI and the resulting political economy implications. The study utilises case study data and argues that in weak regulatory environments Chinese investments stand to present challenges for domestic business regulators. In tandem, he argues that while Chinese foreign investment and aid have been a good source of manufacturing finance in Zambia it has come with nascent damages to the country's sustainable development plans and degradation of regulatory frameworks. Notwithstanding, the restrictions placed on foreign investments through such institutions as the Zambia Development Agency promote higher formalisation and greater corporate governance in foreign investments and therefore presumably greater compliance with regulations (ZDA, 2017).

The review of foreign investment literature above highlights that foreign investment is critical for manufacturing finance, to supplement and reinforce geopolitical and industrial development strategies. Harnessing of foreign investment as demonstrated above needs to make to key considerations: alignment to the country's sustainable development plans and preservation of regulatory integrity. In this view, Zambia's pursuit of foreign investment contributions to manufacturing finance needs to not only focus on the quantity of foreign investment but its quality as well.

2.4.2.8. Foreign Aid

Turning attention to foreign aid contribution to manufacturing finance, Rajan and Subramanian (2011) attempt to understand the effects of aid on manufacturing growth. They use rigorous criteria to check that the channel through which aid affects manufacturing is real exchange rate. Specifically, they check that (1) aid inflows lead to exchange rate appreciation, (2) greater aid induced exchange rate appreciation leads to slower growth of exportable industries and (3) the effect of aid is enhanced when the extent to which exchange rate has over appreciated is considered. They conclude that aid indeed has adverse effects on manufacturing growth due to its

over appreciating exchange rates and recommend that countries should prevent situations that lead to uncompetitive exchange rate. In the more general aid-growth case, Tsaurai (2018) attempted to study whether financial development augments the effect of foreign aid on growth. The study used the panel fully modified ordinary least squares technique on emerging countries data over the period 1994 – 2014 and found that the complementarity effects between foreign aid and financial development had a significant and positive impact on economic growth.

In the Zambian case, Inanga and Mandah (2008) in studying the relationship between foreign aid and economic development in Zambia find that while isolating the specific effects of aid from other growth factors may be difficult, when applied efficiently and effectively, foreign aid contributes positively to growth given a stable macroeconomic environment. Extending the analysis to Africa, Asongu (2015) studied the effectiveness of aid in 53 African countries with respect to their institutional quality for the period 1996 – 2020. The study used eight indicators of government quality and made three key conclusions: (1) the current institutional levels have effects on the institutional benefits of aid, (2) save for democracy, higher institutional quality countries are more negatively correlated with aid than lower institutional quality African countries and (3) the benefits of aid related government quality benefits are questionable regardless of the existing institutional quality levels. Further, Prasad and Nickow (2016) study the channels through which aid is seen to be detrimental to development. They survey the literature and highlight three channels through which aid inhibits development in recipient countries; (1) aid increases or leads to corruption, (2) aid overwhelms administrative capacity and (3) aid weakens the tax systems. To support the conclusions, the study recounts the histories of South Korea and Pakistan and demonstrates that while both countries were affected by corruption and demonstrated strong bureaucracies they had different outcomes, further asserting that weakening of the tax system in Pakistan affected its development trajectory. Specifically, Pakistan avoided the unpopularity associated with implementing taxation and continuously sought-after aid even when it could only be given as debt. On the contrary South Korea developed a resilient tax system.

The above review presents mixed effects of aid on manufacturing finance and broader economic growth. Specifically, while South Korea benefited from aid and complementarity effects between aid and financial development on economic growth exist, aid has also been shown to have negative effects on manufacturing and economic development. In this light, taking Inanga and Mandah

(2008)'s arguments for the economic benefits of aid in Zambia and synthesising them with the findings by Asongu (2015) and Rajan and Subramanian (2011); it can be concluded that aid needs to be strategically harnessed for it to yield positive growth effects with financial development playing a key role in this effort.

2.4.2.9. Household Sectors

Focusing on household sector contributions to manufacturing finance through the international channel, Efobi et al. (2019) assess the direct and indirect effects of remittances on industrial development. Using financial development to analyse the indirect effects, they utilise a panel of 49 African countries over the period 1980 – 2014. They note that remittances are an important foreign capital flow in Sub-Saharan Africa and that while this diaspora flow may not be a significant flow for substantive industrial development, it may help lay foundation to economic stability and sustainability. The study argues that financial development in this context would be required to reduce costs of remittance inflow as well as generate financial instruments capable of channelling remittances to industrialisation activities. Broadly, the study finds that remittances are able to drive industrial development for its initial stages through the financial development channel, further noting that unlike FDI, remittances avoid neo-colonialism sentiments as well as capital repatriation. In agreement, Benmamoun and Lehnert (2013) go so far as to assert from their panel dataset findings that international remittances had greater impact on economic growth than foreign aid and FDI.

Pursuing a more conceptual approach to understanding household participation in financial markets, Attanasio and Paiella (2011) investigate household participation in financial markets and its associated transaction costs and intertemporal choices. They find that household participation and gains in financial markets can in part be attributed to observable and unobservable household attributes. They argue that in some cases, financial market participating households follow rational decision-making processes with implicit or explicit optimisations of intertemporal choice models while households that do not participate appear to follow heuristic decision-making processes. They further conclude that non-financial market participating households stand to gain from rationalising their decision-making processes as this is likely to reduce their costs of participation. Within the same frame, Bruhn and Steffensen (2011) model various scenarios of household utility optimisation using continuous-time Markov models. Allowing households to optimise expected

future utility by controlling consumption, investments and procurement of life insurance, they derive optimal conditions for one-person, two-person and multi-person households. In the one-person case, they conclude that the optimal amount invested in risky assets is a fixed proportion of total wealth, a result that holds for the two-person case as well. The multi-person case however requires smaller investments in risky assets. Further, Pietrzyk and Rokita (2016) present a two-person cash based discrete time household financial plan optimisation model with life length risk aversion and pre-declared consumption. They thus generate an optimisable value function that considers premature death and longevity risk, further generating both joint and disjoint treatments of the household members.

The foregoing review highlights the importance of household contributions to manufacturing finance through two channels: international remittances and household savings and investment. The design of Zambia's manufacturing finance thus needs to carefully study and harness household savings and investments for effective manufacturing finance.

2.4.3. Demand for Manufacturing Finance: Access to Finance

Looking at manufacturing firm access to manufacturing finance, Mertzanis (2016) uses a 136 country micro-survey dataset from the World Bank's Enterprise Surveys to explore the effects of ownership structure and other firm characteristics on firm access to finance. The study finds that while private ownership is associated with higher financial constraints, foreign ownership faces lesser financial constraints. Further, government ownership is associated with lesser constraints in low-income countries, with the influence of special interest group and large firm ownerships being absorbed by firm specific characteristics. The study further notes that country specific characteristics appeared to affect both the demand and supply sides of financing.

From a developing country view, Ayodeji and Balcioglu (2010) studied the industrial sector financing of SMEs in Nigeria and found that ownership structure, education level of entrepreneurs, sub-sector type, start up financing sources, market information sources and trade organisation membership had positive effects on the success of financing industrial sector SMEs. On the contrary, self-funding at start up, poor sources of market information and lack of association with trade organisations had negative effects on financing. The analysis relied on simple descriptive statistics as well as chi-square for analysis. Within the same context, Musamali and Tarus (2013)

study whether firm characteristics have effects on access to finance on Kenyan SMEs and find that larger, older and incorporated manufacturing firms have higher access to finance. In the same vein, (Fanta, 2012) notes that ownership type and availability of collateral were key enhancers of access to bank financing.

Further, Fowowe (2017) relates access to finance and firm growth on African manufacturing and service sector firms using 10,888 firms across 30 African countries. The study finds that inadequate finance inhibits firm growth in African countries while participation in the financial market enhances it. Furthermore, Sibanda et al. (2013) studied the effect of access to finance of Zimbabwean furniture manufacturing firms directly on export participation and indirectly through firm performance and found that access to finance has a positive effect on export performance. Further still, Tyson (2017) made a case for private financing in the manufacturing sector in sub-Saharan Africa. She argues that while manufacturing financing has grown from USD 5.9 billion to USD 35.5 billion in 2006 and 2015 respectively, manufacturing finance remains relatively low compared to other sectors. She contends that while the ease of doing business and financial development are necessary for manufacturing finance mobilisation, they are not sufficient, arguing for the significance of firm level constraints in inhibiting investment and finance mobilisation. She specifically cites lack of viable projects, poor value chains and lack of coordination in the finance mobilisation among private investors, donors, and governments.

From a NICs perspective, Rasiah (2011) using a sample of 151 industrial Malaysian firms investigated the ease of access to finance among manufacturing SMEs and found that access to finance was inversely related to firm size and labour productivity, respectively. Within the same context, Wasiuzzaman et al. (2020) use structural equation modelling methods to understand the relationship between creditworthiness and access to finance among manufacturing sector SMEs in Malaysia and found that creditworthiness was determined by the character, conditions and collateral aspects of the firm and additionally that creditworthiness is in explaining access to finance. Further, Amornkitvikai and Harvie (2017) examined the respective effects of access to finance and sources of finance on manufacturing export performance for both SMEs and large firms in Thailand. The study found that collateral and financial transparency played a critical role in the access to finance and further argued that SMEs, converse to large manufacturing firms had lower access to finance and weaker export participation. Furthermore, the study found that tertiary

education enhanced participation in exports but was not significantly related to access to finance. Focusing on obstacles, Naidu and Chand (2012) study the significance of 19 financial obstacles for manufacturing MSMEs in Fiji and Tonga islands. They conclude that inability to obtain external and internal finance, insufficient working capital, high start-up costs, high lending rates and inability to cover financial obligations are major obstacles in access to manufacturing finance. The above exposition highlights a fair level of consistency in the factors affecting access to finance in manufacturing firms across NICs and developing countries. The foregoing implies minimal contextual differences between the Zambian and NICs settings in this regard and therefore easier testing and application of policies that worked in the NICs cases. The foregoing notwithstanding, studying the Zambian access to finance context remains warranted as there is need to determine which of the identified factors are most prevalent and further how such factors can be harnessed for optimal modelling.

2.5. Critique of Existing Literature

The reviewed literature while useful does not fully address the current study, literature attempting respective components is however available to varying degrees. Literature closest to the benchmarking aspect can be found in Lee (2019) with little statistical treaments and broad reference to African countries in general while benchmarking to a single NIC: South Korea. Cihak et al. (2012), further benchmark financial systems across the world without specific reference to manufacturing nor statistical treatments of how inefficient systems can reach the efficiency frontier, Beck and Feyen (2013) perform a similar feat using regression analysis. Other work comparing industrial and financial development between NICs and developing countries without specific statistical reference to manufacturing finance can be found in Chansa et al. (2019), El-haddad (2010), Lee (2019), Yusuf (2014), Romana and Leonardo (2014), Jarungkitkul and Sukcharoensin (2016) and Asongu (2015).

Literature related to the supply aspects of manufacturing finance can be found in Sethi (2018), Hoxha (2013), Toby and Peterside (2014), Fischer (2018), Rajan and Subramanian (2011), Das (2015), Mesagan et al. (2018), Efobi et al. (2019), Amornkitvikai and Harvie (2017), Aizenman and Sushko (2011) and Svilokos et al. (2019). The foregoing studies however have little or no attempts at statistical optimisation nor demand side treatments. A host of work also exists on the

general relationship between finance and growth with noteworthy overlaps with the current research, including; Mwenda and Mutoti (2011), Tsaurai (2018), Aziakpono (2011), Inanga and Mandah (2008), Levine (2005), Eschenbach (2011), Mahendra (2014), Manganelli and Popov (2015), Andersen and Tarp (2003), Demirguc-Kunt and Levine (2001b) and Odhiambo (2009), to mention a few. Literature closest to the demand side aspects with however inadequate statistical optimisation and relation to the supply side can be found in Naidu and Chand (2012), Wasiuzzaman et al. (2020), Fanta (2012), Rasiah (2011), Ayodeji and Balcioglu (2010), Nadeem and Sheikh (2011), Panda and Nanda (2018), Yegon et al. (2014), Handriani and Robiyanto (2018), Girma and Vencappa (2014), Margaritis and Psillaki (2010), Sutomo et al. (2019), Kadarova et al. (2015), Slavec and Prodan (2016), Musamali and Tarus (2013) and Meric et al. (2014). Further, the foregoing studies despite being related to the current study have respectively narrow focus areas with little attempts at statistical optimisation. Furthermore, the Zambia focused studies specifically lack adequate address of manufacturing finance and the relationship between its demand and supply sides. The deficiencies in the above highlighted studies thus necessitate the current study.

2.6. Lessons Learnt

Having reviewed the foregoing literature and further noted its key shortcomings with reference to the current study, a few stylised notes are warranted.

Zambia's manufacturing is significantly underdeveloped, application of the NICs model however stands to place it on an optimised trajectory. A multi-dimensional assessment of Zambia's manufacturing relative to NICs reveals that the former is severely underdeveloped (Chansa et al., 2019; World Bank, 2021b), application of the NICs model however stands to optimise Zambia's trajectory (Chansa et al., 2019; El-haddad, 2010; Lee, 2019; Romana & Leonardo, 2014; Weiss, 2005; Yusuf, 2014).

Zambia's manufacturing development strategies have thus far been inert with disruptions in manufacturing finance being a key contributor. Consistent and sufficient manufacturing finance is necessary for sustainable manufacturing development (Bell & Rousseau, 2000; Das, 2015; Efobi et al., 2019; Fanta, 2012; Fischer, 2018; Hoxha, 2013; Lee, 2019; Mesagan et al., 2018; Sethi, 2018; Svilokos et al., 2019; Toby & Peterside, 2014). Zambia's manufacturing finance has

however suffered numerous disruptions over the various industrial strategies (Carmody, 2009; Chitonge, 2016; Fessehaie et al., 2015; GRZ, 2014, 2017, 2018; Liebenthal & Cheelo, 2018; Mulimbika & Karim, 2018; Mwenda & Mutoti, 2011; Rolfe & Woodward, 2004; Seidman, 1974).

Effective manufacturing finance requires multidimensional financial development. Manufacturing finance can be sourced from multiple avenues including banking, non-banking, public, foreign investment, foreign aid and household sectors as well as manufacturing firms (Bwalya, 2006; Girma & Vencappa, 2014; GRZ, 2018; Gui-Diby & Renard, 2015; Rolfe & Woodward, 2004). Additional support is however needed from the financial, political and legal systems for efficient operation and expedited manufacturing finance development (Beck et al., 2003; Beck & Feyen, 2013; Beck & Levine, 2003; Demirguc-Kunt & Levine, 2001a; Law & Habibullah, 2009; Maimbo & Melecky, 2016; Melecky & Maria, 2013; Rajan & Zingales, 2003; Voghouei et al., 2011).

Political drive is a key factor in manufacturing finance. Strategic political planning and participation in manufacturing finance by NICs led to successful manufacturing finance systems (Bell & Rousseau, 2000; Chansa et al., 2019; El-haddad, 2010; Hall & Simper, 2013; Lee, 2019; Weiss, 2005; Yusuf, 2014). Further, while Zambia and other developing country governments may not have investible funds, they can create an environment in which investible funds are harnessed into manufacturing finance on the supply side and utilised by manufacturing firms (Briozzo et al., 2016; Chansa et al., 2019; Inanga & Mandah, 2008; Lee, 2019; Liebenthal & Cheelo, 2018; Mwenda & Mutoti, 2011; Prasad & Nickow, 2016; Rodrik, 2009; Romana & Leonardo, 2014; Seidman, 1974; Tyson, 2017; Voghouei et al., 2011; Weiss, 2005).

The legal system serves as the bedrock on which manufacturing finance is anchored and should be optimised for effective manufacturing finance. Contracting anchors all financial transactions, the quality of which depends on the efficiency and effectiveness of the prevailing legal system (Beck et al., 2003; Beck & Levine, 2002, 2003; Voghouei et al., 2011). Further, legal systems in former colonies are reminiscent of colonial systems and therefore need to be realigned to sovereign development agendas, manufacturing finance development inclusive (Beck et al., 2003; Beck & Levine, 2003; La Porta et al., 1998).

Developing countries need foreign inflows to sufficiently finance manufacturing development. Developing countries do not typically generate sufficient savings to finance manufacturing development (GRZ, 2017; Rolfe & Woodward, 2004; World Bank, 2021b). As such, foreign resources through remittances, investment and aid are necessary to supplement domestic efforts (Aizenman & Sushko, 2011; Benmamoun & Lehnert, 2013; Efobi et al., 2019; Fischer, 2018; Inanga & Mandah, 2008; Tsaurai, 2018).

Firm characteristics have significant effects on access to finance and understanding such characteristics is a key step in optimising manufacturing finance. Firm characteristics such as size, manager's experience, transparency, firm type, lack of viable projects, lending rates and labour productivity have significant effects on access to finance (Amornkitvikai & Harvie, 2017; Ayodeji & Balcioglu, 2010; Fanta, 2012; Mertzanis, 2016; Musamali & Tarus, 2013; Naidu & Chand, 2012; Rasiah, 2011; Tyson, 2017; Wasiuzzaman et al., 2020). Further, optimisation of manufacturing finance requires the generation of financial products and services that account for prevailing firm characteristics in ways that optimise utilisation and efficacy (Briozzo et al., 2016; GRZ, 2017; Tyson, 2017).

The supply and demand sides of manufacturing finance need to be aligned for successful manufacturing development. Alignment of the supply and demand sides of manufacturing finance requires address of the multiplicity of nuances and categories on both the supply and demand sides. This thus requires harmonising both micro level data from firms on the demand side and macro level data from regulatory institutions and financers on the supply side (Beck & Feyen, 2013).

While general industrial policy research exists, literature on manufacturing finance in Zambia is limited. Work by Chansa et al. (2019), Mudenda (2009), Seidman (1974), Yamfwa et al. (2002), Mulimbika and Karim (2018), Lombe (2018) and Rolfe and Woodward (2004) has focused on general industrial policy without sufficient statistical address of manufacturing finance. Manufacturing finance, as shown above is a critical subfield in the development agenda.

While respective literature on the supply and demand sides of manufacturing finance exists, literature statistically optimising the two sides is limited. While work exists on the supply side (Bell & Rousseau, 2000; Das, 2015; Efobi et al., 2019; Fanta, 2012; Hoxha, 2013; Lee, 2019;

Mesagan et al., 2018; Rajan & Subramanian, 2011; Sethi, 2018; Svilokos et al., 2019; Toby & Peterside, 2014) and work exists on the demand side (Ayodeji & Balcioglu, 2010; Briozzo et al., 2016; Fowowe, 2017; Girma & Vencappa, 2014; Margaritis & Psillaki, 2010; Mertzanis, 2016; Musamali & Tarus, 2013; Nadeem & Sheikh, 2011; Naidu & Chand, 2012; Panda & Nanda, 2018; Rasiah, 2011; Slavec & Prodan, 2016; Sutomo et al., 2019; Wasiuzzaman et al., 2020; Yegon et al., 2014), hardly any studies attempt to statistically link the two, despite an attempt by Beck and Feyen (2013), albeit not focused on manufacturing finance nor attempting to optimise a specific country(s).

While literature on NICs lessons for developing countries exists, hardly any literature exists on how to statistically translate such lessons into policy. While researchers have studied potential lessons from NICs (Chansa et al., 2019; El-haddad, 2010; Lee, 2019; Romana & Leonardo, 2014; Weiss, 2005), hardly any work has attempted to statistically simulate the effects of such lessons in developing countries nor generate quantitative policy targets.

2.7. Chapter Summary

This chapter defined the key terms of the study, highlighted the countries on which Zambia is benchmarked and why, and presented the empirical literature on the subject. It then concluded with the key deficiencies and lessons from the existing literature. With this arsenal, subsequent chapters attempt to use the lessons drawn to build knowledge on manufacturing finance through the scientific method.

CHAPTER III. METHODOLOGY

3.1. Introduction

This chapter presents the study methodology. It does so in six main sections, namely, research philosophy, data preparation, benchmarking, structural equation modelling and optimisation, and a summary.

3.2. Research Philosophy

This section is exposed in four themes: ontology, epistemology, methodology and axiology. Saunders et al. (2019, p. 130) define a research philosophy as "a system of beliefs and assumptions about the development of knowledge". It refers to the beliefs and assumptions about the nature of reality and how such nature may be discovered and understood. Typically, the adopted research philosophy serves as a blueprint, guiding the entirety of a study; its chosen methods, implicit research processes and how results are interpreted in relation to extant literature (Aliyu et al., 2014; Crotty, 1998; Saunders et al., 2019). In agreement but with an economics focus, Caldwell (1980) argues for the importance of understanding research philosophy in economic research as it aides the selection of fitting research methodology and subsequently enhances the quality of findings. Addressing how such a research philosophy is selected, Saunders et al. (2019) and Aliyu et al. (2014) highlight four components that need address before adopting a study research philosophy, namely: ontology, epistemology, methodology and axiology. What follows is therefore a contextualised review of the foregoing components prior to stating the adopted research philosophy.

3.2.1. Ontology

Ontology can quite simply be defined as the "assumptions about the nature of reality" (Saunders et al., 2019, p. 133). It addresses the structure and type of truth as well as how such truth can be identified and learnt (Aliyu et al., 2014). Simply put, ontology attempts to answer the question: "what is reality?". The current research attempts to use data from NICs and Zambia to build an optimised model for the latter. In this pursuit, it concedes that a reality exists in the NICs that is distinct from the reality observed in Zambia with the former experiencing a more optimised reality

than the latter as regards manufacturing development and manufacturing finance. In this view, the current research recognises that distinct realities exist outside observers of such realities. More technically, assuming two extremes on the ontology spectrum in objectivism and subjectivism, this research is more aligned to objectivism, noting the existence of one reality. Specifically, respective singular realities exist in Zambia and among NICs such that Zambian residents may experience a reality different from their accustomed reality when placed in a NICs environment and should further be able to identify that Zambian manufacturing finance is inferior to NICs manufacturing finance. The corollary is also true, NICs residents are expected to experience a reality different from their accustomed reality when exposed to Zambian manufacturing finance and should similarly be able to note that the NICs manufacturing finance is superior to Zambian manufacturing finance.

3.2.2. Epistemology

Epistemology addresses the assumptions made about knowledge; it focuses on such questions as "How can we know what we know? What is considered acceptable knowledge? What constitutes good-quality data? and What kinds of contribution to knowledge can be made?" (Saunders et al., 2019, p. 135). Epistemology attempts to link the knowledge and the knower by ascertaining what assumptions the knower makes about the knowledge being studied, and how such knowledge can be communicated (Aliyu et al., 2014; Saunders et al., 2019). In view of the current research, emphasis is given to empirically provable pieces of knowledge as well as universally tested and accepted laws within the economics field of study. More technically, the current research attempted to pursue facts using numbers and universally accepted analytical techniques. Specifically, the research used objectively selected statistical indicators and combinations thereof to measure and establish the properties of the NICs and Zambian manufacturing finance and further used such indicators and resulting parameters to develop a model for the Zambian economy. To ensure that the selection of manufacturing finance indicators was objective, the research typically begun with a comprehensive set of potential indicators and used mutual information between each potential manufacturing finance indicator and manufacturing development indicators to determine its suitability for inclusion. Only manufacturing finance indicators strongly related to manufacturing development were included in the analysis. In this way, the researcher's opinions about the indicators and relationships were kept at the minimum while ensuring that the research

and its results could be replicated by external analysts. Specifically, with optimisation functions clearly defined, optimal solutions and pathways towards them could be objectively measured.

3.2.3. Methodology

Methodology may be defined as the "strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes" (Crotty, 1998, p. 3). It focusses on the overall strategy of how knowledge is sought and how the selection of specific implementation methods is justified. Following the methodology approaches by Aliyu et al. (2014), this research by virtue of pursuing facts through empirical means is chiefly aligned to quantitative methods with mild use of qualitative methods in very limited instances. Specifically, wherever possible, the research sought to establish quantitative indicators for all manufacturing finance phenomena. Where the foregoing was not possible, it, where possible, isolated the different qualitative options and analysed them as categorical variables.

3.2.4. Axiology

Axiology refers to "the role of values and ethics" (Saunders et al., 2019, p. 134). It highlights the extent to which a researcher's values influences the research process. This research was undertaken with a view to improve Zambia's manufacturing finance and its associated manufacturing development and ensuing economic development and prosperity. In this view, its value transcended basic academic research. On the execution side, while ascertaining that manufacturing finance and its downstream effects are "good", its execution remained objective to enhance the quality and replicability of the resultant manufacturing finance model. Further, realising the limitedness of human capacity in analysing complex systems objectively, the research used heuristic computing algorithms to enhance the objectivity and scope of analysis in view of the study's complex interrelationships and indicator enormity. This allowed the research to generate all possible iterations of optimal manufacturing finance solutions without the limitedness of analytical capacity nor the exclusion of outcomes based on short-sighted assessments of "good" and "bad". In this way, this research attempted to exclude value judgement in the generation of optimal solutions, reserving such value judgements for policy pathway selection.

3.2.5. Research Philosophy: Positivism

In view of the above analysis, this research adopts the positivist research philosophy. It maintains that there exists one reality and such reality can be sought through empirically verifiable facts without any value judgement at the analysis stage. Limited value judgement is however applied in the selection of the policy pathways to attain the identified quantitative policy targets. A critique of the positivism application in economics can be found in Caldwell (1980), omitted here for a leaner exposition.

3.3. Data Preparation

3.3.1. Data Sources and Quality

The study combined four principal datasets, namely, World Bank Enterprise Surveys (World Bank), Global Financial Development Database (World Bank), International Finance Statistics (International Monetary Fund) and World Development Indicators (World Bank). Data from Central Banks and Ministries of Finance were, where necessary, used to supplement the principal datasets. The World Bank, International Monetary Fund, Central Banks, and Ministries of Finance are all generally considered reliable sources of finance and economic data as they typically relay officially published data and provide meta data for institutionally constructed indicators. Further, manufacturing firm level data from the World Bank Enterprise Surveys has grown to become the "gold standard" in the analysis of manufacturing firms, providing data on 194,000 firms (including services) on over 100 indicators across 13 topics in 155 countries (World Bank, 2023). Within countries, the surveys carry representative samples across key regions with reasonably high survey round frequency. In the case of Zambia, three surveys (2007, 2013 and 2019) have been conducted across the four key manufacturing districts (Lusaka, Ndola, Kitwe, and Livingstone). Furthermore, Enterprise Surveys carry comprehensive manufacturing firm access to finance and financing decisions modules (Beck & Feyen, 2013), averaging about 30 questions across the three cycles carried out in Zambia. This is in addition to production, firm characteristics, interaction with government services and employment modules, among others. In this respect, the data used met the data accuracy, reliability, and completeness thresholds of data quality for this study and has been used in numerous peer reviewed publications including, Beck and Feyen (2013), Cihak et al. (2012), Gui-Diby and Renard (2015), and Maimbo and Melecky (2016), to mention a few. The

principal datasets are however not without their discontents. Data from developing countries like Zambia for instance tends to be generated based on incomplete information. The Zambian inflation data was for instance largely based on an outdated base year and basket of goods and services. Further, data harmonised across countries requires superficial treatments to make it comparable across countries due to variations in such factors as base years and aggregation systems. Furthermore, the Enterprise Survey data while the "gold standard" at the aggregate, may lack complete comparability across countries due to such factors as varying survey years, response biases, coverage completeness and sampling frame qualities. As stated however, the data used is the best available, has undergone sufficient testing over the years and is conventionally accepted in the literature and practice.

3.3.2. Data Organisation and Cleaning

The study used both national and firm level data. Data in each of the four themes (systems, supply, demand, and manufacturing development) was further classified into dependent and independent variables. National level missing data points were replaced with the nearest available year where feasible. Alternative sources carrying similar methodologies were used otherwise, kindly see appendix B for details on each replacement. No imputations or replacements were performed on firm level data.

3.3.3. Data Reduction

While four analytical layers were conceptualised (see figure 13 above), primary analysis eliminated layers that necessitated indexation and/or unobserved variable analysis, reserving the two analytical frameworks for robustness checks. This approach was taken to delineate the manufacturing finance causal channels, reinforcing modelling and optimisation, and consequently strengthening remediation policy generation, notwithstanding the general low interpretability critique of indexation (Berger & Bristow, 2009; Dominique et al., 2013; Greco et al., 2019). Specifically, the respective independent variables of the 12 functions (the first layer of figure 13), were modelled on their dependent variables, while the dependent variables of the 12 functions were modelled on manufacturing development (annual sales at micro-level and manufacturing value added per capita at macro-level). As will be demonstrated later, further consolidation of

supply and demand side dependent variables at functional level was necessary for seamless analysis.

Further, the conceptual framework presented a multiplicity of indicators, some of which prima facie appeared to represent similar phenomenon. A focused analytical framework however required the least possible number of indicators (Andersson & Djeflat, 2013b; Ho & Wu, 2006), the principle of parsimony. As such, the theory and empirically informed indicators were narrowed down to indicators that had the highest impact on their respective functional dependent variable. This streamlining was executed using mutual information (kindly see below) in such a way that each layer preserved indicators that had the most optimal forward and backward dependence structures through an iterative assessment of mutual information scores across analytical layers.

3.3.3.1. Mutual Information

Mutual information is a method of measuring the dependency between variables (Li, 1990). Unlike Pearson Correlation or Euclidean Distance, mutual information does not only detect linear dependencies but any functional relationship (Li, 1990; Steuer et al., 2002). Strong dependence between variables results in a large mutual information score while independent variables have zero mutual information scores. The site-to-site mutual information function as presented in Li (1990), takes the form.

$$M(d) = \sum_{\alpha}^{K} \sum_{\beta}^{K} P_{\alpha\beta}(d) log \frac{P_{\alpha\beta}(d)}{P_{\alpha} P_{\beta}}$$

Where, P_{α} and P_{β} , and $P_{\alpha\beta}$ are the single site probabilities and joint probabilities, respectively.

3.3.4. Data Transformations

Where necessary, variables were transformed to make higher values “good” and smaller values “bad” for manufacturing finance. This made graphical representations of optimisations and their interpretations easier. A log of each transformation is shown in appendix C.

3.4. Benchmarking

3.4.1. Introduction to Benchmarking

Benchmarking was mainstreamed and has its origins in corporate benchmarking, initially in Japan among firms such as the Xerox Corporation in their attempts to learn and adopt best in class products and practices (Adebanjo et al., 2010; Anand & Kodali, 2008; Drake & Fabozzi, 2010; Francis & Holloway, 2007; Papaioannou, 2007; Papaioannou et al., 2006; Robert, 2010; Yasin, 2002). Key predecessors of benchmarking include competitive analysis and quality function deployment (Yasin, 2002). While there is no universal definition of benchmarking, it involves learning and innovation promotion from studying the processes and outputs of external entities (Robert, 2010). At firm level, "Benchmarking is the process of identifying, understanding, and adapting outstanding practices from within the organisation or from other businesses to help improve performance" (Vermeulen, 2003, p. 65). At policy level, benchmarking can be defined as "a technique to systematically measure performance against an objective target, usually a best practice, in order to improve performance" (Dominique et al., 2013, p. 2). Dominique et al. (2013) note three key assumptions of benchmarking: (1) transferability of policy across contexts, (2) policy makers' willingness to learn from other countries and (3) objectivity and rationality of the learning. Further, Papaioannou et al. (2006) present key some tenets in the application of policy benchmarking namely, measurability of benchmarking variables, differentiation between performance and practices, learning the best practices and application of learned practices to the required context, among others.

The purpose of benchmarking is to identify system aspects that need improvement by systematically establishing best performers in the fraternity, learning from them and using this knowledge to develop context specific policies and further monitoring and evaluating their performance against that of the benchmarks (Dominique et al., 2013; Francis & Holloway, 2007; Robert, 2010). Robert (2010) categorises benchmarking into three types: performance, process, and policy. Performance benchmarking focuses on comparing metrics on relevant characteristics to establish rank among units (Andersson & Djeflat, 2013a; Francis & Holloway, 2007; Robert, 2010). Process benchmarking compares structures and systems including key practices and functions (Francis & Holloway, 2007; Papaioannou et al., 2006; Robert, 2010). Lastly, policy benchmarking involves public policy comparisons and how they influence practices and

characteristics (Papaioannou, 2007; Robert, 2010; Room, 2005). While performance benchmarking focuses on stocktaking and ranking, process benchmarking attempts to gain insights into the inherent causes of effectiveness and efficiency (Francis & Holloway, 2007; Robert, 2010). Performance benchmarking, unlike process and policy however has the unique features of intertemporal and multi-subject comparison (Robert, 2010). Further, policy benchmarking can take either bottom-up or top-down approaches with stakeholder engagement and interactive learning taking precedence in the former while "naïve copy and paste" dominates the latter (Papaioannou, 2007).

Benchmarking may be further categorised by the entities performing the benchmarking, three categories arise in this regard: (1) Independent benchmarkers – benchmarkers with no particular affiliation to benchmarked regions such as academics and consultants, (2) Single region benchmarkers – benchmarkers with direct attachment to one of the benchmarked regions and objectives, and (3) Multi-region benchmarkers – benchmarkers with direct attachment to multiple benchmarked regions (Robert, 2010). Examples of benchmarking can be found in the practices of the UK Audit Commission, Belgium Federal Planning Bureau, Australian Federal Ministry of Economy and Labour, and European Commission, among others (Papaioannou et al., 2006). Further, the European Union through the Open Method of Coordination regularly employs the different types of benchmarking at various levels in its operations (Bruno et al., 2006).

Despite its positive attributes, several issues must be addressed to ensure that the correct results are generated from benchmarking. These include indicator selection, harmonising and effectively addressing the three types of benchmarking, and paradigm diversity maintenance. In the first instance, benchmarking is premised on establishing top performers through indicator construction, which inherently determines which entities emerge as best performers. Care should hence be taken to ensure that selected indicators are both valid and reliable in relation to the phenomenon of interest and correspondingly, the aggregation methods are objective and non-leading (Andersson & Djeflat, 2013a; Berger & Bristow, 2009; Broome et al., 2018; Room, 2005). The foregoing should however be achieved with as minimal indicators as possible to ensure clarity of analysis (Andersson & Djeflat, 2013b)

Further, benchmarking for policy development should not merely end at performance benchmarking, it should incorporate process benchmarking and policy benchmarking as well (Andersson & Djeflat, 2013a; Francis & Holloway, 2007; Papaioannou et al., 2006). Specifically, further from identifying top performers; the contexts, quality, processes, strengths and weaknesses of such top performers should be studied to understand the factors leading to such success (Klumpes, 2004; Papaioannou, 2007; Papaioannou et al., 2006). Recontextualization, innovation and learning should then follow to facilitate policy development that ensures that the developed policy fits the new environment whilst operationalising the necessary post benchmarking activities such as monitoring and evaluation (Andersson & Djeflat, 2013a; Papaioannou et al., 2006; Robert, 2010).

Furthermore, in selecting and learning from best performers, care should be taken to ensure that the diversity of paradigms and the comparative advantages of adopting entities are preserved (Broome et al., 2018; Francis & Holloway, 2007; Papaioannou, 2007; Room, 2005). In this regard, Broome et al. (2018) highlight that benchmarks produced by international organisations such as the FDI regulatory restrictiveness index and Ease of Doing Business Ranking promote specific economic paradigms and present them as facts when in fact not; further noting that such benchmarks are an indirect but significant source of political power as they influence the global political economy. Broome et al. (2018) further document failures of the aforementioned benchmarks in their inability to predict outcomes, and their general lack of intertemporal consistency.

Applications of benchmarking analysis exist at various levels in the literature. Mukherjee et al. (2002) for instance study the strategic homogeneity that comes with performance benchmarking in Indian commercial banks using Data Envelopment Analysis (DEA). Similarly, Sufian (2011) applies DEA to measure the efficiency of South Korean banks. At international level, Jarungkitkul and Sukcharoensin (2016) apply relative value analysis to benchmark the competitiveness of equity markets across five countries. Other benchmarking methods nonetheless exist, Ho and Wu (2006) for instance apply grey relation analysis to the benchmarking of Indian Banks while taking the stock market into account. In a different context, Galariotis et al. (2016) introduce a multi attribute benchmarking method and apply it on the financial benchmarking of local governments in France. At global level, Cihak et al. (2012) introduce the Global Financial Development

Database in an attempt to benchmark financial institutions and financial markets (financial systems) through four dimensions: financial depth, access, efficiency and stability by selecting appropriate indicators under each dimension, and further applying cluster analysis to assign countries to groups for further analysis. The current study utilises benchmarking on two levels, in the relative value thematic benchmarking of Zambia's manufacturing finance against the NICs and in the data envelopment construction of country specific non-parametric manufacturing finance efficiency frontiers. The latter allows comparison of the profiles of Zambian efficient firms with NICs efficient firms.

3.4.2. Graphical Analysis

Graphical analysis was used to visualise Zambia's manufacturing finance relative to NICs, highlighting nuances that may have otherwise been missed in numerical analysis. The analysis collapsed the combined dataset by country and year to compare the different dimensions of manufacturing finance with manufacturing development, and Zambia against the benchmark countries.

3.4.3. Relative Value Analysis

Relative value analysis was used to investigate the performance of Zambia's manufacturing finance themes relative to NICs. The analysis typically compares the performances of multiple entities on identical indicators (Jarungkitkul & Sukcharoensin, 2016). Algebraically, the relative value in each theme was given by.

$$RV_{A,i} = \frac{(V_{A,i} - Min_A)}{(Max_A - Min_A)/10}$$

Where $RV_{A,i}$, $V_{A,i}$, Min_A and Max_A are the theme A relative value for country i, country i and theme A numeric value, theme A minimum value and theme A maximum value, respectively. The generated relative values carry values in the range 0 and 10, with 10 representing best performance and 0 the worst performance (Jarungkitkul & Sukcharoensin, 2016). Robustness checks in this analysis used alternative but related indicators and, where possible, alternative reference periods.

3.4.4. Data Envelopment Analysis

Data Envelopment Analysis (DEA) is a benchmarking method used to analyse technical, pure technical and scale efficiencies among Decision Making Units (DMUs) (Ji & Lee, 2010; Sufian, 2011). DEA uses linear programming to measure the relative efficiency of homogenous DMUs considering multiple inputs and outputs (Azadeh et al., 2010; Mukherjee et al., 2002). It offers various advantages over conventional parametric methods such as regression analysis. In this context, while regression techniques may attempt to compare each firm's manufacturing finance properties against the central tendency efficiency of a set of firms, DEA attempts to analyse the efficiency of each firm with a view to optimise it relative to the best performer. The method however carries a shortcoming, each DMU attempts to obtain its maximum efficiency by optimising its own weight, leading to overestimated efficiency and general clustering around unit efficiency, thereby making discrimination difficult. Cross efficiency nonetheless reduces this clustering (Mukherjee et al., 2002).

In this study, DEA constructed country specific non-parametric efficiency frontiers with number of workers, manager's experience, external auditing, court constraints, taxation constraints, firm type, lending interest rate, capacity utilisation and foreign aid as inputs, and annual sales, access to working capital finance and access to investment finance as outputs. Manufacturing firms that lay on the frontier or were close enough (above 95%) to the frontier were deemed the most efficient, with firms lying below the frontier assessed as lesser efficient. By country, the profiles of the efficient NICs firms were then compared with the profiles of the Zambian efficient firms and further used to generate constraints in the optimisation phase of the study. Algebraically, DEA assuming constant returns to scale minimised the function (Sufian, 2011),

$$l_0 - \varepsilon\left[\sum_{i=1}^{m} S_i^- + \sum_{r=1}^{s} S_r^+\right]$$

subject to,

$$\sum_{f=1}^{N} \lambda_f x_{if} = l_0 x_{if_0} - S_i^-$$

and

$$\sum_{f=1}^{N} \lambda_f y_{rf} = S_r^+ + y_{rf_0}$$

Where; $i = 1 \dots m;\ r = 1 \dots s; f = 1 \dots N;\ \lambda_f \geq 0;\ S_i^- \geq 0\ and\ S_i^+ \geq 0\ for\ all\ i\ and\ r$. Further, x_{if} and y_{rf} represent the i^{th} and r^{th} input and output respectively for each manufacturing firm in each country; N is the number of manufacturing firms, ε is the lower bound of inputs and outputs, λ_f is the contribution of firm f in generating the efficiency of the rated firm f_0; S_i^- and S_i^+ are slack, proxying the extra savings and extra gains in input i and output r respectively and l_0 denotes the radial efficiency factor.

Similar applications of DEA to finance can be found in Azadeh et al. (2010), Margaritis and Psillaki (2010) and Sufian (2011). The *deaR* package in R was used to implement DEA. Robustness in this analysis took two forms. Firstly, respective input and output variables were iterated with close substitutes. Secondly, alternative survey rounds were used, in cases of multiple survey rounds, maintaining the latest survey (year) in the primary analysis.

3.5. Structural Equation Modelling

Structural Equation Modelling (SEM) may be seen as a multivariate estimation technique that considers both observed and unobserved variables (Igolkina & Meshcheryakov, 2020; Rosseel, 2012). Its origins can be traced back to Wright (1921), in path analysis involving only observed variables that later evolved to encompass the economics inspired simultaneous equation models and factor analysis from psychology (Igolkina & Meshcheryakov, 2020; Rosseel, 2012). SEM has consequently evolved to comprise a diverse set of tools and approaches including, path analysis, factor analysis and multivariate regression models.

SEM may be viewed as an extension of linear regression where several regression equations are executed simultaneously (Kline, 2015). Specifically, an independent variable in one equation may also be a dependent variable in another equation within the same system of regression equations and further, latent variables can exist as independent or dependent variables (Kline, 2015; Rosseel, 2012). Estimation of relationships in SEM are carried out using model parameters to describe the

sample variance-covariance structure (Igolkina & Meshcheryakov, 2020; Kline, 2015). Traditionally, SEM contains structural and measurement components where latent variables are linked to each other in the structural components and the measurements specify the linear effects of latent variables on observed variables (Igolkina & Meshcheryakov, 2020). Algebraically,

$$x = \alpha x + \lambda$$

and

$$y = \beta x + \tau$$

Where x is a latent variable vector, y is an observed variable vector, α and β are linear parameter matrices and λ and τ are random error vectors.

While the choice of SEM in this study is self-evident, three SEM features make it especially suited for the study. Firstly, SEM's estimation of several regressions at the same time in which an independent variable in one equation may be a dependent variable in another makes it especially useful for this study (Kline, 2015; Rosseel, 2012). As shown in the conceptual framework, the equations estimated in this study are interrelated and need to be estimated simultaneously. Secondly, SEM allows the modelling of complex relationships simultaneously, given that this study models numerous relationships across several subjects (countries), SEM halves the number of analyses conducted (Hox & Bechger, 1999; Kline, 2015; Ockey, 2013). Thirdly, SEM's inclusion of unobserved variables allows robustness checks of the unobserved components of the study conceptual framework with minimal deviation from the primary analytical model (Igolkina & Meshcheryakov, 2020; Kline, 2015). Explicit path analysis in SEM additionally made it an attractive option as it allowed greater flexibility in conducting robustness checks through path manipulation.

Notwithstanding the strategic draws, SEM carries four assumptions that need to be considered before application, namely, no multicollinearity and singularity, linear relationships between the variables, multivariate normality, and observation independence, with a minimum sample size of 150 recommended (Kline, 2015; Ockey, 2013). As such, four pre-estimation tests were conducted, following standard SEM literature (Chang et al., 2009; Hox & Bechger, 1999; Kline, 2015; Ockey,

2013; Rosseel, 2012). Specifically, multicollinearity and singularity were initially assessed using correlation analysis with Variance Inflation Factor being checked on correlation results greater than 0.9. linearity was assessed on bivariate scatter plots while multivariate composed two tiers. Firstly, univariate normality was assessed based on the skewness and kurtosis absolute values, with results higher than 3 in the former and 10 in the latter being considered problematic. Secondly, multivariate normality was tested using Mardia's coefficient of multivariate kurtosis adopting Satorra-Bentler correction and bootstraped standard errors in cases of non-normal data (Hox & Bechger, 1999; Kline, 2015; Ockey, 2013; Rosseel, 2012).

SEM analysis also requires post estimation checks to ensure that the resulting model is well fitted. In this regard, four checks are proposed in literature, chi-square statistic, an absolute fit index, a relative fit index and the standard root mean square residual (Chang et al., 2009; Hox & Bechger, 1999; Igolkina & Meshcheryakov, 2020; Kline, 2015; Ockey, 2013; Rosseel, 2012). The chi-square statistic assesses the deviation between the population covariance matrix estimated based on the model and the sample covariance matrix based on the data. The model is well fitted if the deviation is not significant. In the study formulation, obtaining a p-value higher than 0.05 implies that the model is well fitted. Because the chi-square statistic is based on sample size however, mild differences in between the proposed model and actual data in large data sets can lead to an erroneous conclusion about the model fit. As such, absolute and relative fit indices, operationalised through the Root Mean Square Error of Approximation (RMSEA) and Comparative Fit Index (CFI), respectively and the SRMR provide fit assessments that consider sample size and other factors. Literature recommends up to 0.08 for RMSEA, 0.9 and above for the CFI and less than 0.1 for SRMR (Kline, 2015; Ockey, 2013). With the multiplicity of considerations, overall analysis of model fit considers all post estimation checks wholistically.

Specifically, the study used the Generalised SEM to model the NICs and Zambian manufacturing finance models. The access to working capital finance (AWC) and access to investment finance (AIN) models for the respective efficient NIC firms and Zambian firms carried the following functional forms:

$$AWC_i = \beta_0 - \beta_1 X_{1i} + \beta_1 X_{2i} + \beta_1 X_{3i} + \cdots + \beta_n X_{ni} + \varepsilon_i$$

$$AIN_i = \alpha_0 - \alpha_1 Y_{1i} + \alpha_2 Y_{2i} + \alpha_3 Y_{3i} + \cdots + \alpha_m Y_{mi} + \tau_i$$

Where $\boldsymbol{X}$ and $\boldsymbol{Y}$ are independent variable vectors in AWC and AIN models, with varying configurations between efficient NICs and Zambia. Further, $\boldsymbol{\beta}$ and $\boldsymbol{\alpha}$ are vectors of coefficients and intercepts with i representing the firm ID and, ε and τ are the respective error terms. While the domestic private start-up investment (DPO) and foreign private start-up investment (FPO) models for the respective study countries carried the following functional forms:

$$DPO_j = \pi_0 - \pi_1 V_{1j} + \pi_2 V_{2j} + \pi_3 V_{3j} + \cdots + \pi_l V_{lj} + \psi_j$$

$$FPO_j = \lambda_0 - \lambda_1 W_{1j} + \lambda_2 W_{2j} + \lambda_3 W_{3j} + \cdots + \lambda_o W_{oj} + \varphi_j$$

Where $\boldsymbol{V}$ and $\boldsymbol{W}$ are dependent variable vectors in the DPO and FPO models, with varying configurations across the respective study countries. Further, $\boldsymbol{\pi}$ and $\boldsymbol{\lambda}$ are vectors of coefficients and intercepts with j representing the firm ID and, ψ and φ are the respective error terms. It should be emphasized that the start-up investment models attempted to investigate the conditions at firm establishment, returning only firms that were at most 10 years old and using proxy variables where necessary.

The study used the *lavaan* package in R to estimate the structural equation models. Robustness checks took three forms, path manipulation, iteration with substitute indicators and alternative non-normality estimation techniques.

3.6. Optimisation

The study utilised lessons from NICs in the benchmarking phase to optimise Zambia's manufacturing finance as modelled in the SEM. Specifically, a multi-objective optimisation of the SEM equations was executed using the benchmarking results to design the multi-constraint framework. A multi-objective optimisation attempts to generate a pareto front of non-dominated solutions based on trade-off solutions between competing and sometimes conflicting objectives (Briza & Naval, 2011; Raquel & Naval, 2005) . A solution is non-dominated if an improvement in one aspect requires worsening at least one other aspect. Such optimisations aim to obtain the best

estimate of the pareto optimal set that is well distributed. Algebraically, a multi-objective optimisation problem may be stated as follows (Briza & Naval, 2011);

Maximise: $y = f(x) = \big(f_1(x), \dots, f_n(x)\big)$

Subject to: $g(x) = \big(g_1(x), \dots, g_n(x)\big) \leq 0$ and $h(x) = \big(h_1(x), \dots, h_n(x)\big) = 0$

Where; $x = (x_1, \dots, x_m) \in X$ and $y = (y_1, \dots, y_n) \in Y$

Such that x is a decision vector with X as its decision space, and y is the objective vector with Y as its objective space with $g(x)$ and $h(x)$ being the constraints. In this way, a solution (pareto front), x^* are decision vectors that optimise the objective functions.

3.6.1. Objective Functions and Constraint Framework

Four objective functions were drawn from SEM. The constraint framework adopted the thresholds of historical Zambian performance such that it is not outside the scope of reason that such limits can be attained. Other operational constraints were placed on the optimisation to ensure that the optimal solutions conformed to economic logic such as keeping ownership share between 0 and 100.

3.6.2. Multi-Objective Particle Swarm Optimisation with Crowding Distance

Attributed to Kennedy and Eberhart (1995), particle swarm optimisation is an optimisation algorithm based on the social behaviour of a swarm of birds as they search for food. With little practical use from the social metaphor, optimisation is achieved by firstly launching an initial population of particles with random solutions in the solution search space. For every generation, each particle maintains its best solution and its so far found global best solution, updating this relative to the other particles. The search direction is further updated based on the particle and global best solutions; iteration of the foregoing thus generates a collection of non-dominated solutions. Among heuristic optimisation methods, MOPSO was selected because it stood to provide the most optimal outcomes for the study. Specifically, relative to other heuristics, PSO carries two key advantages, its relative simplicity and effectiveness at low computational cost (Briza & Naval, 2011; Hassan et al., 2005; Raquel & Naval, 2005). The study applied MOPSO

with Crowding Distance (MOPSOCD), a MOPSO variation that incorporates the Non-Dominated Sorting Genetic Algorithm (NSGA-II, an evolutionary algorithm) crowding distance density estimator to facilitate global best selection and removal of less optimal but non-dominated solutions from the archive. The MOPSOCD pseudo code and algorithm flow chart (figure 14) found in Briza and Naval (2011, pp. 1193–1194) are reproduced below.

*"**Begin***

Initialise swarm;

Evaluate objective functions;

Store particle bests;

Store non-dominated particles;

As 0 approaches time, t;

***While** time, t is less than the maximum time, t_{max}*

Compute crowding distances in the archive and select guides;

Compute new positions;

Mutation;

Evaluate objective functions;

Impose constraints;

Update archive;

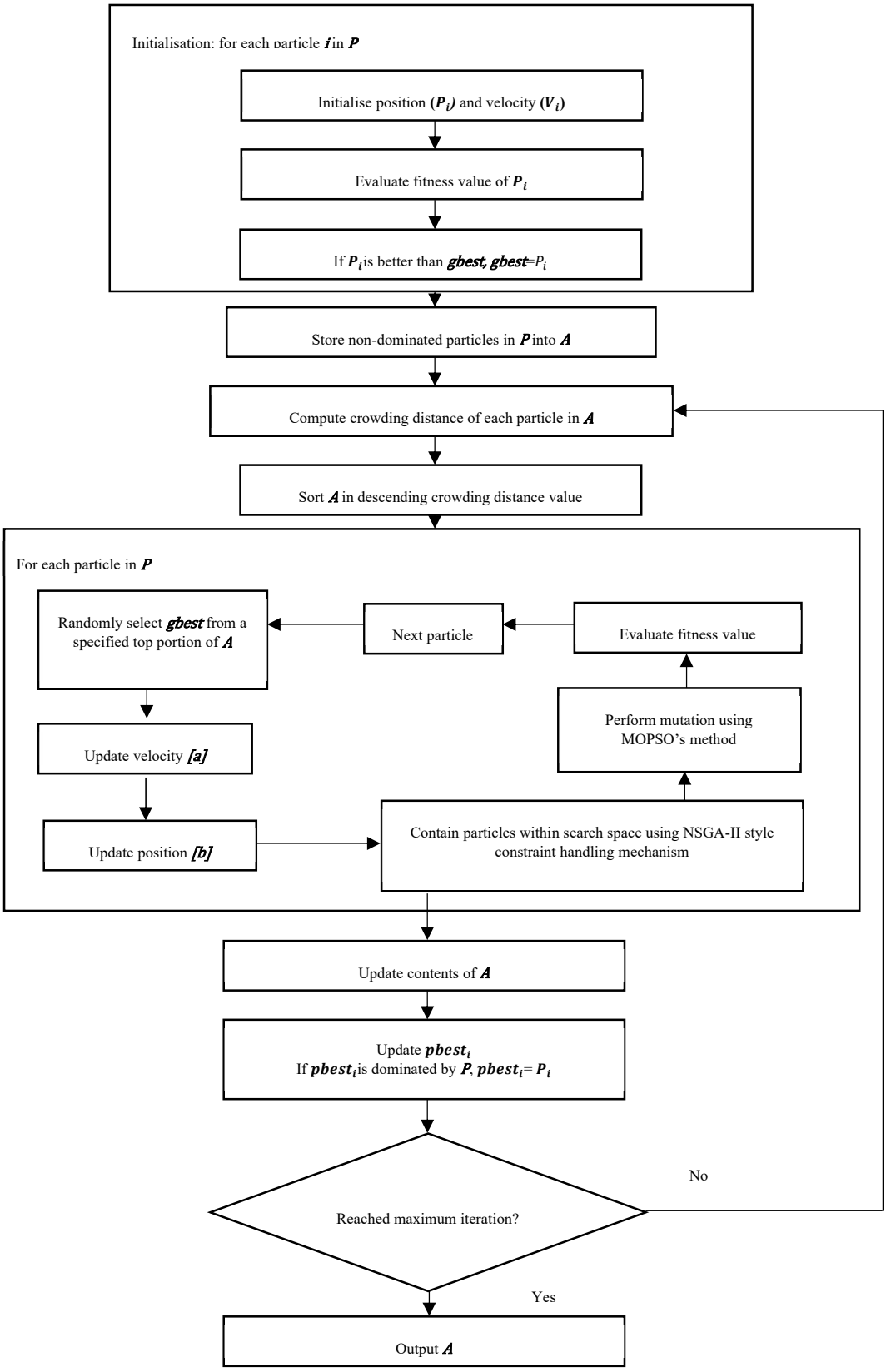
Update particle bests;

As time plus one, $t+1$ approaches t;

End while

***End**"*

Figure 14: Multi-Objective Particle Swarm Optimisation with Crowding Distance Algorithm



Where, *P, M, A,* P_i, and V_i are the population, population size, external archive, position of the i^{th} particle and velocity of the i^{th} particle, respectively. With *[a]*, the velocity update equation given by:

$$V_i = w * V_i + R1 * (pbest_i - P_i) + R2 * A_{gbest} - P_i$$

Where, w, $r1$ and $r2$, $pbest_i$, A_{gbest} are inertia weight, random numbers in the range [0…1], best position that particle i have reached and global best guide for each non-dominated solution, respectively. Further, *[b],* the position update equation is given by:

$$P_i = P_i + V_i$$

The study adopted heuristic optimisation as opposed to classical econometric optimisation methods such as linear programming. Based on Gilli and Schumann (2012) and Krink and Paterlini (2011), heuristic optimisation carried numerous advantages over linear programming in the current study. Firstly, heuristic optimisation allows application of more diverse constraints relative to linear programming. With a multiplicity of objective functions, variables and constraints, heuristic optimisation allows easier application of constraints. Secondly, heuristic optimisation executes faster than linear programming, with multiple iterations and corrections, linear programming takes longer to implement. The study implemented MOPSOCD using the *mopsocd* package in R. As the optimisation was based on a heuristic method, robustness checks focused on using alternative algorithms to ensure that the generated optimums were substantiated by other algorithms.

3.7. Chapter Summary

This chapter has presented the study methodology, its associated robustness checks and where necessary, pre- and post-estimation checks. It highlighted adopted research philosophy and the justification thereof and further, the data preparation process; including the sources, reliability, organisation, cleaning and data reduction and transformation, noting the use of mutual information to streamline the indicators. The chapter then highlighted the benchmarking methods employed, highlighting the use of DEA for firm level benchmarking and relative value analysis for national level benchmarking with graphical analysis providing visual analysis. SEM was then presented and how its results were used in the optimisation process, using the generalised structural equation

model in the first instance and multi-objective particle swarm optimisation with crowding distance in the latter. The next chapter presents and interprets the results.

CHAPTER IV. RESULTS AND INTERPRETATION

4.1. Introduction

This chapter presents and interprets the study results. It lays out, without discussion, the results from data reduction, graphical analysis, relative value analysis, data envelopment analysis, structural equation modelling and optimisation.

4.2. Data Reduction

This section presents a series of tables in which mutual information scores illustrate the strengths of relationships between the dependent and independent variables within manufacturing finance functional themes across the study countries. While mutual information relationships are not necessarily causal, they helped indicator selection and informed inclusion and exclusion between closely related variables. Causal relationships were established in the SEM analysis and visualised through path diagrams, as demonstrated below.

Table 14: Data Reduction Results: Manufacturing Development

S/n	Type	Variable Name	Annual Sales	MI Score
1	Dependent	Annual sales	-	0.61547
2	Dependent	MVA per capita	0.61913	-
3	Independent	Domestic market capitalisation	0.62399	2.01890
4	Independent	Banking sector credit	0.62124	2.06225
5	Independent	ODA per capita	0.61700	2.06134
6	Independent	Lending interest rate	0.61409	2.02359
7	Independent	Access to working capital finance	0.05192	0.14528
8	Independent	Taxation as a constraint	0.02503	0.04297
9	Independent	Domestic private ownership	0.02409	0.10162
10	Independent	Access to investment finance	0.02330	0.05061
11	Independent	Foreign private ownership	0.02078	0.09716
12	Independent	Courts as a constraint	0.01097	0.01151
13	Independent	Government ownership	0.00900	0.00005

Table 14 above shows that, with the exception of government ownership, the conceptualised functional theme dependent variables were at least statistically related to both the micro (annual sales) and macro (manufacturing value added per capita) indicators of manufacturing development.

Table 15: Data Reduction Results: Financial System

S/n	Type	Variable Name	MI Score
1	Dependent	Lending interest rate	-
2	Independent	Central bank assets	2.02370
3	Independent	Broad money to reserves	2.02364
4	Independent	Claims on private sector	2.02355
5	Independent	Domestic bank credit	2.02355
6	Independent	Monetary sector credit	2.02340
7	Independent	Real effective exchange rate	2.02329
8	Independent	Foreign direct investment	2.02326
9	Independent	Liquid liabilities	2.02323
10	Independent	Gross savings	2.02320
11	Independent	Inflation	2.02317
12	Independent	Domestic market capitalisation	2.01958
13	Independent	Financial system deposits	1.96621
14	Independent	Access to working capital finance	0.13893
15	Independent	External auditor	0.12121
16	Independent	Capacity utilisation	0.09745
17	Independent	Access to investment finance	0.06013
18	Independent	Taxation as a constraint	0.03864
19	Independent	Courts as a constraint	0.01155

Table 14 above shows that the financial system indicator (lending interest rate) was related to its conceptualised causal variables, paying due attention to domestic bank credit, domestic market capitalisation, both access to finance indicators, taxation as a constraint and courts as a constraint.

Table 16: Data Reduction Results: Political System

S/n	Type	Variable Name	MI Score
1	Dependent	Taxation as a constraint	-
2	Independent	Corruption as major constraint	0.075
3	Independent	Region	0.056
4	Independent	Domestic market capitalisation	0.050
5	Independent	Age dependency ratio	0.042
6	Independent	Rural population	0.042
7	Independent	Taxes on exports	0.041
8	Independent	Claims on central government	0.038
9	Independent	Urban population	0.037
10	Independent	Political instability as major constraint	0.036
11	Independent	Compensation of employees	0.035
12	Independent	Bank domestic credit	0.033
13	Independent	Total natural resources rents	0.031
14	Independent	Labour regulations as major constraint	0.029
15	Independent	Tax and contribution rate	0.025

S/n	Type	Variable Name	MI Score
16	Independent	Access to working capital finance	0.013
17	Independent	Capacity utilisation	0.012
18	Independent	ISIC code	0.004
19	Independent	Access to investment finance	0.003

Table 16 above shows that the political system indicator (taxation as a constraint) was related to its conceptualised causal variables, paying due attention to domestic market capitalisation, bank domestic credit and both indicators of access to finance.

Table 17: Data Reduction Results: Legal System

S/n	Type	Variable Name	MI Score
1	Dependent	Courts as a constraint	-
2	Independent	Use of intellectual property	0.0203
3	Independent	Lending interest rate	0.0169
4	Independent	Employment to population ratio	0.0167
5	Independent	Number of heads of state	0.0162
6	Independent	Bank domestic credit	0.0161
7	Independent	Years of independence	0.0046
8	Independent	Access to working capital finance	0.0045
9	Independent	Domestic market capitalisation	0.0043
10	Independent	Exported directly	0.0040
11	Independent	Domestic private ownership	0.0032
12	Independent	Access to investment finance	0.0000

Table 17 above shows that the legal system indicator (courts as a constraint) was related to its conceptualised causal variables, paying due attention to lending interest rate, bank domestic credit, domestic market capitalisation, domestic private ownership, and access to working capital finance.

Table 18: Data Reduction Results: Access to working capital finance.

S/n	Type	Variable Name	MI Score
1	Dependent	Access to working capital finance	-
2	Independent	Region	0.2621
3	Independent	Real effective exchange rate	0.2299
4	Independent	Lending interest rate	0.2263
5	Independent	Reserves in months	0.2217
6	Independent	Commercial bank branches	0.2183
7	Independent	Domestic bank credit	0.2159
8	Independent	Broad money to GDP	0.2141
9	Independent	Liquid liabilities	0.2134
10	Independent	Foreign direct investment	0.2068

S/n	Type	Variable Name	MI Score
11	Independent	Financial system deposits	0.2060
12	Independent	Domestic market capitalisation	0.1964
13	Independent	Total natural resources rents	0.1916
14	Independent	ATMs	0.1875
15	Independent	Remittance inflows	0.1869
16	Independent	ISIC code	0.1366
17	Independent	Firm age	0.1235
18	Independent	Number of workers	0.1155
19	Independent	Capacity utilisation	0.1115
20	Independent	Firm type	0.0898
21	Independent	Annual sales	0.0563
22	Independent	Legal origin	0.0559
23	Independent	Imported inputs	0.0548
24	Independent	Domestic sales	0.0540
25	Independent	Exported directly	0.0475
26	Independent	Domestic private ownership	0.0408
27	Independent	External auditor	0.0363
28	Independent	Corruption as obstacle	0.0168
29	Independent	Taxation as a constraint	0.0085
30	Independent	Courts as a constraint	0.0068

Table 18 above shows that access to working capital finance was related to its conceptualised causal variables, paying due attention to firm properties such as number of workers, firm type and external auditing and market related factors such as domestic market capitalisation, banking related variables, lending interest rates and real effective exchange rates.

Table 19: Data Reduction Results: Access to investment finance

S/n	Type	Variable Name	MI Score
1	Dependent	Access to investment finance	-
2	Independent	Real effective exchange rate	0.1989
3	Independent	Firm age	0.1546
4	Independent	Commercial bank branches	0.1464
5	Independent	ISIC code	0.1463
6	Independent	Lending interest rate	0.1449
7	Independent	Reserves in months	0.1417
8	Independent	Region	0.1390
9	Independent	Broad money to GDP	0.1365
10	Independent	Liquid liabilities	0.1333
11	Independent	Number of workers	0.1321
12	Independent	Financial system deposits	0.1311

S/n	Type	Variable Name	MI Score
13	Independent	Foreign direct investment	0.1167
14	Independent	Domestic bank credit	0.1126
15	Independent	Total natural resources rents	0.1044
16	Independent	Capacity utilisation	0.1009
17	Independent	Domestic market capitalisation	0.0963
18	Independent	Remittance inflows	0.0924
19	Independent	ATMs	0.0839
20	Independent	Firm type	0.0599
21	Independent	Domestic sales	0.0569
22	Independent	Imported inputs	0.0451
23	Independent	Exported directly	0.0407
24	Independent	Annual sales	0.0350
25	Independent	Domestic private ownership	0.0311
26	Independent	Corruption as obstacle	0.0173
27	Independent	Taxation as a constraint	0.0148
28	Independent	External auditor	0.0134
29	Independent	Legal origin	0.0099
30	Independent	Foreign technology	0.0066
31	Independent	Courts as a constraint	0.0013

Table 19 above shows that access to investment finance was related to its conceptualised causal variables, paying due attention to firm properties such as number of workers, firm type and external auditing and market related factors such as domestic market capitalisation, banking related variables, lending interest rates, real effective exchange rates, and taxation and court constraints.

Table 20: Data Reduction Results: Domestic Banking Sector

S/n	Type	Variable Name	MI Score
1	Dependent	Domestic bank credit	-
2	Independent	Liquid liabilities	2.06222
3	Independent	Broad money to GDP	2.06219
4	Independent	Bank deposits to GDP	2.06219
5	Independent	Bank credit to deposits	2.06216
6	Independent	Bank non-interest income	2.06213
7	Independent	Bank cost to income	2.06210
8	Independent	Inflation	2.06205
9	Independent	Real effective exchange rate	2.06199
10	Independent	Insurance and financial services	2.06193
11	Independent	Commercial bank branches	2.06187
12	Independent	Bank Z-score	2.06187
13	Independent	Bank concentration	2.06172
14	Independent	Bank non-performing loans	2.05402

S/n	Type	Variable Name	MI Score
15	Independent	Lending interest rate	2.02334
16	Independent	Bank regulatory capital	1.96453
17	Independent	Value of collateral	0.62751
18	Independent	Region	0.50640
19	Independent	Firm type	0.37430
20	Independent	ISIC code	0.20597
21	Independent	Imported inputs	0.14278
22	Independent	External auditor	0.12749
23	Independent	Number of workers	0.11262
24	Independent	Domestic private ownership	0.10419
25	Independent	Capacity utilisation	0.09805
26	Independent	Foreign private ownership	0.09514
27	Independent	Domestic sales	0.09264
28	Independent	Manager's experience	0.09128
29	Independent	Firm age	0.07693
30	Independent	Exported directly	0.07298
31	Independent	Loans requiring collateral	0.05569
32	Independent	Taxation as a constraint	0.04139
33	Independent	Bank concentration	-
34	Independent	ODA per capita	2.06222
35	Independent	Inflation	2.06219
36	Independent	Bank non-interest income	2.06219
37	Independent	Bank cost to income	2.06216

Table 20 above shows that domestic bank credit was related to its conceptualised causal variables, paying due attention to lending interest rate and real effective exchange rate.

Table 21: Data Reduction Results: Domestic Non-Banking Sector

S/n	Type	Variable Name	MI Score
1	Dependent	Domestic market capitalisation	-
2	Independent	Direct debt investments	2.02006
3	Independent	High tech in manufacturing	2.01935
4	Independent	Direct liabilities investment	2.01938
5	Independent	Value of stocks traded	2.01929
6	Independent	Broad money to GDP	2.01926
7	Independent	Real effective exchange rate	2.01911
8	Independent	Equity and investment fund shares	2.01935
9	Independent	Total reserves	2.01970
10	Independent	Inflation	2.01935
11	Independent	Lending interest rate	2.01896
12	Independent	Portfolio debt liabilities	2.01095
13	Independent	Insurance company assets	2.01123
14	Independent	Portfolio equity inflows	2.02047

S/n	Type	Variable Name	MI Score
15	Independent	Profit tax	1.54020
16	Independent	Annual sales	0.61422
17	Independent	Capacity utilisation	0.10016
18	Independent	ISIC code	0.20716
19	Independent	Manager's experience	0.08707
20	Independent	Imported inputs	0.14758
21	Independent	Firm type	0.36361
22	Independent	Firm age	0.08336
23	Independent	Foreign private ownership	0.09458
24	Independent	Number of workers	0.11198
25	Independent	External auditor	0.11809
26	Independent	Foreign technology	0.02626
27	Independent	Domestic listed firms	0.68458
28	Independent	Taxation as a constraint	0.04018
29	Independent	Introduced new product	0.04254
30	Independent	Not needing a loan	0.02898
31	Independent	Courts as a constraint	0.01416

Table 21 above shows that the domestic non-banking sector indicator (market capitalisation) was related to its conceptualised causal variables, paying due attention to lending interest rate and real effective exchange rate.

Table 22: Data Reduction Results: Foreign Investment

S/n	Type	Variable Name	MI Score
1	Dependent	Foreign private ownership	-
2	Independent	Manufactures imports	0.10091
3	Independent	Domestic market capitalisation	0.09573
4	Independent	Reserves in months	0.09485
5	Independent	Domestic bank credit	0.09253
6	Independent	Unemployment rate	0.09177
7	Independent	Real interest rate	0.09084
8	Independent	Non-resident banks	0.08963
9	Independent	Final consumption expenditure	0.08932
10	Independent	Export unit value	0.08871
11	Independent	Inflation	0.08857
12	Independent	Remittance inflows	0.08810
13	Independent	Taxes on trade	0.08237
14	Independent	Real effective exchange rate	0.08151
15	Independent	Trade openness	0.07754
16	Independent	Lending interest rate	0.07587
17	Independent	Imported inputs	0.07367
18	Independent	Profit tax	0.06294

S/n	Type	Variable Name	MI Score
19	Independent	Firm type	0.06118
20	Independent	Domestic sales	0.05661
21	Independent	Number of workers	0.04158
22	Independent	Exported directly	0.04001
23	Independent	ISIC code	0.02557
24	Independent	Foreign technology	0.01567
25	Independent	Taxation as a constraint	0.01216
26	Independent	Manager's experience	0.00946
27	Independent	Courts as a constraint	0.00333

Table 22 above shows that foreign private investment, indicated by foreign private ownership, was related to its conceptualised causal variables, paying due attention lending interest rate, real effective exchange rate, banking sector credit and market capitalisation.

Table 23: Data Reduction Results: Foreign Aid

S/n	Type	Variable Name	MI Score
1	Independent	ODA per capita	-
2	Independent	Claims on central government	2.07326
3	Independent	Domestic bank credit	2.07300
4	Independent	Reserves in months	2.07289
5	Independent	Population growth	2.07283
6	Independent	HH and NPISHs consumption	2.07280
7	Independent	Remittance inflows	2.07280
8	Independent	Inflation	2.07272
9	Independent	Real effective exchange rate	2.07269
10	Independent	Imports	2.07263
11	Independent	Foreign direct investment	2.07260
12	Independent	Employment to population ratio	2.07260
13	Independent	Export unit value	2.07254
14	Independent	Total natural resources rents	2.07240
15	Independent	Labour force participation rate	2.07237
16	Independent	Unemployment rate	2.07237
17	Independent	MVA per capita	2.07232
18	Independent	Compensation of employees	2.07223
19	Independent	Lending interest rate	2.03472
20	Independent	Domestic market capitalisation	2.03056
21	Independent	Years of independence	2.02144
22	Independent	Life expectancy	1.98785
23	Independent	Number of heads of state	1.63351
24	Independent	Annual sales	0.61897
25	Independent	Firm type	0.36361

Table 23 above shows that the foreign aid indicator (ODA per capita) was related to numerous macroeconomic factors including lending interest rate.

Table 24: Data Reduction Results: Public Sector

S/n	Type	Variable Name	MI Score
1	Dependent	Government ownership	-
2	Independent	Real interest rate	0.01390
3	Independent	Manufacturing value added	0.01140
4	Independent	Employment to population	0.01063
5	Independent	ODA to GNI	0.01062
6	Independent	Reserves in months	0.00854
7	Independent	Technical cooperation grants	0.00799
8	Independent	Tax and contribution rate	0.00702
9	Independent	Total natural resources rents	0.00611
10	Independent	ODA to government expense	0.00608
11	Independent	Urban population	0.00606
12	Independent	Number of heads of state	0.00517
13	Independent	ODA per capita	0.00509
14	Independent	Number of workers	0.00374
15	Independent	Foreign direct investment	0.00372
16	Independent	Capacity utilisation	0.00322
17	Independent	Unemployment rate	0.00305
18	Independent	Lending interest rate	0.00190

Table 24 above shows that government investment, indicated by government ownership, was related to numerous macroeconomic factors including lending interest rate and manufacturing value added.

Table 25: Data Reduction Results: Domestic Private Ownership

S/n	Type	Variable Name	MI Score
1	Dependent	Domestic private ownership	-
2	Independent	Largest owner proportion	0.11188
3	Independent	Employment to population ratio	0.10618
4	Independent	Domestic market capitalisation	0.10460
5	Independent	Labour force participation rate	0.10310
6	Independent	Real interest rate	0.10151
7	Independent	Urban population	0.10147
8	Independent	Other business taxes	0.09934
9	Independent	Tax and contribution rate	0.09887
10	Independent	Inflation	0.09847
11	Independent	Domestic bank credit	0.09706
12	Independent	Unemployment rate	0.09434

S/n	Type	Variable Name	MI Score
13	Independent	Age dependency ratio	0.09361
14	Independent	Taxes on trade	0.09336
15	Independent	Remittance inflows	0.09274
16	Independent	Commercial bank branches	0.08989
17	Independent	Lending interest rate	0.08802
18	Independent	Real effective exchange rate	0.08673
19	Independent	Profit tax	0.08520
20	Independent	Firm type	0.06543
21	Independent	Region	0.05926
22	Independent	Domestic sales	0.05337
23	Independent	Number of workers	0.03039
24	Independent	Not needing a loan	0.01861
25	Independent	ISIC code	0.01805
26	Independent	Foreign technology	0.01747
27	Independent	Taxation as a constraint	0.01217

Table 25 above shows that domestic private investment, indicated by domestic private ownership, was related to its conceptualised variables, paying due attention to lending interest rate and real effective exchange rate.

4.3. Benchmarking

This section presents and interprets benchmarking results across the three methodologies applied namely, graphical analysis, relative value analysis and data envelopment analysis.

4.3.1. Graphical Analysis

This subsection presents static versions of four-dimension plots of manufacturing finance theme dependent variables against manufacturing development across the study countries over time. While illustrating Zambia's relative performance across each manufacturing finance theme, the graphs also show the links between manufacturing finance and manufacturing development.

Figure 15 below shows a stationary version of a four-dimension plot of lending interest rate and manufacturing development by country and year. It shows that South Korea's 2005 manufacturing development was the highest in the sample. Further, there appears to be an overall negative relationship between manufacturing development and lending interest rate, such that, higher lending interest rates are associated with lower manufacturing development. Further, figure 16 below shows a stationary version of a four-dimension plot of taxation as a constraint and

manufacturing development by country and year. In the figure, taxation constraints appear to be well distributed across manufacturing development levels with no immediately discernible relationship. It is however apparent that taxation constraints in Zambia were relatively higher than in NICs.

Figure 15: Lending interest rate and manufacturing development: Zambia Vs NICs

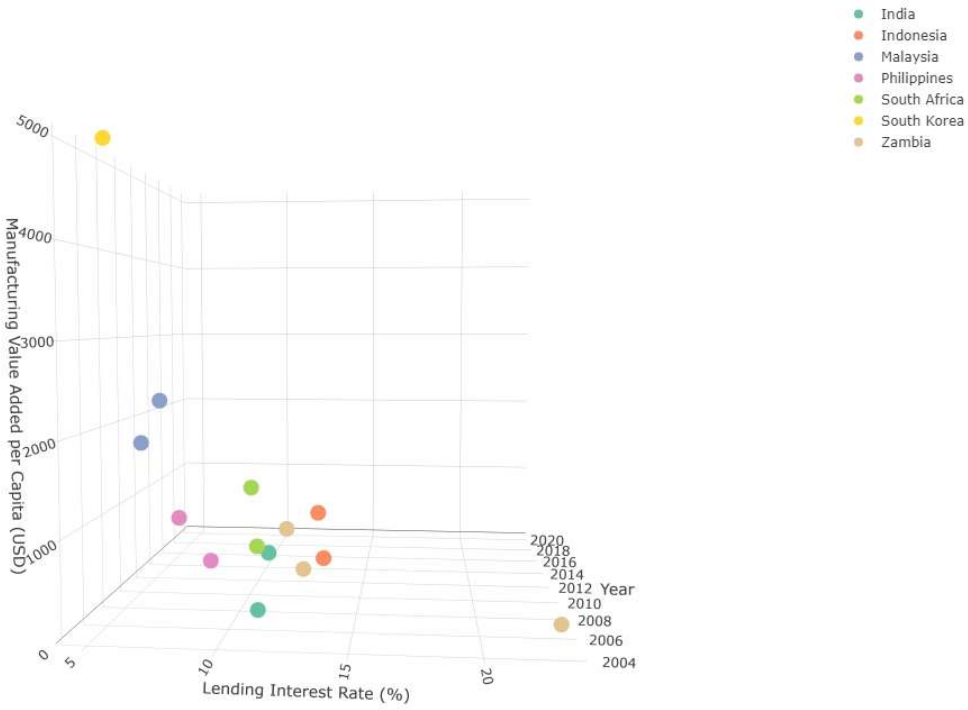


Figure 16: Taxation as a constraint and manufacturing development: Zambia Vs NICs

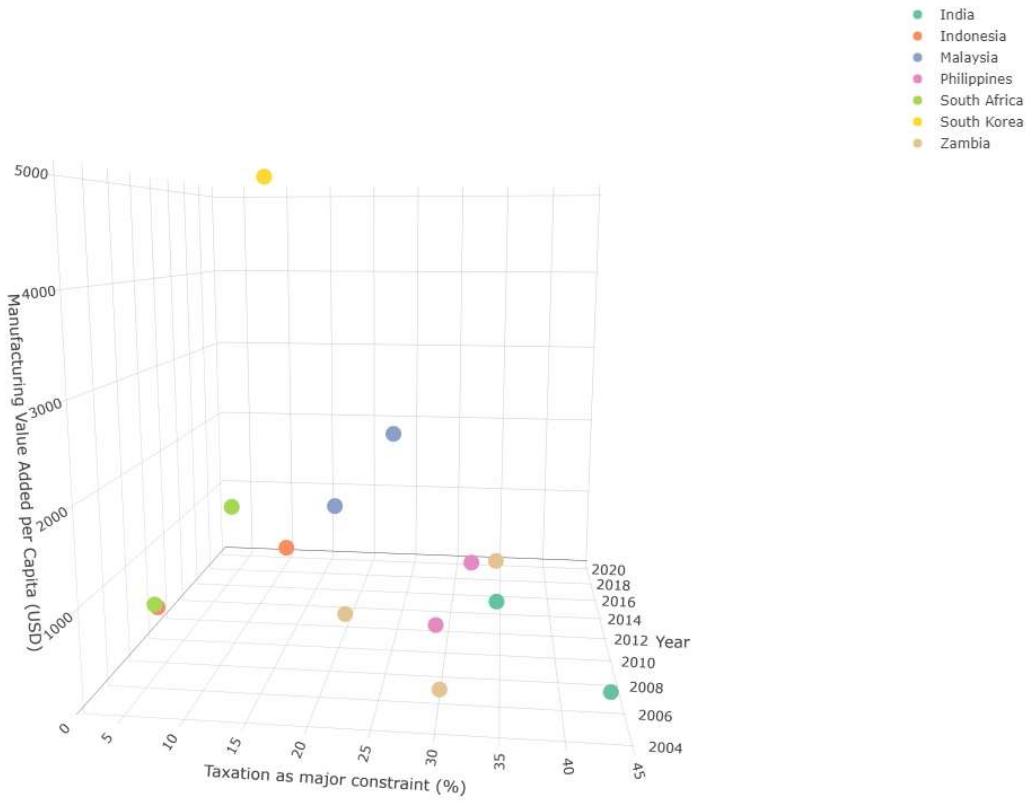


Figure 17: Courts as a constraint and manufacturing development: Zambia Vs NICs

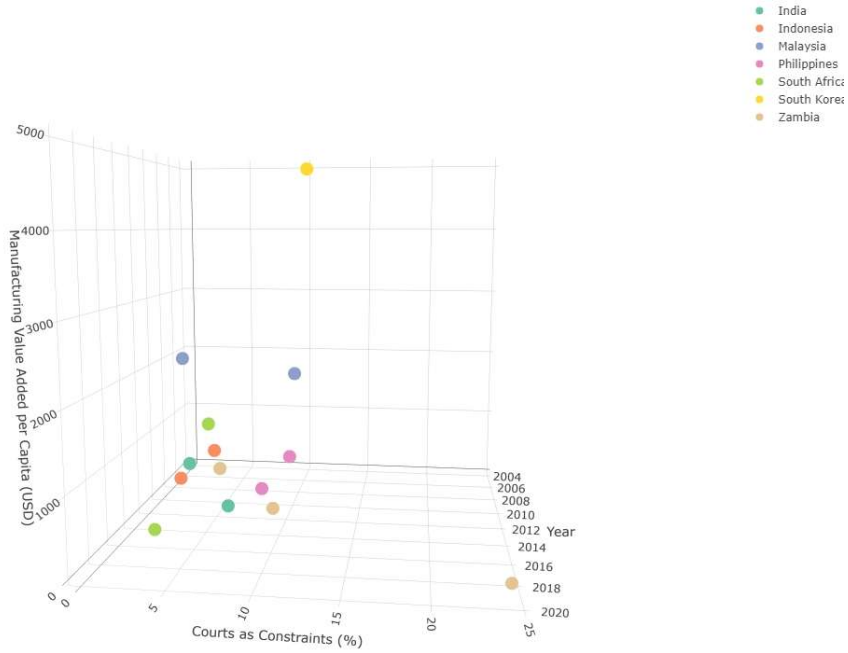


Figure 17 above shows a stationary version of a four-dimension plot of court constraints and manufacturing development by country and year. No immediately discernible relationship can be deduced between manufacturing development and court constraints. It is however apparent that court constraints in Zambia were higher than in NICs.

Figure 18: Access to working capital finance and manufacturing development: Zambia Vs NICs

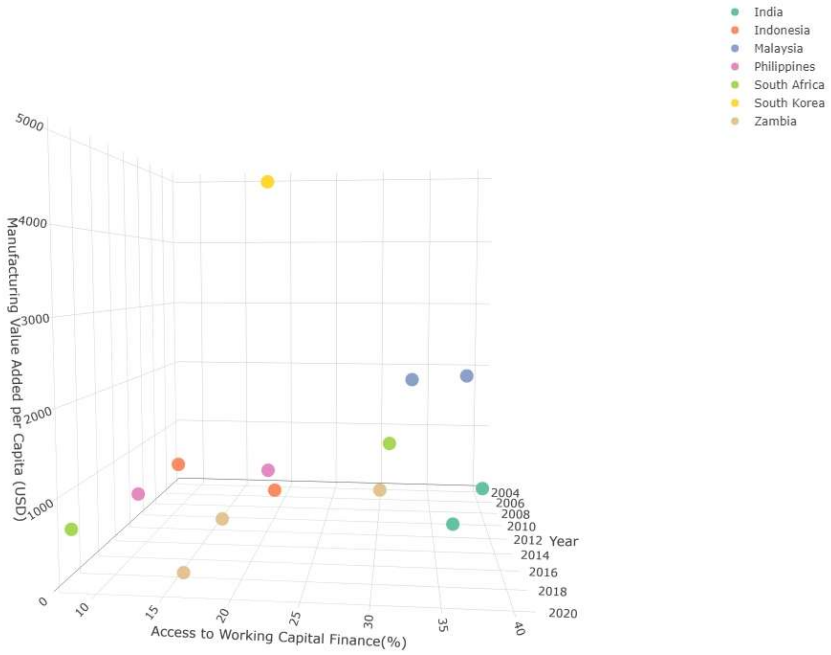


Figure 18 above shows a stationary version of a four-dimension plot of access to working capital finance and manufacturing development by country and year. It shows a mild positive relationship between manufacturing development and access to working capital finance, such that, higher access to working capital finance is associated with higher manufacturing development.

Figure 19: Access to investment finance and manufacturing development: Zambia Vs NICs

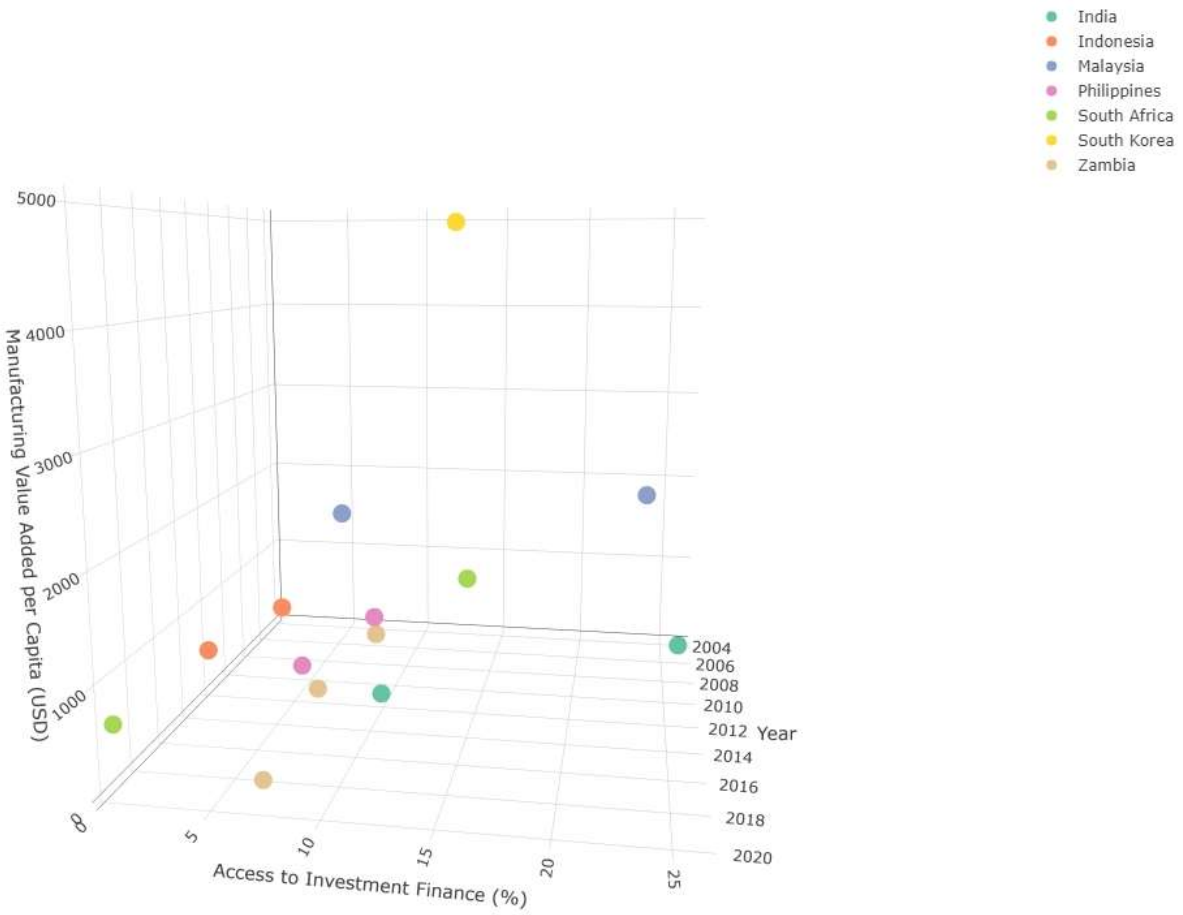


Figure 19 above shows a stationary version of a four-dimension plot of access to investment finance and manufacturing development by country and year. It suggests a positive relationship between manufacturing development and access to investment finance, such that, higher access to investment finance is associated with higher manufacturing development. Further, figure 20 below shows a stationary version of a four-dimension plot of domestic banking sector credit and manufacturing development by country and year. It suggests a positive relationship between domestic banking sector credit and manufacturing development, such that, higher levels of domestic banking sector credit are associated with higher manufacturing development.

Figure 20: Domestic banking sector and manufacturing development: Zambia Vs NICs

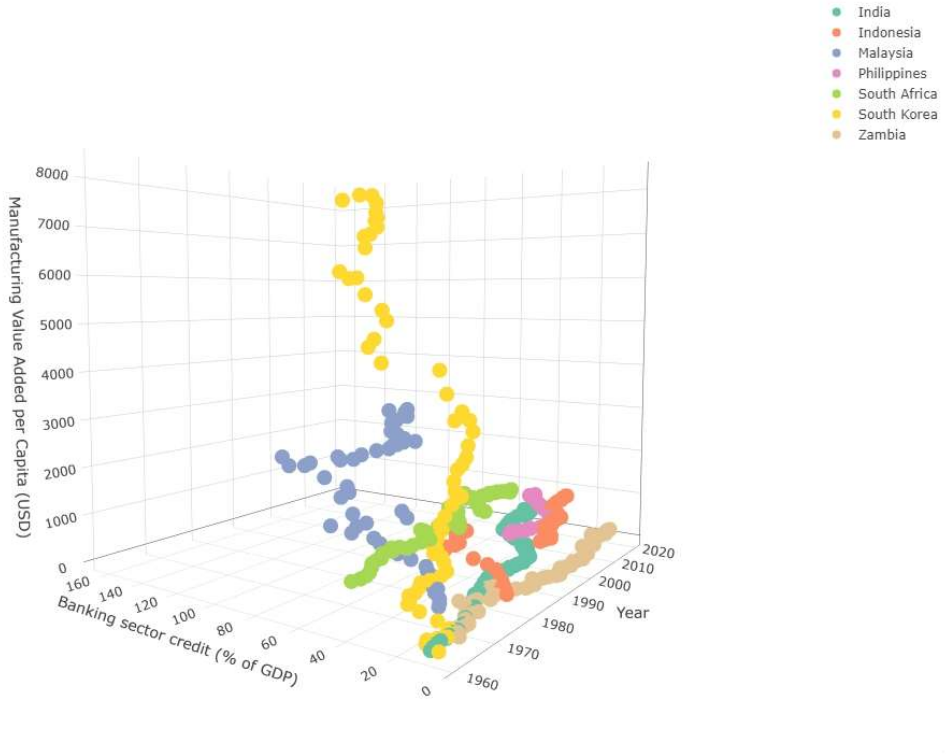


Figure 21: Domestic non-banking sector and manufacturing development: Zambia Vs NICs

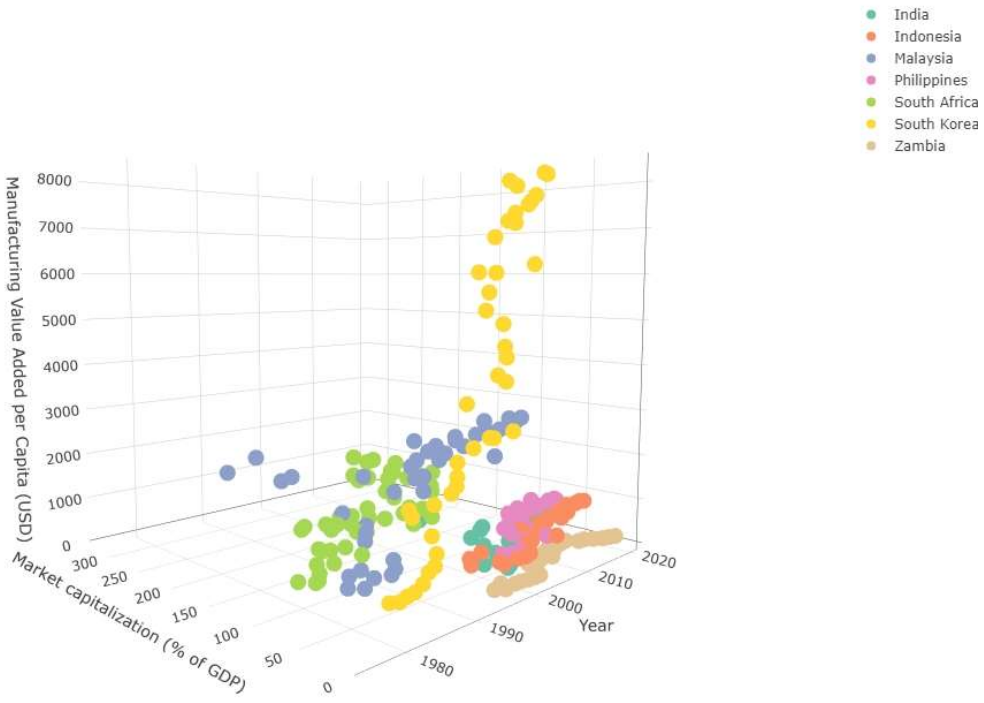


Figure 21 above shows a stationary version of a four-dimension plot of domestic market capitalisation and manufacturing development by country and year. It suggests a positive relationship between domestic market capitalisation and manufacturing development, such that, higher levels of domestic market capitalisation are associated with higher manufacturing development.

Figure 22: Foreign investment and manufacturing development: Zambia Vs NICs

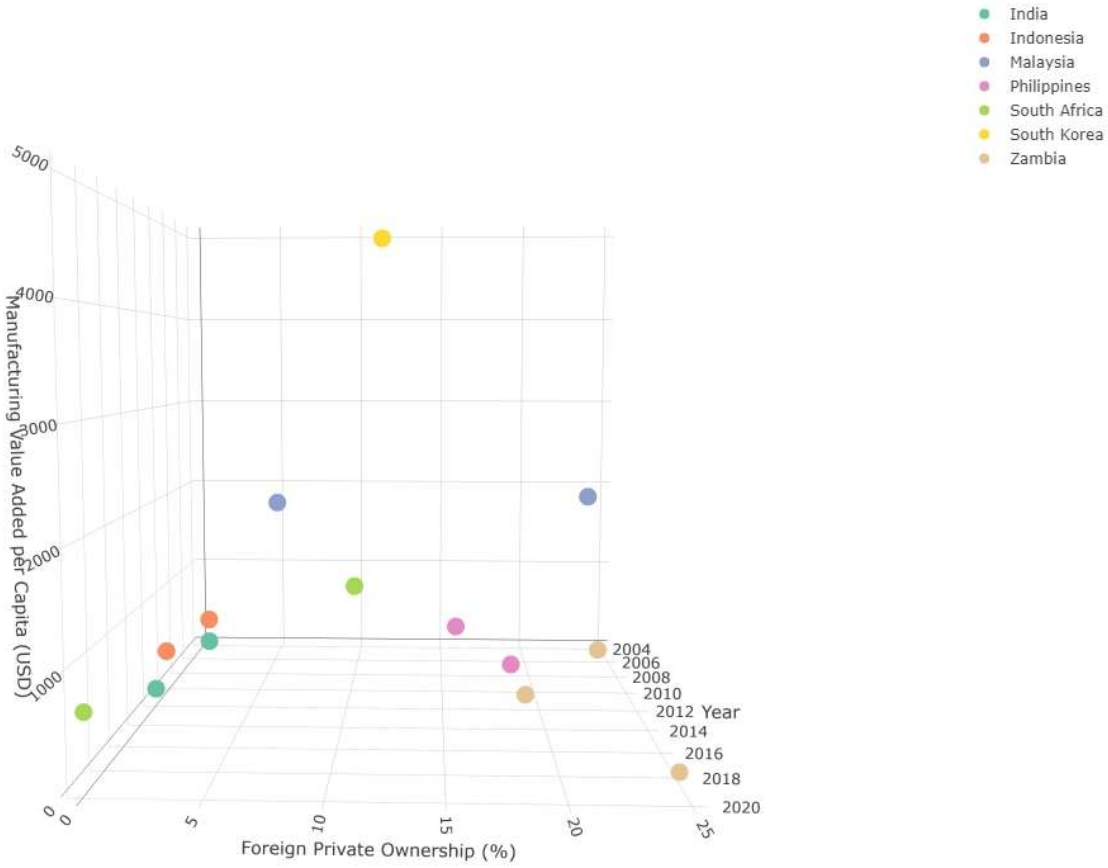


Figure 22 above shows a stationary version of a four-dimension plot of foreign private ownership of manufacturing firms and manufacturing development by country and year. No immediately discernible relationship may be deduced between foreign private ownership and manufacturing development. It is however apparent that foreign private ownership in Zambia is relatively higher than NICs. Further, figure 23 below shows a stationary version of a four-dimension plot of net ODA per capita and manufacturing development by country and year. While there appears to be no immediately discernible relationship between foreign aid and manufacturing development, Zambia appears to have received significantly higher levels of foreign aid, relative to NICs.

Figure 23: Foreign aid and manufacturing development: Zambia Vs NICs

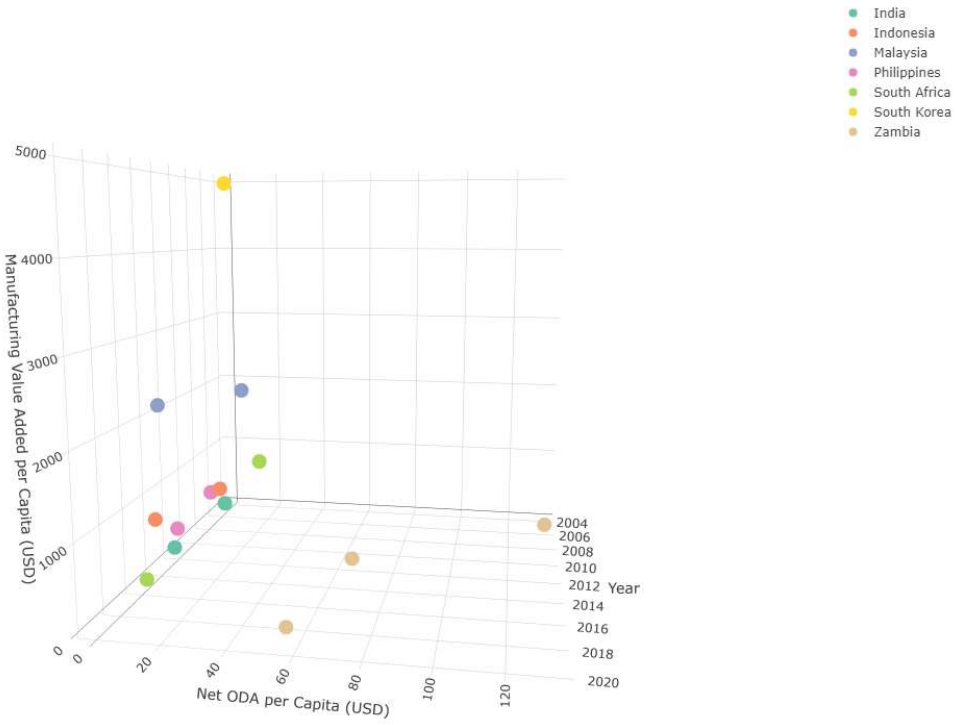


Figure 24: Government investment and manufacturing development: Zambia Vs NICs

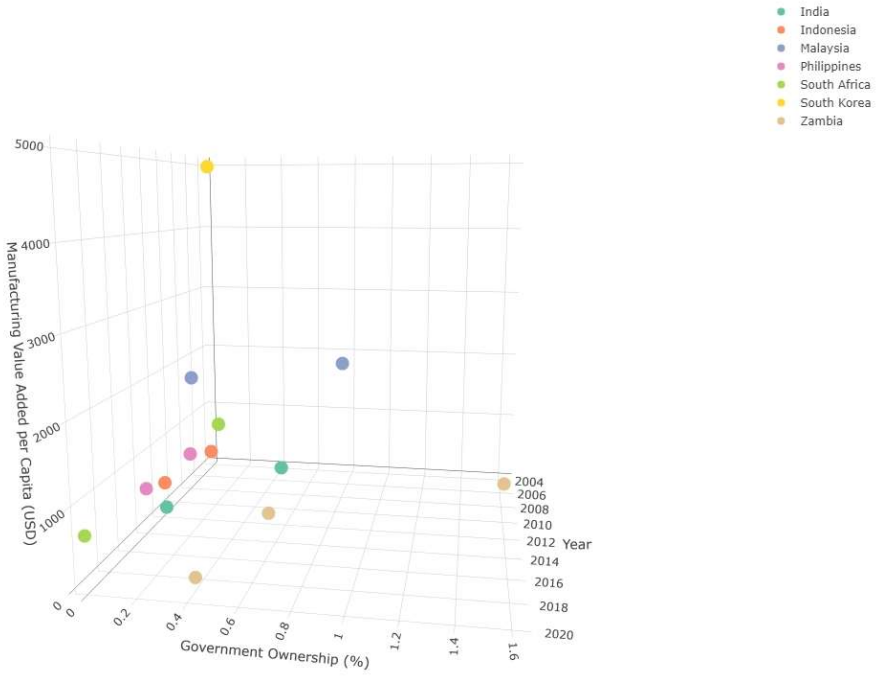


Figure 24 above shows a stationary version of a four-dimension plot of government ownership of manufacturing firms and manufacturing development by country and year. While there appears to

be no immediately discernible relationship between government ownership and manufacturing development, Zambia appears to have relatively higher government ownership than NICs.

Figure 25: Domestic private investment and manufacturing development: Zambia Vs NICs

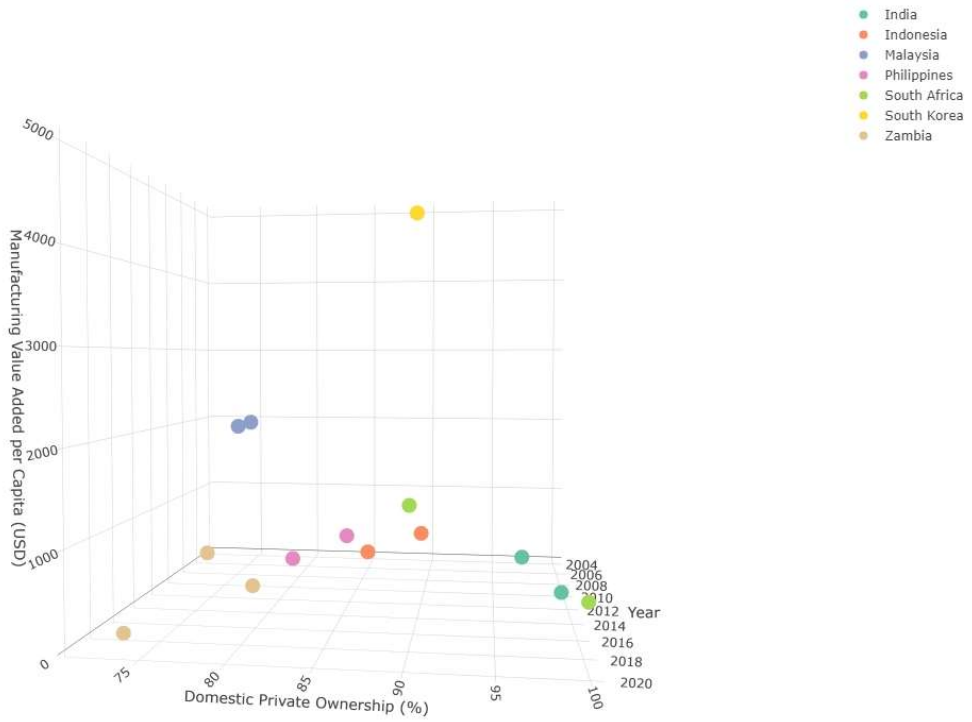


Figure 25 above shows a stationary version of a four-dimension plot of domestic private ownership in manufacturing firms and manufacturing development by country and year. While there appears to be no immediately discernible relationship between domestic private ownership and manufacturing development, domestic private ownership appears to be generally high among NICs relative to Zambia.

4.3.2. Relative Value Analysis

This section presents the results of the relative value analysis through a summary table and a series of radar graphs comparing manufacturing finance theme performance between NICs and Zambia. Table 26 below shows the relative values of the study countries across 26 manufacturing finance sub-themes. As previously stated, a relative value score of 10 indicates the highest performer while 0 represents the lowest performer under the respective theme, the best performing country's value is presented in bold text. Interpretation is given beneath the radar graphs below.

Table 26: Relative Value Analysis Scores

S/n	Country Year	India, 2014	Indonesia, 2015	Malaysia, 2015	Philippines, 2015	South Africa, 2020	South Korea, 2005	Zambia, 2019
1	MVA per capita	0.2	1.2	4.2	1.0	1.1	**10.0**	0.0
2	Access to working capital finance	**10.0**	4.6	8.7	0.4	0.0	3.3	2.7
3	Access to investment finance score	8.5	0.7	7.1	5.1	0.0	**10.0**	5.6
4	Lending interest rate	7.1	**10.0**	0.0	1.2	4.2	1.6	7.0
5	Net ODA received per capita	0.6	0.0	0.4	1.4	3.2	0.1	**10.0**
6	Taxation as constraint	**10.0**	3.1	6.7	9.2	0.0	4.6	9.96
7	Court as constraint	1.4	0.0	3.7	2.6	0.6	3.1	**10.0**
8	Unemployment rate	1.0	0.4	0.0	0.3	**10.0**	0.2	3.7
9	Labour force participation	0.2	6.8	5.8	4.9	0.0	5.2	**10.0**
10	Not needing a loan	3.2	0.3	0.8	7.6	**10.0**	-	0.0
11	Internally financed working capital	0.0	4.5	0.0	9.3	**10.0**	2.8	6.5
12	Internally financed investments	3.8	2.5	3.6	7.0	0.0	6.9	**10.0**
13	Capacity utilisation	6.6	5.8	0.0	6.6	**10.0**	6.9	2.4
14	External auditor	9.9	0.0	5.8	**10.0**	2.4	5.1	6.1
15	Manager's experience	2.2	6.6	0.0	**10.0**	6.0	-	6.8
16	Number of workers	1.8	0.0	**10.0**	2.1	0.6	-	2.3
17	Firm age	2.1	3.5	0.6	4.9	**10.0**	0.0	2.5
18	Fixed assets	4.9	2.9	4.6	6.4	0.0	-	**10.0**
19	Foreign technology	3.3	**10.0**	9.7	4.1	0.0	-	3.5
20	Domestic inputs	**10.0**	9.3	4.9	0.0	8.7	0.2	1.5
21	Imported inputs	0.0	0.7	5.1	**10.0**	1.3	9.8	8.5
22	Domestic sales	7.7	9.6	0.0	4.9	8.7	3.2	**10.0**
23	Direct exports	3.0	0.3	**10.0**	6.2	0.8	9.0	0.0
24	Indirect exports	1.1	0.4	**10.0**	2.7	2.3	2.4	0.0
25	Domestic private ownership	9.8	5.0	2.1	3.1	**10.0**	5.8	0.0
26	Foreign private ownership	0.1	0.5	2.7	7.4	0.0	4.5	**10.0**
27	Government ownership	1.4	2.3	5.8	0.1	0.0	0.0	**10.0**
28	Market capitalisation	1.7	1.0	4.0	2.4	**10.0**	1.2	0.0
29	Banking sector credit	3.7	1.9	**10.0**	2.3	4.6	8.6	0.0
30	Firm type	0.7	0.0	3.4	6.5	**10.0**	5.9	2.0
31	Technology intensity	6.8	0.0	6.8	3.4	7.5	**10.0**	0.0

Figure 26: Relative Value Analysis Radar: Manufacturing development, lending interest rate, and access to finance working capital and investment finance.

As shown in figure 26 above, South Korea had the best manufacturing development performance among the study countries, with Zambia having the worst performance. As regards access to finance, while South Korea had the highest access to investment finance, India had the highest access to working capital finance. Not counting Philippines and South Africa as they led in firms not needing loans, Zambia had the unintended lowest access to working capital and second unintended lowest access to investment finance. Further, as shown in figure 27 below, South Africa had the best domestic banking sector performance while Zambia had the worst performance. As regards, domestic market capitalisation, Malaysia had the best performance. Furthermore, as shown in figure 28 below, Zambia had the highest taxation and court constraints and reported the highest amount of foreign aid received. This implies that, Zambian manufacturing firms faced the

most taxation and court constraints among the study countries. Zambia however received more aid than NICs. Further, Zambia recorded the highest labour force participation rate and the second highest unemployment rate.

Figure 27: Relative Value Analysis Radar: Domestic banking and non-banking sectors

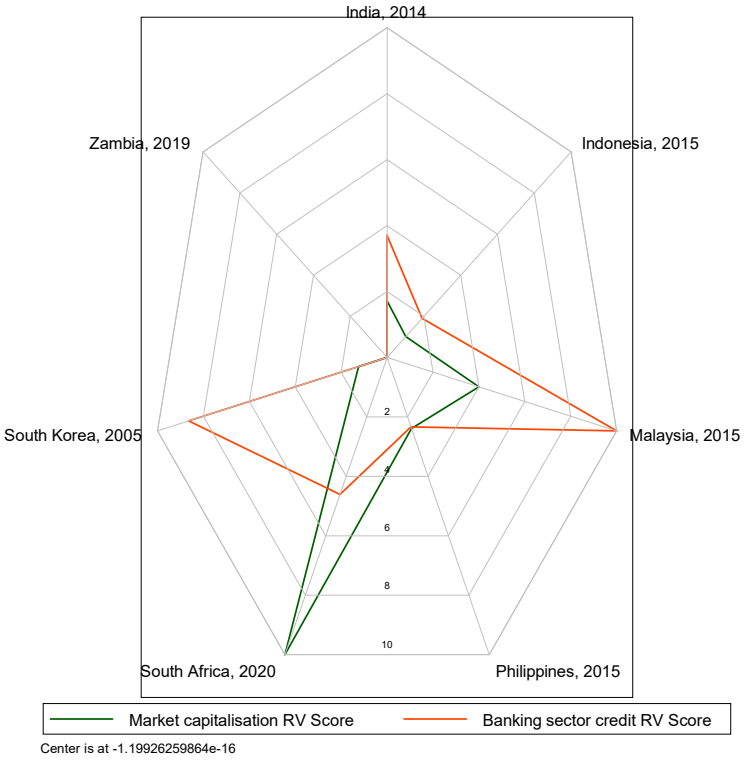


Figure 28: Relative Value Analysis Radar: Systems, aid and labour

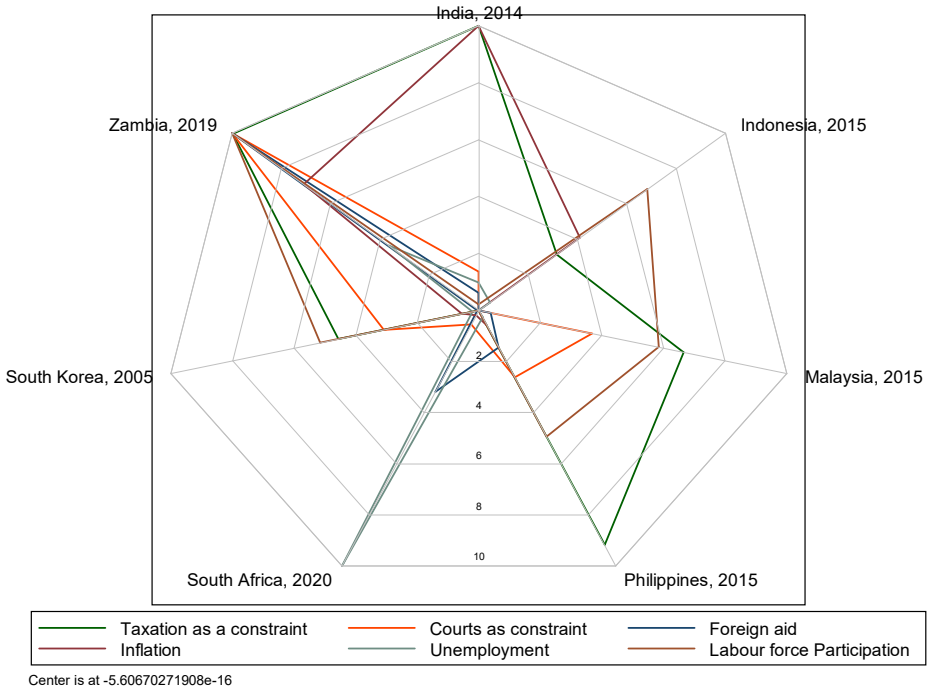
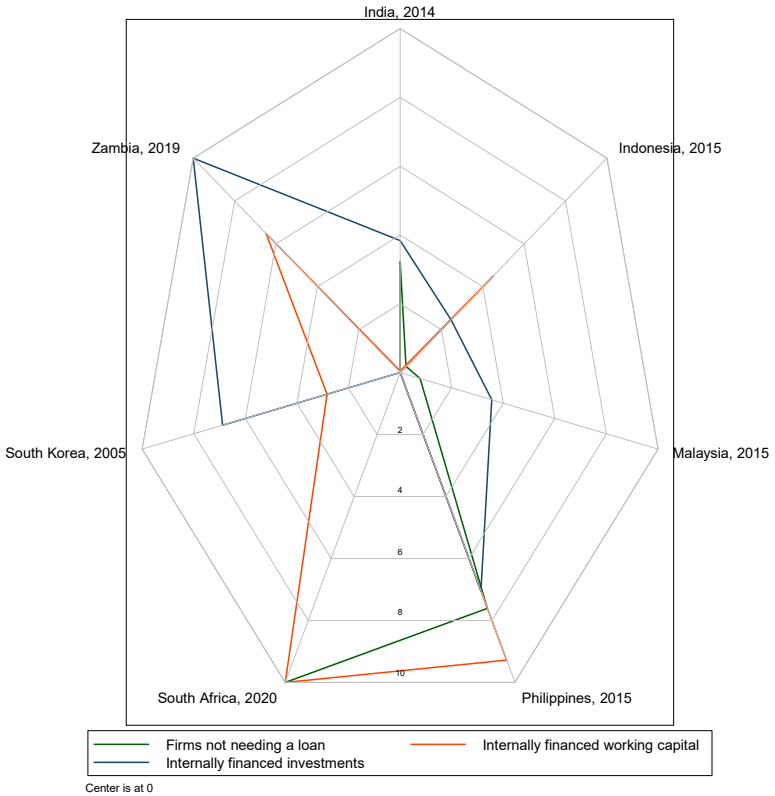


Figure 29: Relative Value Analysis Radar: Internal finance



As shown in figure 29 above, while Zambia had the lowest report of firms not needing loans, it reported the highest internally financed investments, excluding Philippines and South Africa for reasons previously stated. This implies that while Zambian manufacturing firms may need loans, they are still left with no choice but to finance their own working capital and investments. Further, as shown in figure 30 below, Zambia had the worst domestic private ownership but had, by wide margins, the highest foreign private ownership and government ownership. This implies that the Zambian manufacturing sector has, relative to NICs, an unhealthy mix of foreign and domestic ownership structures. Zambia additionally recorded the lowest technology intensity and was on the lower end of the share of limited liability companies. Furthermore, as shown in figure 31 below, Zambia had the highest domestic sales but the lowest direct and indirect exports, while also returning relatively high imported inputs. This implies that the Zambian manufacturing sector is relatively import dependent for production inputs but largely services the domestic market.

Figure 30: Relative Value Analysis Radar: Ownership, firm type and technology intensity

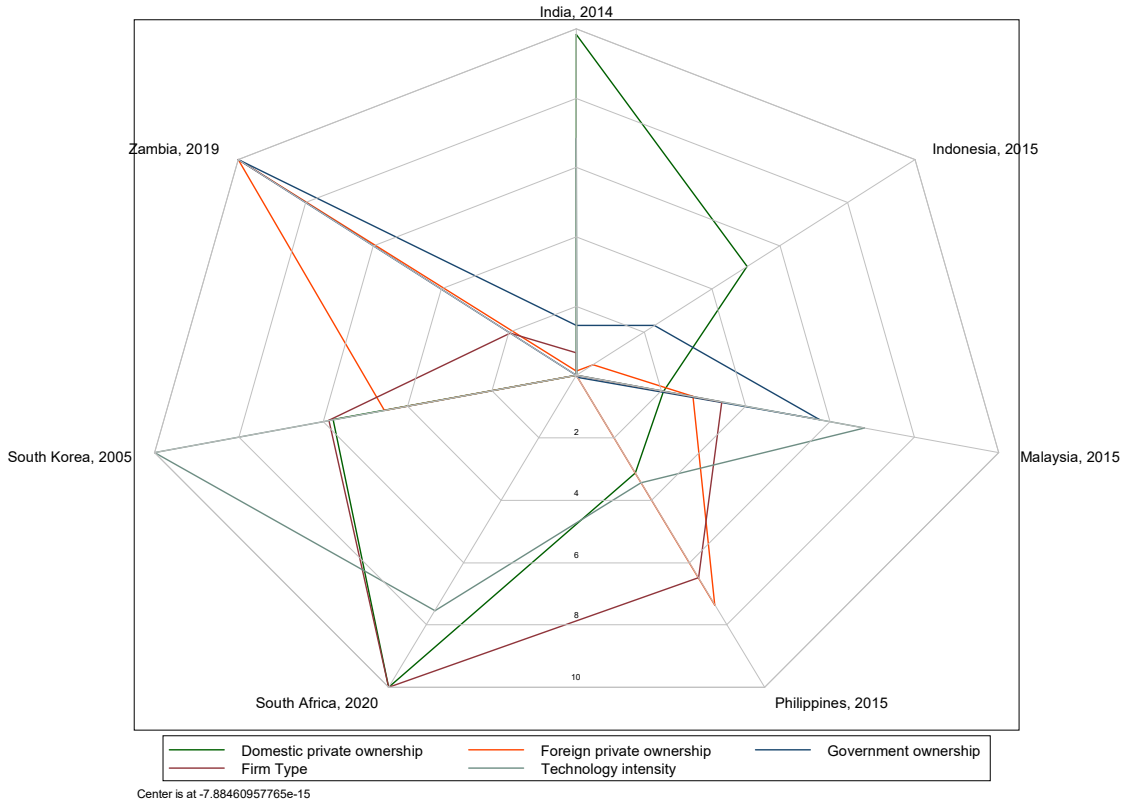


Figure 31: Relative Value Analysis Radar: Trade

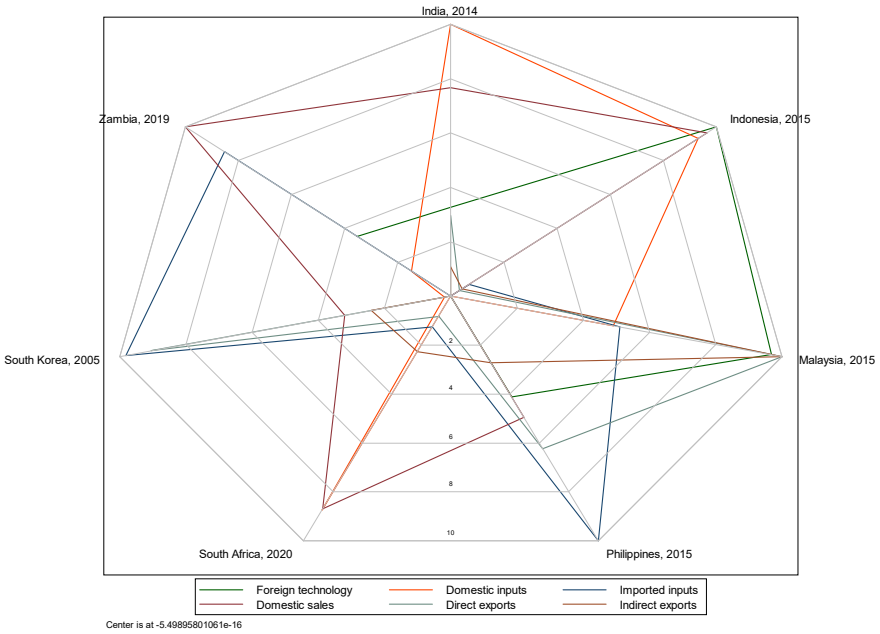
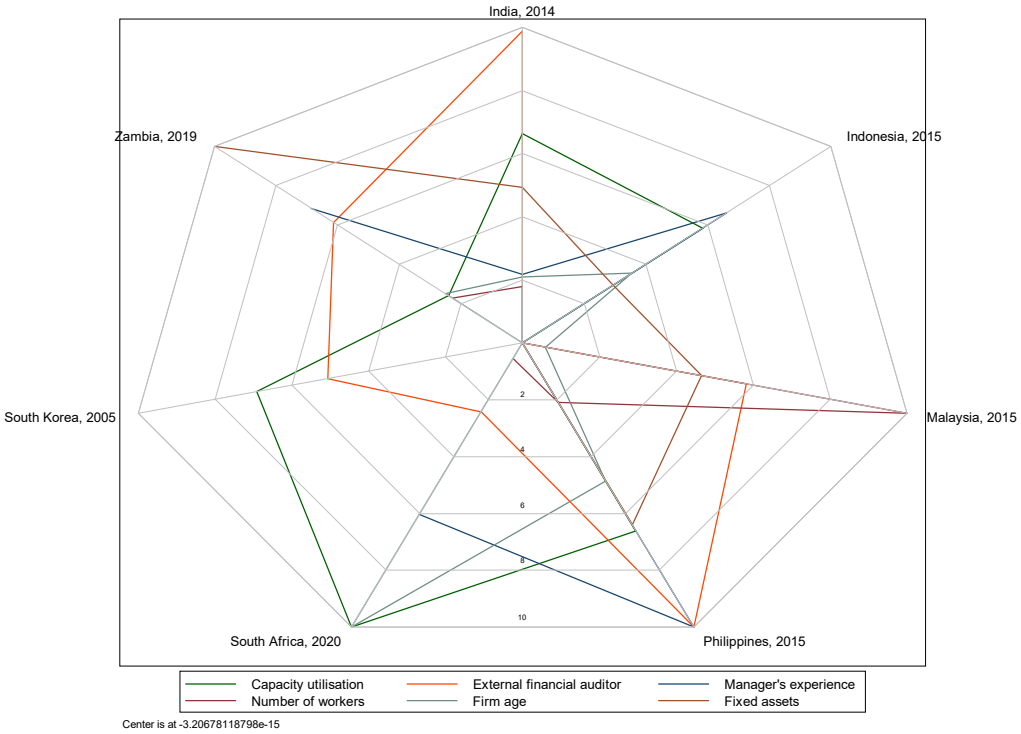


Figure 32: Relative Value Analysis Radar: Firm characteristics



As shown in figure 32 above, Zambia had the second lowest capacity utilisation, implying that relatively, the Zambian manufacturing sector has low utilisation of firm capacities while recording

the highest share of firms buying fixed assets. It however had average performance on the presence of external auditors, manager's experience, firm size, and firm age.

4.3.3. Data Envelopment Analysis

This section presents and interprets the data envelopment analysis results. The results focus on manufacturing firm interactions with manufacturing finance. Specifically, DEA was used to analyse firm finance efficiency within countries. The profiles of the most efficient firms in each country were then compared across countries.

Figure 33 below shows the distribution of efficient firms across the study countries by firm output. A few revelations are worth noting, firstly, firms with the highest output are generally the most efficient across all countries with a mild exception on South Africa. This implies that the largest producers usually have more efficient firm finance systems relative to smaller firms. Further, unlike the rest of the study countries, Zambia does not appear to have significant variation across the efficiency scale, with most firms being upward of 0.8 efficiency score. This implies that Zambian firms have lesser diversity in efficiency relative to NICs. It must be emphasised that efficiency analysis was done within countries to enhance the homogeneity of firm environments, implying that the firm efficiency scores were not comparable across countries. The profiles of the efficient firms across countries were nonetheless comparable and provided the requisite learning.

4.3.3.1. Firm Finance Efficiency

Figure 33: Efficient firm distribution by country and revenue

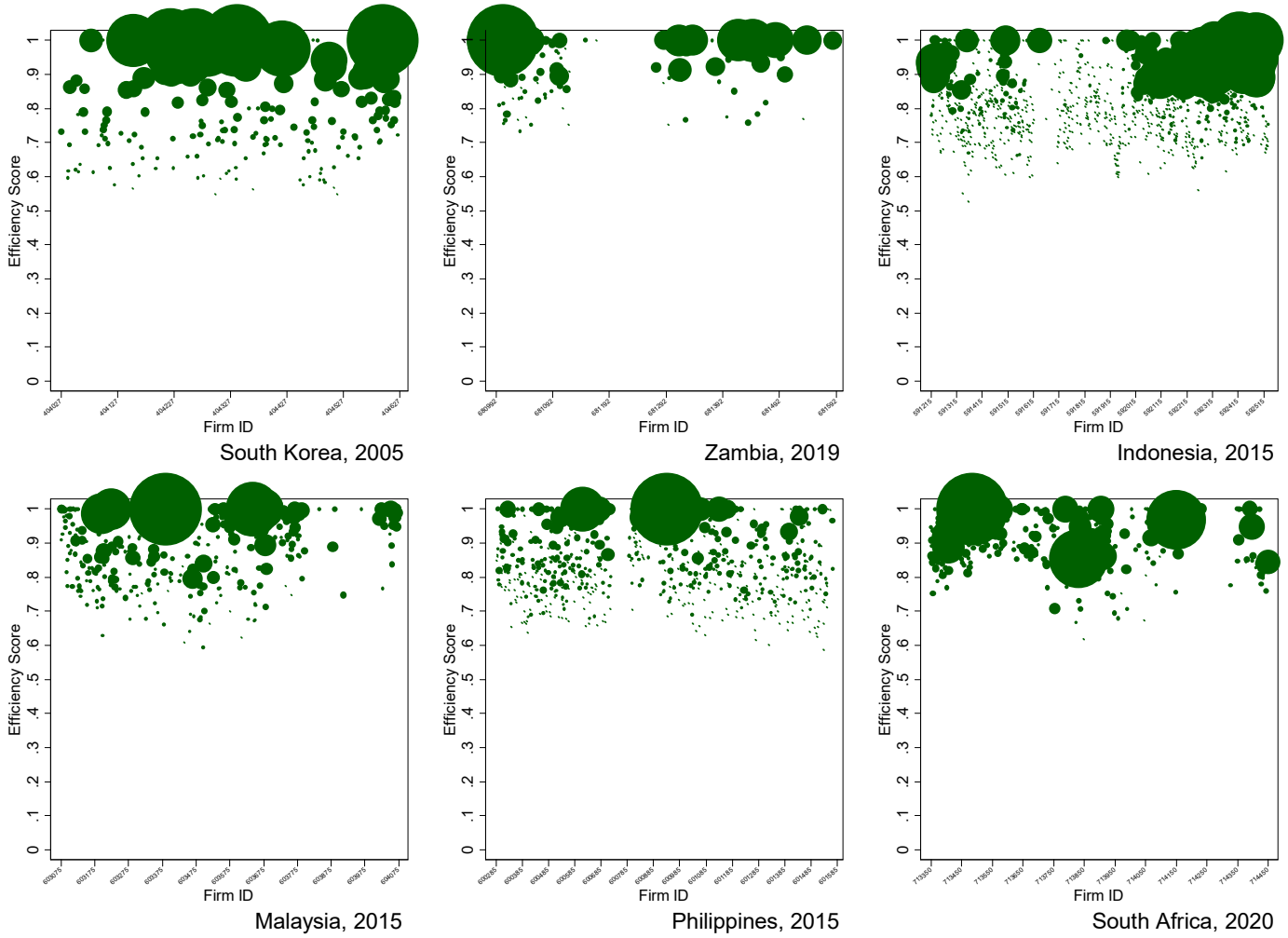
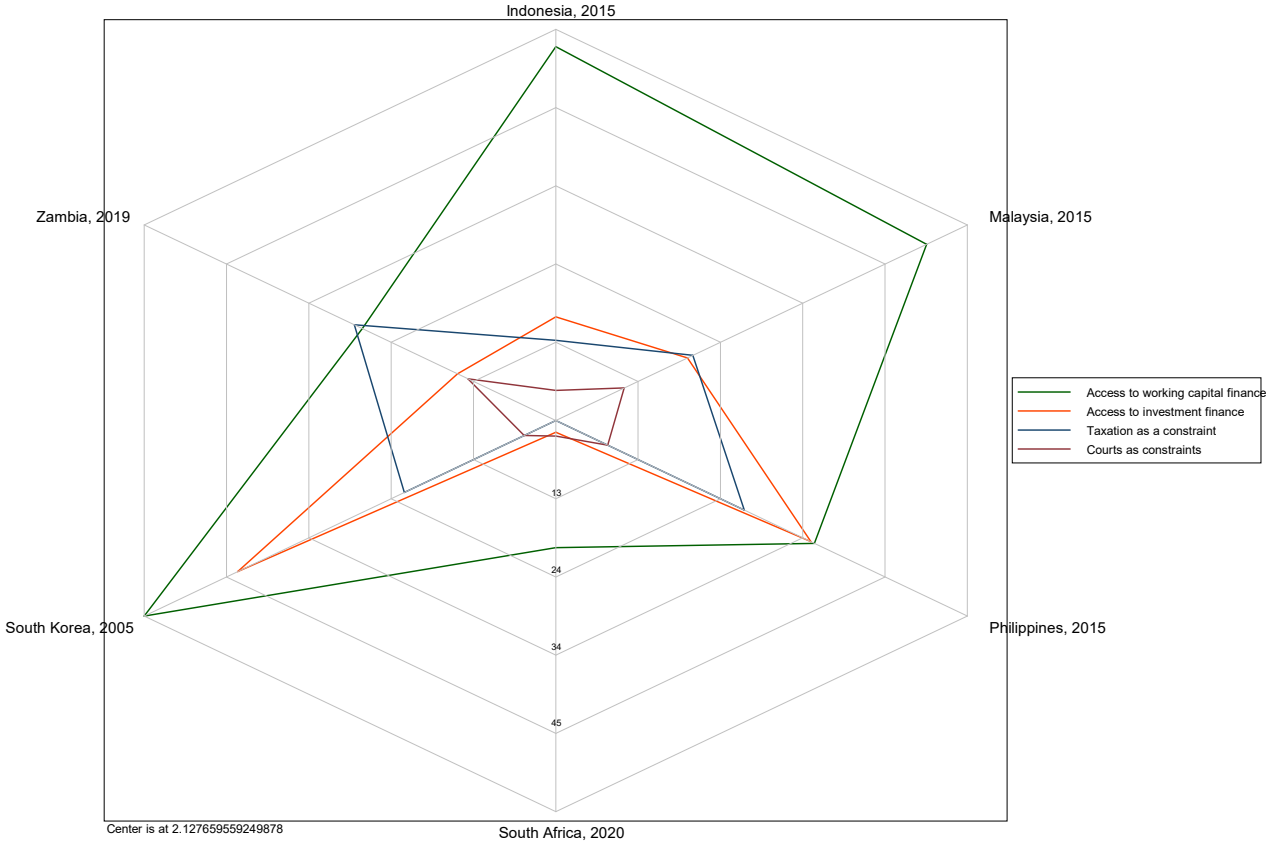


Table 27 below shows the means, minimums, and maximums of the most efficient firms in each of the study countries across 21 manufacturing finance sub-themes. Interpretation is given under the radar graphs that follow.

Table 27: DEA: Comparison of the averages of the most efficient firms

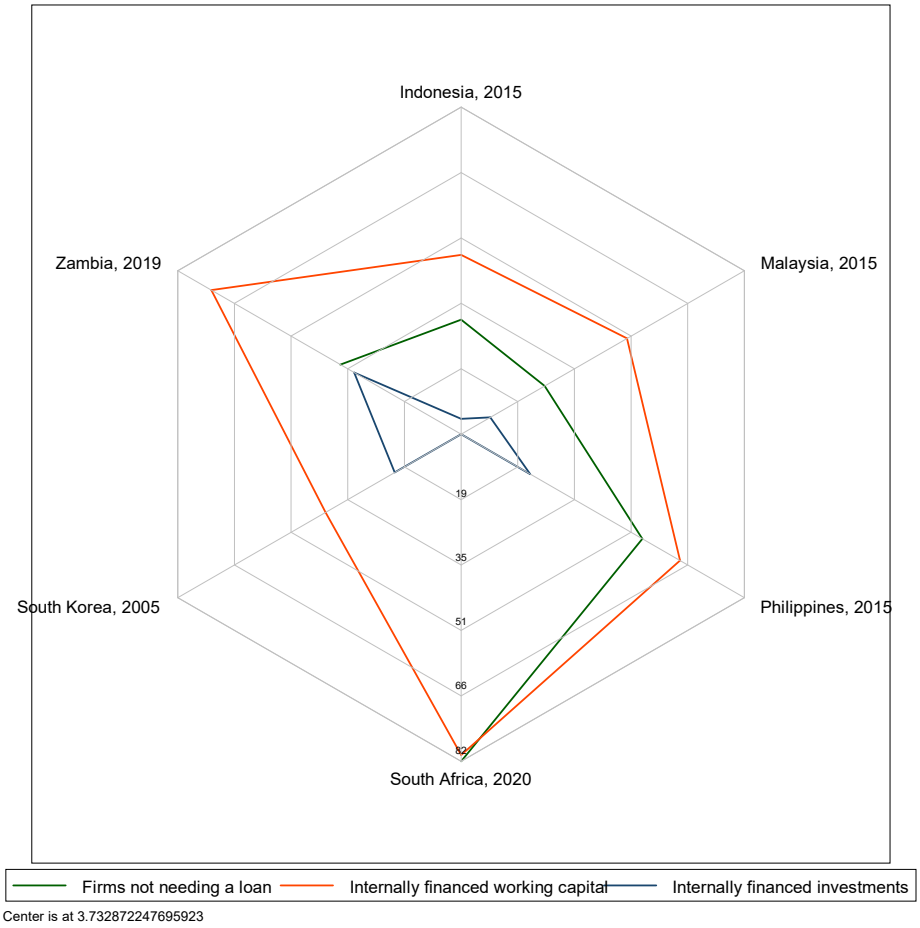
S/n	Variable/Country	Indonesia, 2015			Malaysia, 2015			Philippines, 2015			South Africa, 2020			South Korea, 2005			Zambia, 2019		
		Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
1	Annual sales (USD, millions)	245.8	0.005	3,718.7	5.7	0.02	258.6	93.0	0.01	5,931.8	6.1	0.02	182.2	285.3	0.2	1,228.7	5.6	0.001	94.6
2	Access to working capital finance	53.4	0	100	50.5	0	100	35.8	0	100	19.6	0	100	55.8	0	100	27.4	0	100
3	Access to investment finance	16.4	0	100	19.3	0	100	35.4	0	100	3.7	0	100	43.6	0	100	14.9	0	100
4	Taxation as constraint	0.1	0	1	0	0	1	0.3	0	1	0.0	0	1	0.2	0	1	0.3	0	1
5	Courts as constraints	0.1	0	1	0	0	1	0.1	0	1	0.0	0	1	0.1	0	1	0.1	0	1
6	Internally financed working capital (%)	46.6	0	100	49.5	0	100	64.2	0	100	80.4	0	100	41.1	0	100	72.7	0	100
7	Internally financed investments (%)	7.4	0	100	11.8	0	100	22.8	0	100	3.7	0	100	22.0	0	100	33.2	0	100
8	Not needing a loan	0.3	0	1	0.3	0	1	0.5	0	1	0.8	0	1	-	-	-	0.4	0	1
9	Private domestic ownership (%)	78.4	0	100	68.0	0	100	76.7	0	100	98.9	0	100	83.1	0	100	70.0	0	100
10	Private foreign ownership (%)	7.6	0	100	10.9	0	100	23.3	0	100	1.1	0	100	16.9	0	100	26.9	0	100
11	Government ownership (%)	0.7	0	70	2.7	0	80	0.0	0	0	0.0	0	0	0.0	0	0	0.5	0	40
12	Foreign technology	0.5	0	1	0.2	0	1	0.2	0	1	0.1	0	1				0.2	0	1
13	Domestic inputs (%)	88	0	100	84	0	100	55	0	100	89	0	100	57	0	100	72	10	100
14	Imported inputs (%)	12.3	0	95	15.9	0	80	44.6	0	100	11.0	0	100	42.7	0	100	27.6	0	100
15	Domestic sales (%)	82.7	0	100	68.9	0	100	76.1	0	100	90.0	0	100	73.5	0	100	93.2	10	100
16	Direct exports (%)	11.2	0	100	22.0	0	100	16.1	0	100	5.4	0	100	21.4	0	95	4.3	0	50
17	Capacity utilization (%)	81	2	100	70	10	100	86	25	100	88	1	100	87.2	50	100	75.9	20	100
18	External auditor	67.5	0	100	50.5	0	100	90.4	0	100	47.9	0	100	59.4	0	100	65.4	0	100
19	Manager's experience (years)	15.3	1	40	10.3	1	50	16.1	1	54	14.6	1	46	-	-	-	18.8	2	53
20	Firm size (number of workers)	190.0	2	1521	199.5	2	2500	178.6	5.0	1500.0	69.1	5	663	-	-	-	104.6	1	650
21	Firm age (years)	23.2	3	87	19.4	5	51	21.0	3	118	26.5	3	135	23.9	4	55	20.3	1	65
22	Firm type (%)	6	-	100	41	-	100	66	-	100	95	-	100	59	-	100	32	-	100
23	Technological intensity	2	1	3	2	1	4	2	1	4	2	1	3	2	1	4	1	1	4
24	Fixed assets (%)	24	0	100	32	0	100	58	0	100	9	0	100	0	0	0	52	0	100

Figure 34: DEA efficient firms: Access to working capital and investment finance and systems.



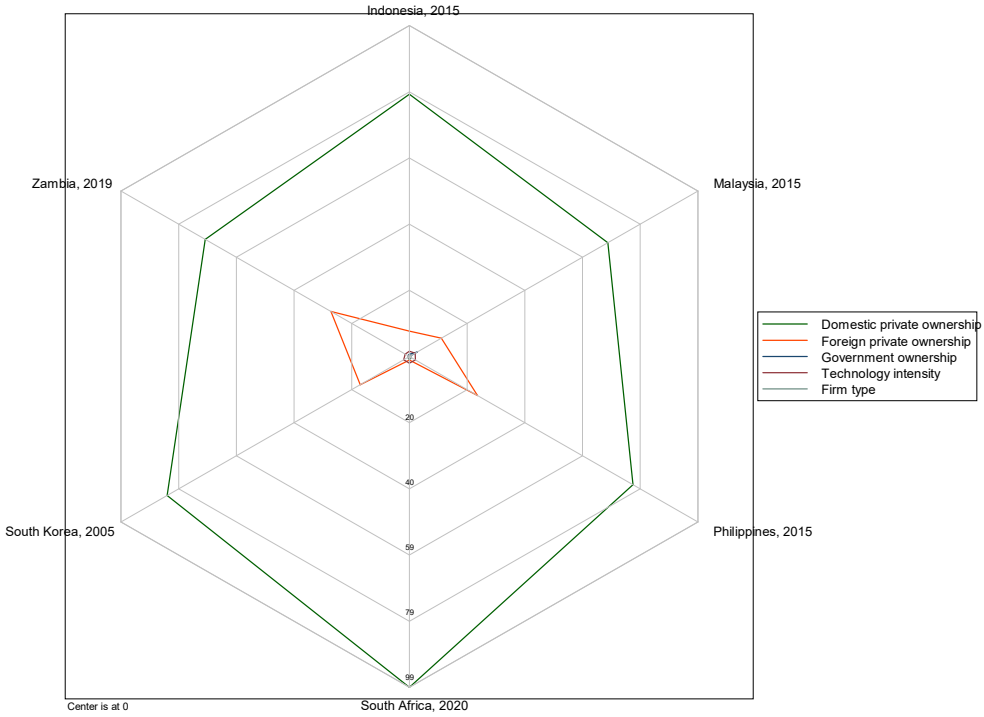
As shown in figure 34 above, among the most efficient firms in each country, South Korea had the highest access to both working capital and investment finance. Zambia had the second least access to both, eclipsed only by South Africa, which had the highest reports of firms not needing loans. Further, Zambia had the highest reported taxation and court constraints among the most efficient firms.

Figure 35: DEA efficient firms: Internal finance



As shown in figure 35 above, Zambia had the highest internally financed investments and second highest internally financed working capital among the most efficient firms, again and for the same reason as above, eclipsed only by South Africa in the latter case.

Figure 36: DEA efficient firms: Ownership, technology and firm type



As shown in figure 36 above, among the most efficient firms, Zambia had the highest foreign private ownership and the second lowest domestic private ownership. A further analysis shows, that out of the 79 efficient Zambian firms, foreign private owners had at least 50 percent stake in about 29 percent of the Zambian efficient firms. In contrast, out of the combined 621 efficient firms in the NICs, foreign private ownership with at least 50 percent stake was only present in about 11 percent of the firms. Based on the Pearson correlation coefficient, none of the three types of ownership were strongly correlated with efficiency. Zambia had the second lowest share of limited liability firms and the lowest average technology intensity. Further, as shown in figure 37 below, among the most efficient firms, Zambia had the highest domestic sales and correspondingly the lowest direct export sales. This implies that even among the most efficient manufacturing firms, most of them serviced the domestic market.

Figure 37: DEA efficient firms: Trade

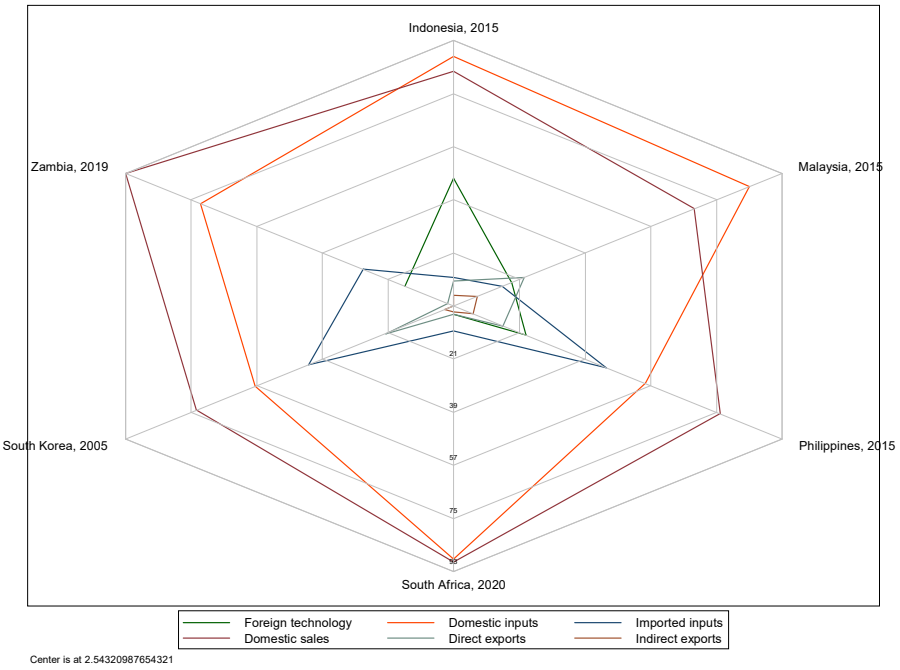
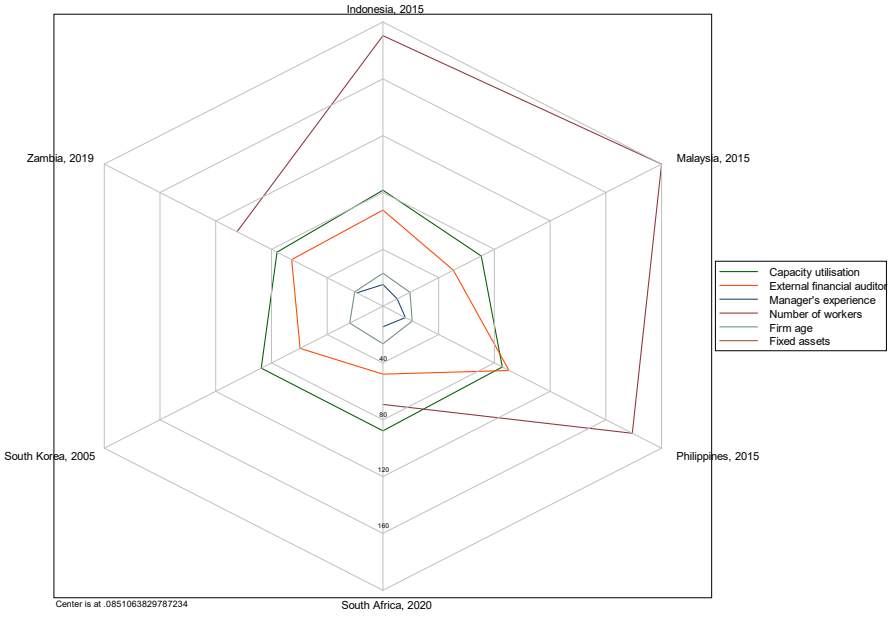


Figure 38: DEA efficient firms: Firm characteristics



As shown in figure 38 above, among the most efficient firms, Zambia had the second lowest utilisation rate. This implies that even among the most efficient firms, Zambian firms were operating below capacity, relative to NICs. It is also notable that Zambia had the second highest

share of firms buying fixed assets (South Korean data missing), second lowest number of workers (South Korean data missing) and the lowest level of technology intensity.

4.4. Structural Equation Modelling

This section presents the structural equation modelling of manufacturing finance in NICs and Zambia respectively, including both demand and supply side phenomena. As stated above, manufacturing finance is for analytical accuracy and policy development precision divided into two components: access to working capital and investment finance, and domestic and foreign private start-up investment. In the former case, two respective SEM results are presented for efficient NIC firms and Zambian firms while in the latter, SEM six respective results are presented for Indian, Indonesian, Philippine, Malaysian, South African and Zambian firms. While the former analysed access to finance of operating firms the latter attempted to analyse the conditions that prevailed at start-up, using proxies where necessary. In each SEM results instance, two tables are presented, the model fit and regressions tables, and a path diagram. A brief interpretation of the tables ensues, leaving discussion of the results to chapter seven. For a leaner exposition, while the post-estimation checks are presented in-text, some pre-estimation test results and strategic robustness checks are relegated to appendix D.

4.4.1. Efficient NIC Firms SEM Results: Working Capital and Investment Finance

4.4.1.1. Model fit: Efficient NIC firms working capital and investment finance

Table 28: SEM model fit: Efficient NICs WCIF

Estimator	ML	
Optimisation method	NLMINB	
Number of model parameters	21	
	Used	Total
Number of observations	569	622
Model test user model:	Standard	Scaled
Test statistic	16.056	14.631
Degrees of freedom	8.000	8.000
P-value (chi-square)	0.042	0.067
Scaling correction factor: Satorra-Bentler correction		1.097
Model test baseline model:		
Test statistic	840.078	1323.325

Degrees of freedom	25.000	25.000
P-value (chi-square)	0.000	0.000
Scaling correction factor		0.635
User model versus baseline model:		
Comparative Fit Index (CFI)	0.990	0.995
Tucker-Lewis Index (TLI)	0.969	0.984
Robust Comparative Fit Index (CFI)		0.991
Robust Tucker-Lewis Index (TLI)		0.972
Loglikelihood and Information Criteria:		
Loglikelihood user model (H0)	-2754.122	-2754.122
Loglikelihood unrestricted model (H1)	-2746.094	-2746.094
Akaike (AIC)	5550.245	5550.245
Bayesian (BIC)	5641.466	5641.466
Sample-size adjusted Bayesian (BIC)	5574.801	5574.801
Root Mean Square Error of Approximation:		
RMSEA	0.042	0.038
90 Percent confidence interval - lower	0.008	0.000
90 Percent confidence interval - upper	0.072	0.067
P-value H_0: RMSEA <= 0.05	0.627	0.715
P-value H_0: RMSEA <= 0.08	0.016	0.007
Robust RMSEA		0.040
90 Percent confidence interval - lower		0.000
90 Percent confidence interval - upper		0.072
P-value H_0: Robust RMSEA <= 0.05		0.655
P-value H_0: Robust RMSEA <= 0.08		0.017
Standardized Root Mean Square Residual:		
SRMR	0.011	0.011

As shown in table 28 above, the efficient NIC firms working capital and investment SEM model was statistically significant with a user model p-value of 0.067, RMSEA of 0.038, CFI of 0.995 and SRMR of 0.011. Based on the literature recommended thresholds highlighted in the methodology section above, the modelling was robust, and the results could be confidently applied in subsequent analyses.

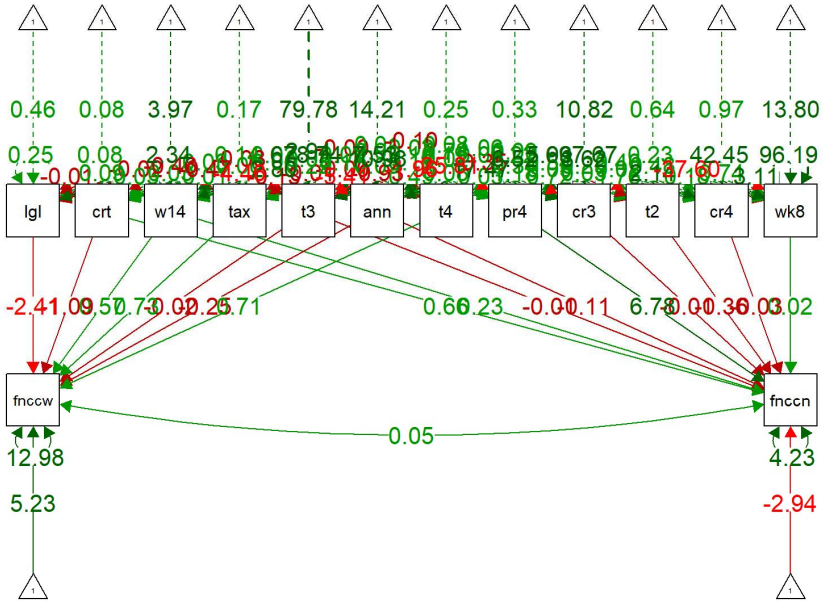
4.4.1.2. Regressions: Efficient NIC firms working capital and investment finance

Table 29: SEM regressions: Efficient NICs working capital and investment finance (WCIF)

Access to working capital finance	Estimate	Standard Error	Z-Value	P-Value
Intercept	5.232	1.081	4.842	0.000
Firm type	-2.410	0.324	-7.447	0.000
Court constraints	-1.086	0.619	-1.755	0.079
Number of workers	0.569	0.155	3.664	0.000
Taxation constraints	0.727	0.394	1.844	0.065
Capacity utilisation	-0.018	0.007	-2.814	0.005
Annual sales	-0.252	0.080	-3.174	0.002
Foreign technology	0.709	0.373	1.901	0.057
Access to investment finance	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	-2.943	0.558	-5.274	0.000
Court constraints	0.658	0.282	2.335	0.020
Number of workers	0.233	0.084	2.774	0.006
Capacity utilisation	-0.011	0.003	-3.218	0.001
Fixed assets	6.784	0.273	24.847	0.000
Foreign ownership	-0.013	0.005	-2.441	0.015
Annual sales	-0.107	0.043	-2.496	0.013
External auditing	-0.359	0.136	-2.642	0.008
Government ownership	-0.031	0.018	-1.724	0.085
Manager's experience	0.017	0.010	1.715	0.086

As shown in table 29 above, all the efficient NIC firms model variables were significant at either 1, 5 or 10 percent. Firm type, court constraints, capacity utilisation and annual sales were negatively related to access to working capital while number of workers, taxation constraints and foreign technology were positively related to access to working capital finance. Further, capacity utilisation, foreign ownership, annual sales, external auditing and government ownership were negatively related to access to investment finance while court constraints, number of workers, fixed assets and manager's experience were positively related to access investment finance. Variances and covariances are shown in appendix E. The path diagram for the foregoing results is shown in figure 39 below.

Figure 39: SEM path diagram: Efficient NIC firms WCIF



4.4.2. Zambian Firms SEM Results: working capital and investment finance.

4.4.2.1. Model fit: Zambian firms working capital and investment finance.

Table 30: SEM model fit: Zambian firms WCIF

Estimator	ML	
Optimisation method	NLMINB	
Number of model parameters	12	
	Used	Total
Number of observations	149	179
Model test user model:	Standard	Scaled
Test statistic	2.348	2.289
Degrees of freedom	7.000	7.000
P-value (chi-square)	0.938	0.942
Scaling correction factor: Satorra-Bentler correction		1.026
Model test baseline model:		
Test statistic	78.933	81.813
Degrees of freedom	15.000	15.000
P-value (chi-square)	0.000	0.000
Scaling correction factor		0.965
User model versus baseline model:		
Comparative Fit Index (CFI)	1.000	1.000
Tucker-Lewis Index (TLI)	1.156	1.151
Robust Comparative Fit Index (CFI)		1.000

Robust Tucker-Lewis Index (TLI)		1.161
Loglikelihood and Information Criteria:		
Loglikelihood user model (H0)	-1351.189	-1351.189
Loglikelihood unrestricted model (H1)	-1350.015	-1350.015
Akaike (AIC)	2726.377	2726.377
Bayesian (BIC)	2762.425	2762.425
Sample-size adjusted Bayesian (BIC)	2724.448	2724.448
Root Mean Square Error of Approximation:		
RMSEA	0.000	0.000
90 Percent confidence interval - lower	0.000	0.000
90 Percent confidence interval - upper	0.023	0.015
P-value H_0: RMSEA <= 0.05	0.977	0.980
P-value H_0: RMSEA <= 0.08	0.005	0.004
Robust RMSEA		0.000
90 Percent confidence interval - lower		0.000
90 Percent confidence interval - upper		0.019
P-value H_0: Robust RMSEA <= 0.05		0.978
P-value H_0: Robust RMSEA <= 0.08		0.005
Standardized Root Mean Square Residual:		
SRMR	0.015	0.015

As shown in table 30 above, the Zambian firms working capital and investment SEM model was statistically significant with a user model p-value of 0.942, RMSEA of 0.000, CFI of 1 and SRMR of 0.015. Based on the literature recommended thresholds highlighted in the methodology section above, the modelling was robust, and the results could be confidently applied in subsequent analyses.

4.4.2.2. Regressions: Zambian firms working capital and investment finance

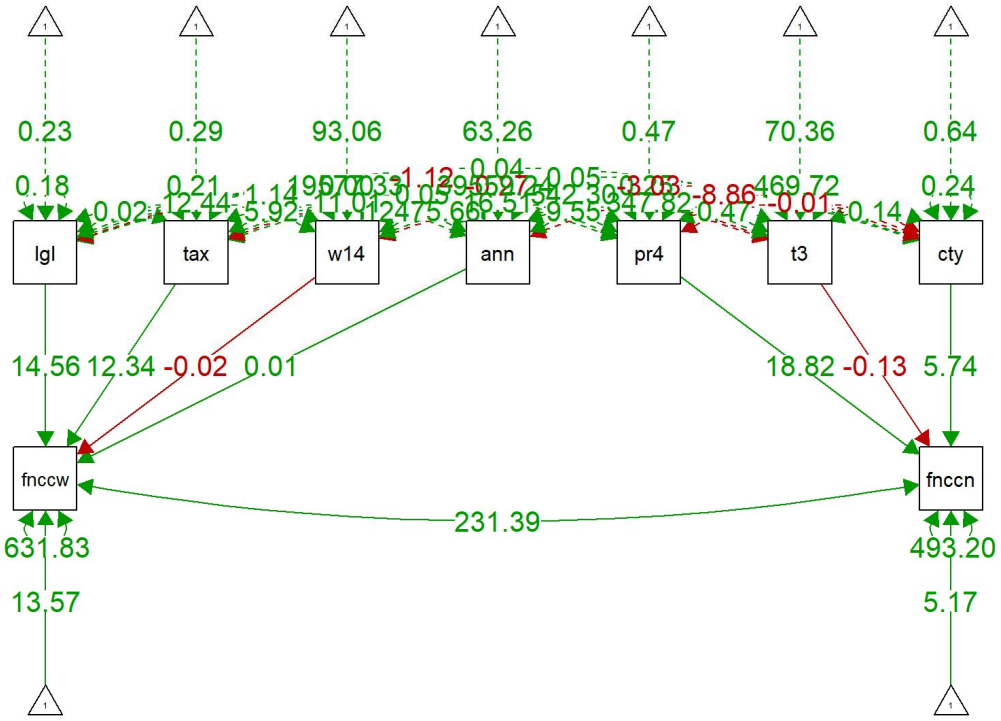
Table 31: SEM regressions: Zambian firms WCIF

Access to working capital finance	Estimate	Standard Error	Z-Value	P-Value
Intercept	13.574	2.531	5.363	0.000
Firm type	14.556	5.223	2.787	0.005
Taxation constraints	12.338	4.767	2.588	0.010
Number of workers	-0.018	0.015	-1.263	0.207
Annual sales	0.012	0.007	1.657	0.097
Access to investment finance	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	5.171	4.599	1.124	0.261
Fixed assets	18.825	3.526	5.340	0.000
Capacity utilisation	-0.126	0.059	-2.127	0.033

City population	5.736	3.923	1.462	0.144

As shown in table 31 above, all the Zambian working capital and investment finance model variables were significant at either 1, 5, 10, 15 and 21 percent. Firm type, taxation constraints and annual sales were positively related to access to working capital finance while number of workers was negatively related to access to working capital finance. Further, fixed assets and city population were positively related to access to investment finance while capacity utilisation was negatively related to access to investment finance. The variation between the efficient NICs and Zambia model fits is expected as NICs are the efficient case while Zambia is the inefficient case. Some similarities are nonetheless noteworthy, fixed assets and capacity utilisation had the same respective effects on access to investment finance in both the efficient NIC and Zambian firms. In the same way, taxation constraints had the same effect on access to working capital finance in both cases. Variances and covariances are shown in appendix E. Figure 40 below shows the path diagram of the table 30 results.

Figure 40: SEM path diagram: Zambia WCIF



4.4.3. SEM Results: NICs Start-Up Investment

This section shows the respective start-up investment models of Indian, Indonesian, Philippine, Malaysian and South African firms. As shown below, while there exist some differences, similarities abound in start-up investment across NIC firms. Specifically, the effects of ODA per capita, firm type and number of workers, and to a lesser extent market capitalisation and broad money, on domestic private ownership were generally consistent across the NICs. In the same way, the effects of firm type, number of workers and ODA per capita, and to a lesser extent technology intensity and FDI, on foreign private ownership were generally consistent across the NICs.

4.4.3.1. India

1. Model fit: India Start-Up Investment

Table 32: SEM model fit: India start-up investment

Estimator	ML	
Optimisation method	NLMINB	
Number of model parameters	12	
	Used	
Number of observations	1901	
Model test user model:	Standard	Scaled
Test statistic	5.210	3.913
Degrees of freedom	3.000	3.000
P-value (chi-square)	0.157	0.271
Scaling correction factor: Satorra-Bentler correction		1.331
Model test baseline model:		
Test statistic	4097.607	217.254
Degrees of freedom	11.000	11.000
P-value (chi-square)	0.000	0.000
Scaling correction factor		18.861
User model versus baseline model:		
Comparative Fit Index (CFI)	0.999	0.996
Tucker-Lewis Index (TLI)	0.998	0.984
Robust Comparative Fit Index (CFI)		1.000
Robust Tucker-Lewis Index (TLI)		0.999
Loglikelihood and Information Criteria:		
Loglikelihood user model (H0)	-10288.303	-10288.303
Loglikelihood unrestricted model (H1)	-10285.699	-10285.699

Akaike (AIC)	20600.607	20600.607
Bayesian (BIC)	20667.209	20667.209
Sample-size adjusted Bayesian (BIC)	20629.085	20629.085
Root Mean Square Error of Approximation:		
RMSEA	0.020	0.013
90 Percent confidence interval - lower	0.000	0.000
90 Percent confidence interval - upper	0.047	0.039
P-value H_0: RMSEA <= 0.05	0.967	0.995
P-value H_0: RMSEA <= 0.08	0.000	0.000
Robust RMSEA		0.015
90 Percent confidence interval - lower		0.000
90 Percent confidence interval - upper		0.049
P-value H_0: Robust RMSEA <= 0.05		0.955
P-value H_0: Robust RMSEA <= 0.08		0.000
Standardized Root Mean Square Residual:		
SRMR	0.008	0.008

As shown in table 32 above, the Indian firms start-up investment model was statistically significant with a user model p-value of 0.271, RMSEA of 0.013, CFI of 0.996 and SRMR of 0.008. Based on the literature recommended thresholds highlighted in the methodology section above, the modelling was robust, and the results could be confidently applied in subsequent analyses.

2. Regressions: India Start-Up Investment

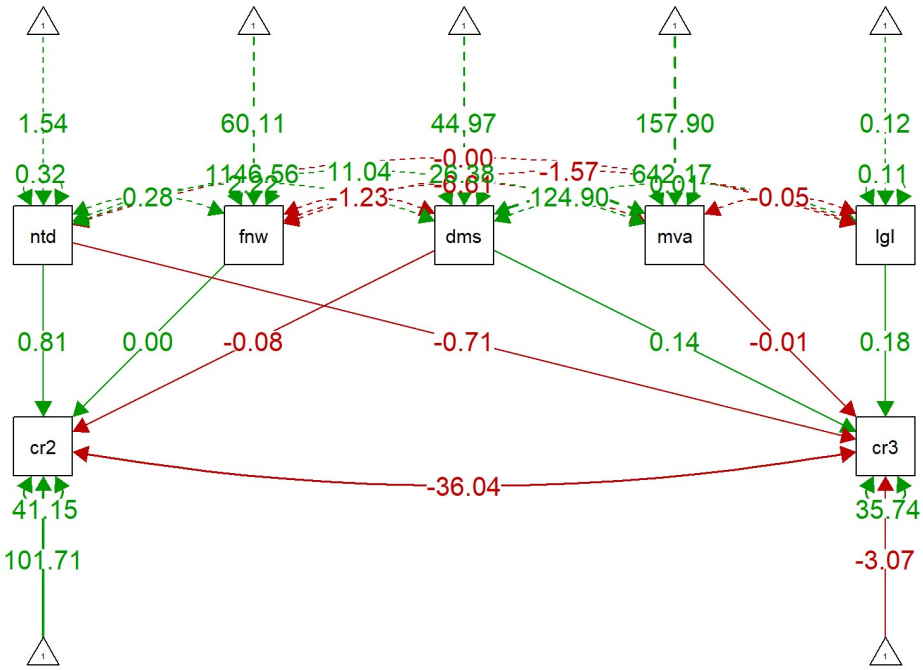
Table 33: SEM regressions: India start-up investment

Domestic private ownership	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	101.714	1.329	76.511	0.000
ODA per capita	0.811	0.322	2.522	0.012
Internal working capital	0.003	0.002	1.533	0.125
Banking sector credit	-0.082	0.039	-2.101	0.036
Foreign private ownership	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	-3.067	1.289	-2.379	0.017
ODA per capita	-0.708	0.308	-2.303	0.021
MVA per capita	-0.012	0.005	-2.343	0.019
Firm type	0.176	0.094	1.868	0.062
Banking sector credit	0.145	0.051	2.821	0.005

As shown in table 33 above, all the Indian firms start-up investment model variables were significant at either 1, 5, 10 and 15 percent. ODA per capita and internal working capital were positively related to domestic private ownership while banking sector credit was negatively related

to domestic private ownership. Further, ODA per capita and MVA per capita were negatively related foreign private ownership while firm type and banking sector credit were positively related to foreign private ownership. Variances and covariances are shown in appendix E. Figure 41 below depicts the path diagram for the foregoing results.

Figure 41: SEM path diagram: India start-up investment



4.4.3.2. Indonesia

1. Model fit: Indonesia Start-Up Investment

Table 34: SEM model fit: Indonesia start-up

Estimator	ML
Optimisation method	NLMINB
Number of model parameters	13

	Used	Total
Number of observations	310	311
Model test user model:	Standard	Scaled
Test statistic	1.145	1.058
Degrees of freedom	4.000	4.000
P-value (chi-square)	0.887	0.901
Scaling correction factor: Satorra-Bentler correction		1.083
Model test baseline model:		
Test statistic	321.809	144.593
Degrees of freedom	13.000	13.000
P-value (chi-square)	0.000	0.000
Scaling correction factor		2.226
User model versus baseline model:		
Comparative Fit Index (CFI)	1.000	1.000
Tucker-Lewis Index (TLI)	1.030	1.073
Robust Comparative Fit Index (CFI)		1.000
Robust Tucker-Lewis Index (TLI)		1.035
Loglikelihood and Information Criteria:		
Loglikelihood user model (H0)	-2702.173	-2702.173
Loglikelihood unrestricted model (H1)	-2701.600	-2701.600
Akaike (AIC)	5430.345	5430.345
Bayesian (BIC)	5478.921	5478.921
Sample-size adjusted Bayesian (BIC)	5437.690	5437.690
Root Mean Square Error of Approximation:		
RMSEA	0.000	0.000
90 Percent confidence interval - lower	0.000	0.000
90 Percent confidence interval - upper	0.040	0.032
P-value H_0: RMSEA <= 0.05	0.968	0.978
P-value H_0: RMSEA <= 0.08	0.004	0.002
Robust RMSEA		0.000
90 Percent confidence interval - lower		0.000
90 Percent confidence interval - upper		0.038
P-value H_0: Robust RMSEA <= 0.05		0.970
P-value H_0: Robust RMSEA <= 0.08		0.005
Standardized Root Mean Square Residual:		
SRMR	0.006	0.006

As shown in table 34 above, the Indonesian firms start-up investment model was statistically significant with a user model p-value of 0.901, RMSEA of 0.000, CFI of 1 and SRMR of 0.006.

Based on the literature recommended thresholds highlighted in the methodology section above, the modelling was robust, and the results could be confidently applied in subsequent analyses.

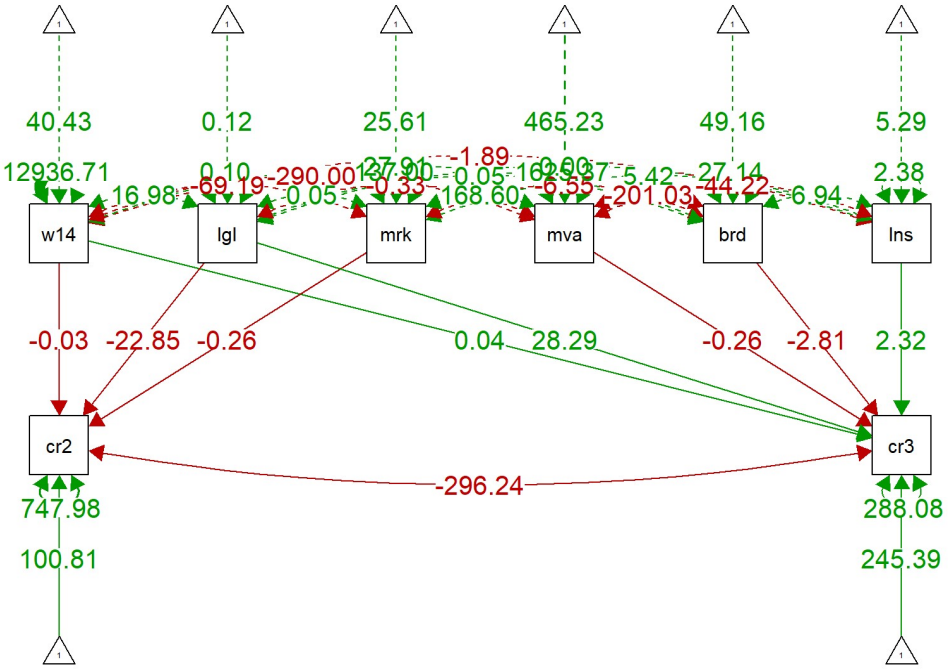
2. Regressions: Indonesia Start-Up Investment

Table 35: SEM regressions: Indonesia start-up investment

Domestic private ownership	Estimate	Standard Error	Z-Value	P-Value
Intercept	100.812	3.795	26.564	0.000
Number of workers	-0.031	0.027	-1.134	0.257
Firm type	-22.854	8.194	-2.789	0.005
Market capitalisation	-0.258	0.162	-1.595	0.111
Foreign private ownership	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	245.387	105.274	2.331	0.020
Number of workers	-0.257	0.114	-2.257	0.024
MVA per capita	28.295	7.788	3.633	0.000
Firm type	-2.811	1.249	-2.250	0.024
Broad money	2.320	1.799	1.290	0.197
Non-resident bank loans	100.812	3.795	26.564	0.000

As shown in table 35 above, all the Indonesian firms start-up investment model variables, save for number of workers in relation to domestic private ownership, were significant at either 1, 5 or 20 percent. Number of workers, firm type and market capitalisation were negatively related domestic private ownership. Further, number of workers and firm type were negatively related to foreign private ownership while MVA per capita, broad money and non-resident bank loans were positively related to foreign private ownership. Variances and covariances are shown in appendix E. Figure 42 below depicts the path diagram for the foregoing results.

Figure 42: SEM path diagram: Indonesia start-up investment



4.4.3.3. Philippines

1. Model fit: Philippines Start-Up Investment

Table 36: SEM model fit: Philippines start-up investment

Estimator	ML	
Optimisation method	NLMINB	
Number of model parameters	17	
	Used	Total
Number of observations	427	431
Model test user model:	Standard	Scaled
Test statistic	0.736	0.739
Degrees of freedom	2.000	2.000
P-value (chi-square)	0.692	0.691
Scaling correction factor: Satorra-Bentler correction		0.995
Model test baseline model:		

Test statistic	2171.901	2454.651
Degrees of freedom	15.000	15.000
P-value (chi-square)	0.000	0.000
Scaling correction factor		0.885
User model versus baseline model:		
Comparative Fit Index (CFI)	1.000	1.000
Tucker-Lewis Index (TLI)	1.004	1.004
Robust Comparative Fit Index (CFI)		1.000
Robust Tucker-Lewis Index (TLI)		1.004
Loglikelihood and Information Criteria:		
Loglikelihood user model (H0)	-3331.385	-3331.385
Loglikelihood unrestricted model (H1)	-3331.017	-3331.017
Akaike (AIC)	6696.770	6696.770
Bayesian (BIC)	6765.736	6765.736
Sample-size adjusted Bayesian (BIC)	6711.788	6711.788
Root Mean Square Error of Approximation:		
RMSEA	0.000	0.000
90 Percent confidence interval - lower	0.000	0.000
90 Percent confidence interval - upper	0.071	0.072
P-value H_0: RMSEA <= 0.05	0.873	0.872
P-value H_0: RMSEA <= 0.08	0.031	0.032
Robust RMSEA		0.000
90 Percent confidence interval - lower		0.000
90 Percent confidence interval - upper		0.071
P-value H_0: Robust RMSEA <= 0.05		0.873
P-value H_0: Robust RMSEA <= 0.08		0.031
Standardized Root Mean Square Residual:		
SRMR	0.007	0.007

As shown in table 35 above, the Philippine firms start-up investment model was statistically significant with a user model p-value of 0.691, RMSEA of 0.000, CFI of 1 and SRMR of 0.007. Based on the literature recommended thresholds highlighted in the methodology section above, the modelling was robust, and the results could be confidently applied in subsequent analyses.

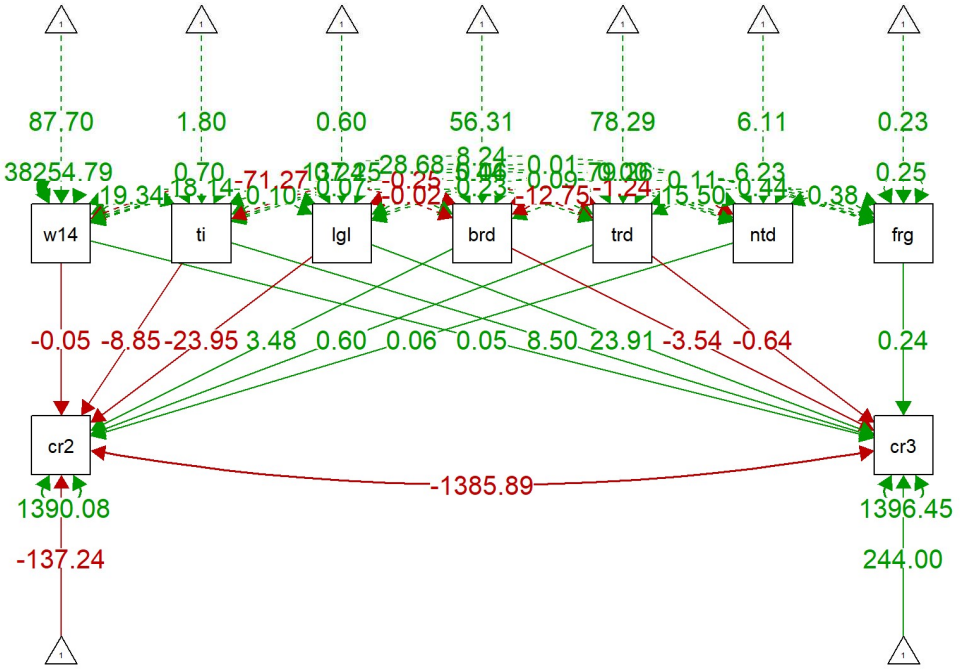
2. Regressions: Philippines Start-Up Investment

Table 37: SEM regressions: Philippines start-up investment

Domestic private ownership	Estimate	Standard Error	Z-Value	P-Value
Intercept	-137.245	67.400	-2.036	0.042
Number of workers	-0.049	0.014	-3.564	0.000
Technology intensity	-8.848	2.235	-3.960	0.000
Firm type	-23.954	3.676	-6.516	0.000
Broad money	3.477	0.943	3.688	0.000
Trade openness	0.603	0.257	2.347	0.019
ODA per capita	0.055	0.053	1.044	0.297
Foreign private ownership	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	243.999	67.520	3.614	0.000
Number of workers	0.046	0.015	3.135	0.002
Technology intensity	8.496	2.237	3.798	0.000
Firm type	23.907	3.688	6.482	0.000
Broad money	-3.540	0.945	-3.745	0.000
Trade openness	-0.641	0.257	-2.498	0.012
FDI	0.240	0.226	1.064	0.287

As shown in table 37 above, all the Philippine firms start-up investment model variables, save for ODA per capita and FDI in relation to domestic and foreign private ownership respectively, were significant at 1 and 5 percent. Number of workers, technology intensity and firm type were negatively related to domestic private ownership while broad money and trade openness were positively related to domestic private ownership. Despite only being significant at 30 percent ODA per capita was positively related to domestic private ownership. Further, number of workers, technology intensity and firm type were positively related to foreign private ownership while broad money and trade openness were negatively related to foreign private ownership. Despite FDI only being significant at 30 percent, it was positively related to foreign private ownership. Variances and covariances are shown in appendix E. Figure 43 below depicts the path diagram for the foregoing results.

Figure 43: SEM path diagram: Philippines start-up investment



4.4.3.4. Malaysia

1. Model fit: Malaysia Start-Up Investment

Table 38: SEM model fit: Malaysia start-up.

Estimator	ML	
Optimisation method	NLMINB	
Number of model parameters	17	
	Used	
Number of observations	193	
Model test user model:	Standard	Scaled
Test statistic	0.385	0.428
Degrees of freedom	4.000	4.000
P-value (chi-square)	0.984	0.980
Scaling correction factor: Satorra-Bentler correction		0.899
Model test baseline model:		

Test statistic	918.900	1025.805
Degrees of freedom	17.000	17.000
P-value (chi-square)	0.000	0.000
Scaling correction factor		0.896
User model versus baseline model:		
Comparative Fit Index (CFI)	1.000	1.000
Tucker-Lewis Index (TLI)	1.017	1.015
Robust Comparative Fit Index (CFI)		1.000
Robust Tucker-Lewis Index (TLI)		1.015
Loglikelihood and Information Criteria:		
Loglikelihood user model (H0)	-1683.784	-1683.784
Loglikelihood unrestricted model (H1)	-1683.591	-1683.591
Akaike (AIC)	3401.568	3401.568
Bayesian (BIC)	3457.033	3457.033
Sample-size adjusted Bayesian (BIC)	3403.182	3403.182
Root Mean Square Error of Approximation:		
RMSEA	0.000	0.000
90 Percent confidence interval - lower	0.000	0.000
90 Percent confidence interval - upper	0.000	0.000
P-value H_0: RMSEA <= 0.05	0.993	0.988
P-value H_0: RMSEA <= 0.08	0.002	0.003
Robust RMSEA		0.000
90 Percent confidence interval - lower		0.000
90 Percent confidence interval - upper		0.000
P-value H_0: Robust RMSEA <= 0.05		0.993
P-value H_0: Robust RMSEA <= 0.08		0.002
Standardized Root Mean Square Residual:		
SRMR	0.003	0.003

As shown in table 38 above, the Malaysian firms start-up investment model was statistically significant with a user model p-value of 0.98, RMSEA of 0.000, CFI of 1 and SRMR of 0.003. Based on the literature recommended thresholds highlighted in the methodology section above, the modelling was robust, and the results could be confidently applied in subsequent analyses.

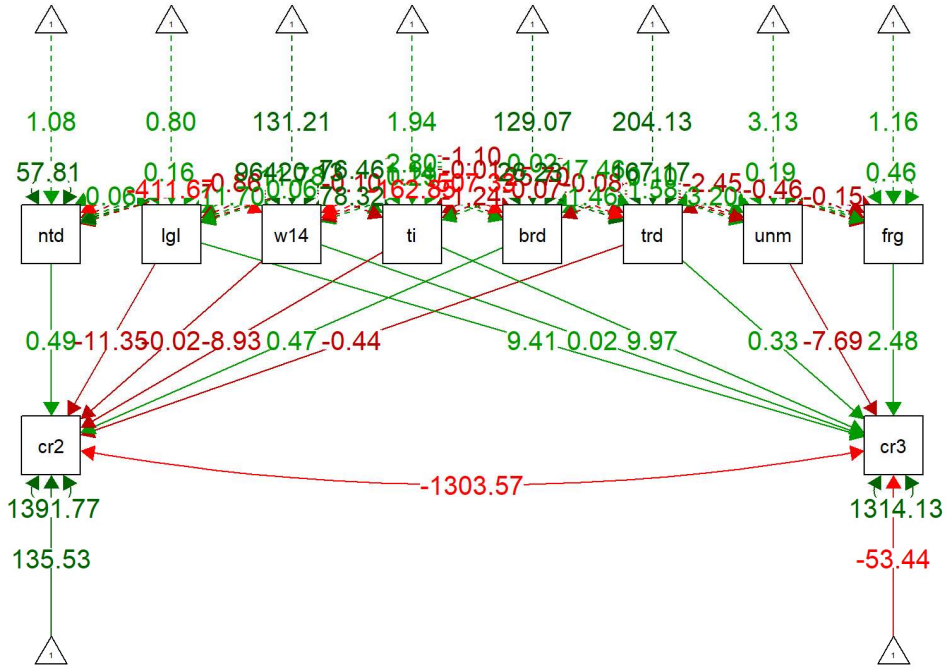
2. Regressions: Malaysia Start-Up Investment

Table 39: SEM regressions: Malaysia start-up investment

Domestic private ownership	Estimate	Standard Error	Z-Value	P-Value
Intercept	135.533	51.464	2.634	0.008
ODA per capita	0.490	0.249	1.970	0.049
Firm type	-11.347	5.513	-2.058	0.040
Number of workers	-0.025	0.014	-1.801	0.072
Technology intensity	-8.932	3.161	-2.826	0.005
Broad money	0.468	0.330	1.421	0.155
Trade openness	-0.445	0.263	-1.692	0.091
Foreign private ownership	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	-53.437	45.088	-1.185	0.236
Firm type	9.407	5.418	1.736	0.083
Number of workers	0.025	0.013	1.817	0.069
Unemployment rate	-7.690	4.815	-1.597	0.110
Technology intensity	9.972	3.032	3.289	0.001
Trade openness	0.330	0.234	1.410	0.159
FDI	2.483	1.709	1.453	0.146

As shown in table 39 above, all the Malaysian firms start-up investment model variables were significant at either 1, 5, 10 or 16 percent. ODA per capita and broad money were positively related to domestic private ownership while firm type, number of workers and technology intensity were negatively related to domestic private ownership. Further, firm type, number of workers, technology intensity, trade openness and FDI were positively related to foreign private ownership while unemployment rate was negatively related to foreign private ownership. Variances and covariances are shown in appendix E. Figure 44 below depicts the path diagram for the foregoing results.

Figure 44: SEM path diagram: Malaysia start-up investment



4.4.3.5. South Africa

1. Model fit: South Africa Start-Up Investment

Table 40: SEM model fit: South Africa start-up investment

Estimator	ML	
Optimisation method	NLMINB	
Number of model parameters	19	
	Used	Total
Number of observations	328	329
Model test user model:	Standard	Scaled
Test statistic	7.485	7.331
Degrees of freedom	6.000	6.000
P-value (chi-square)	0.278	0.291
Scaling correction factor: Satorra-Bentler correction		1.021
Model test baseline model:		

Test statistic	673.248	525.694
Degrees of freedom	21.000	21.000
P-value (chi-square)	0.000	0.000
Scaling correction factor		1.281
User model versus baseline model:		
Comparative Fit Index (CFI)	0.998	0.997
Tucker-Lewis Index (TLI)	0.992	0.991
Robust Comparative Fit Index (CFI)		0.998
Robust Tucker-Lewis Index (TLI)		0.993
Loglikelihood and Information Criteria:		
Loglikelihood user model (H0)	-2787.496	-2787.496
Loglikelihood unrestricted model (H1)	-2783.753	-2783.753
Akaike (AIC)	5612.991	5612.991
Bayesian (BIC)	5685.059	5685.059
Sample-size adjusted Bayesian (BIC)	5624.791	5624.791
Root Mean Square Error of Approximation:		
RMSEA	0.027	0.026
90 Percent confidence interval - lower	0.000	0.000
90 Percent confidence interval - upper	0.080	0.079
P-value H_0: RMSEA <= 0.05	0.696	0.711
P-value H_0: RMSEA <= 0.08	0.052	0.046
Robust RMSEA		0.026
90 Percent confidence interval - lower		0.000
90 Percent confidence interval - upper		0.080
P-value H_0: Robust RMSEA <= 0.05		0.702
P-value H_0: Robust RMSEA <= 0.08		0.052
Standardized Root Mean Square Residual:		
SRMR	0.018	0.018

As shown in table 40 above, the South African firms start-up investment model was statistically significant with a user model p-value of 0.291, RMSEA of 0.026, CFI of 0.997 and SRMR of 0.018. Based on the literature recommended thresholds highlighted in the methodology section above, the modelling was robust, and the results could be confidently applied in subsequent analyses.

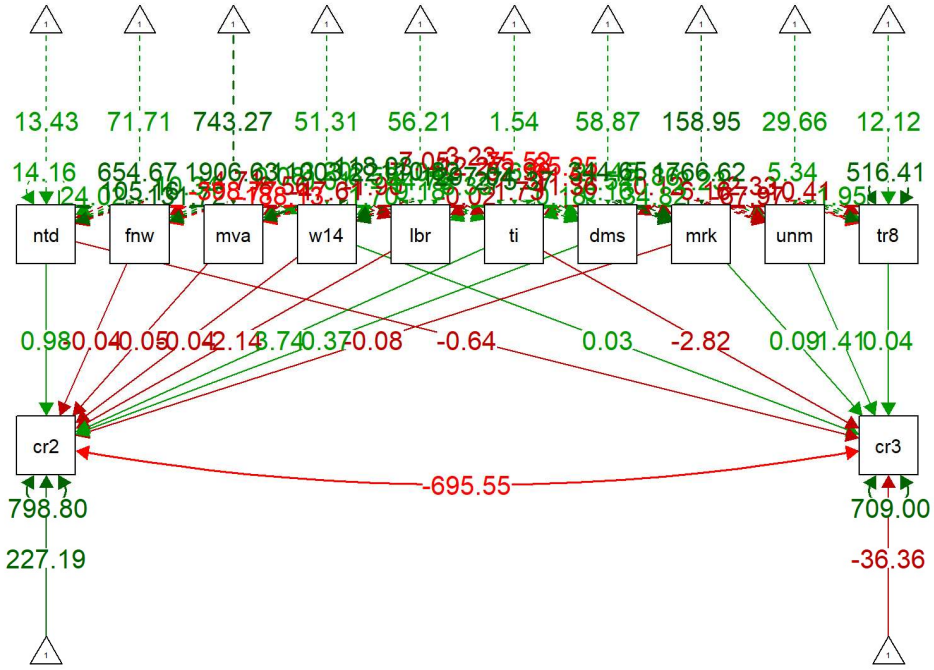
2. Regressions: South Africa Start-Up Investment

Table 41: SEM regressions: South Africa start-up investment

Domestic private ownership	Estimate	Standard Error	Z-Value	P-Value
Intercept	227.186	69.048	3.290	0.001
ODA per capita	0.976	0.408	2.391	0.017
Internal working capital	-0.041	0.024	-1.744	0.081
MVA per capita	-0.053	0.027	-1.987	0.047
Number of workers	-0.038	0.021	-1.756	0.079
Labour force participation	-2.140	0.964	-2.220	0.026
Technology intensity	3.744	1.668	2.245	0.025
Banking sector credit	0.371	0.178	2.078	0.038
Market capitalisation	-0.082	0.044	-1.847	0.065
Foreign private ownership	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	-36.365	23.529	-1.546	0.122
ODA per capita	-0.636	0.432	-1.471	0.141
Number of workers	0.033	0.021	1.543	0.123
Unemployment rate	1.414	0.632	2.235	0.025
Imported inputs	0.038	0.014	2.614	0.009
Technology intensity	-2.819	1.628	-1.732	0.083
Market capitalisation	0.087	0.045	1.921	0.055

As shown in table 41 above, all the South African firms start-up investment model variables were significant at either 1, 5, 10 or 13 percent. ODA per capita, technology intensity and banking sector credit were positively related to domestic private ownership while internal working capital, MVA per capita, number of workers, labour force participation and market capitalisation. Further, ODA per capita and technology intensity was negatively related to foreign private ownership while number of workers, unemployment rate, imported inputs and market capitalisation was positively related to foreign private ownership. Variances and covariances are shown in appendix E. Figure 45 below depicts the path diagram for the foregoing results.

Figure 45: SEM path diagram: South Africa start-up investment



4.4.4. SEM Results: Zambia Start-Up Investment

This section presents the start-up investment model in the Zambian case. As is evident below, despite some differences, the Zambian firms' start-up investment model shares numerous similarities with NIC firm models. Specifically, every independent variable in the Zambian model had a similar effect in at least one NIC model. Notably, ODA per capita in relation to domestic private ownership in Zambia had similar effects in the Indian, Philippine, Malaysian and South African models. Similarly, number of workers in relation to domestic private ownership had similar effects in the Indonesian, Philippine, Malaysian and South African models, with firm type showing similar effects in Indonesian, Philippine and Malaysian models. Similar phenomenon was found in relation to foreign private ownership with firm type having similar effects in the Indian, Philippine and Malaysian models while number of workers had similar effects in the Philippine, Malaysian and South African models.

4.4.4.1. Model fit: Zambia Start-Up Investment

Table 42: SEM model fit: Zambia start-up investment

Estimator	ML	
Optimisation method	NLMINB	
Number of model parameters	19	
	Used	Total
Number of observations	332	343
Model test user model:	Standard	Scaled
Test statistic	9.398	9.273
Degrees of freedom	4.000	4.000
P-value (chi-square)	0.052	0.055
Scaling correction factor: Satorra-Bentler correction		1.013
Model test baseline model:		
Test statistic	827.680	870.886
Degrees of freedom	19.000	19.000
P-value (chi-square)	0.000	0.000
Scaling correction factor		0.950
User model versus baseline model:		
Comparative Fit Index (CFI)	0.993	0.994
Tucker-Lewis Index (TLI)	0.968	0.971
Robust Comparative Fit Index (CFI)		0.993
Robust Tucker-Lewis Index (TLI)		0.969
Loglikelihood and Information Criteria:		
Loglikelihood user model (H0)	-2950.684	-2950.684
Loglikelihood unrestricted model (H1)	-2945.986	-2945.986
Akaike (AIC)	5939.369	5939.369
Bayesian (BIC)	6011.666	6011.666
Sample-size adjusted Bayesian (BIC)	5951.397	5951.397
Root Mean Square Error of Approximation:		
RMSEA	0.064	0.063
90 Percent confidence interval - lower	0.000	0.000
90 Percent confidence interval - upper	0.118	0.117
P-value H_0: RMSEA <= 0.05	0.274	0.281
P-value H_0: RMSEA <= 0.08	0.359	0.349
Robust RMSEA		0.063
90 Percent confidence interval - lower		0.000
90 Percent confidence interval - upper		0.118
P-value H_0: Robust RMSEA <= 0.05		0.278
P-value H_0: Robust RMSEA <= 0.08		0.357

Standardized Root Mean Square Residual:		
SRMR	0.022	0.022

As shown in table 42 above, the Zambian firms start-up investment model was statistically significant with a user model p-value of 0.055, RMSEA of 0.063, CFI of 0.994 and SRMR of 0.022. Based on the literature recommended thresholds highlighted in the methodology section above, the modelling was robust, and the results could be confidently applied in subsequent analyses.

4.4.4.2. Regressions: Zambia Start-Up Investment

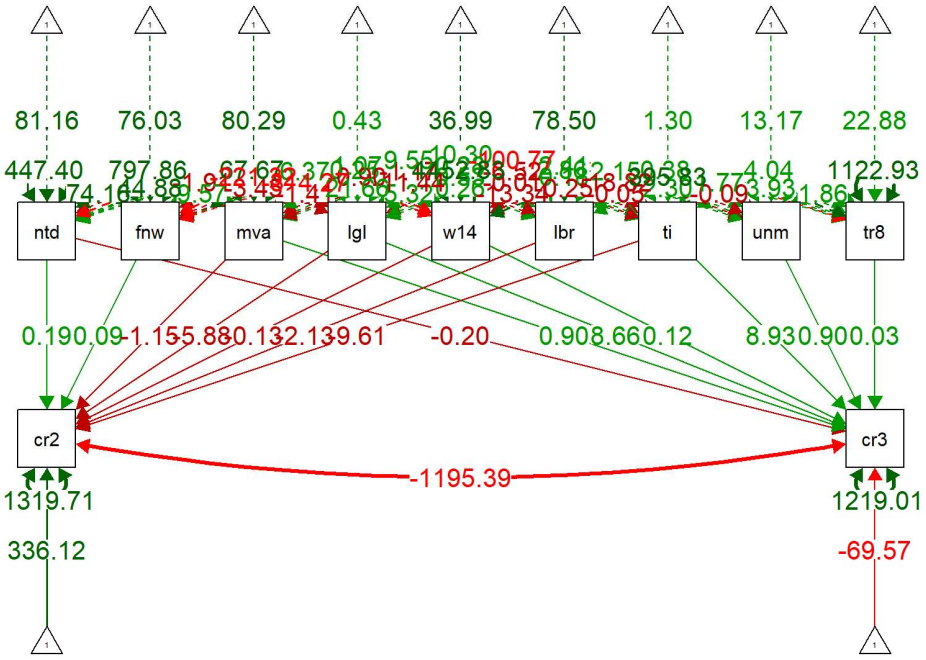
Table 43: SEM regressions: Zambia start-up investment

Domestic private ownership	Estimate	Standard Error	Z-Value	P-Value
Intercept	336.116	142.164	2.364	0.018
ODA per capita	0.193	0.119	1.628	0.104
Internal working capital	0.091	0.044	2.037	0.042
MVA per capita	-1.152	0.411	-2.806	0.005
Firm type	-5.882	4.550	-1.293	0.196
Number of workers	-0.130	0.025	-5.243	0.000
Labour force participation	-2.135	1.532	-1.393	0.164
Technology intensity	-9.606	3.671	-2.617	0.009
Foreign private ownership	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	-69.571	24.405	-2.851	0.004
ODA per capita	-0.201	0.106	-1.891	0.059
MVA per capita	0.905	0.269	3.366	0.001
Firm type	8.657	4.214	2.054	0.040
Number of workers	0.118	0.023	5.058	0.000
Unemployment rate	0.899	0.582	1.544	0.122
Imported inputs	0.029	0.018	1.607	0.108
Technology intensity	8.929	3.405	2.622	0.009

As shown in table 43 above, all the Zambian firms start-up investment model variables were significant at either 1, 5, 10 or 20 percent. ODA per capita and internal working capital were positively related to domestic private ownership while MVA per capita, firm type, number of workers, labour force participation and technology intensity were negatively related to domestic private ownership. Further, while ODA per capita was negatively related to foreign private ownership, MVA per capita, firm type, number of workers, unemployment rate, imported inputs and technology intensity were positively related to foreign private ownership. Variances and

covariances are shown in appendix E. Figure 46 below shows the path diagram of the foregoing results.

Figure 46: SEM path diagram: Zambia start-up investment



4.5. Optimisation

This section presents and interprets the optimisation results. It highlights the optimisation equations, states the constraints and benchmarks the non-dominated solutions against the respective performances of South Korea, NICs and Zambia.

4.5.1. Optimisation Equations

This sub-section presents and interprets the optimisation equations. These equations are derived from tables 31 and 43. The four optimisation equations highlight how manufacturing finance relates to its determinants in the Zambian case. Optimising these equations stands to yield optimal manufacturing outcomes given Zambia's prevailing conditions in terms of both capabilities given

previous performance and interrelationships among the associated variables. Knowledge of these specific solutions and the input variable levels needed to achieve them may give policy makers specific policy options from which to select, complete with targets and instruments on both the input and output sides.

a. Access to working capital finance.

$$FAWC = 13.574 + 14.556FT + 12.338TC - 0.018NW + 0.012AS$$

The equation above shows the access to working capital finance equation. It shows that, on average, a limited liability companies have about 15 percentage points higher access to working capital finance with firms reporting taxation constraints having about 12 percentage points higher access to working capital finance. Further, an extra worker is associated with 0.02 percentage points lower access to working capital finance while an extra million in sales increases access to working capital finance by about 0.01 percentage points.

b. Access to investment finance

$$FAIN = 5.171 + 18.815FA - 0.126CU + 5.736CP$$

The above equation shows the access to investment finance equation. It shows that, on average, firms that had fixed assets had about 19 percentage points more access to investment finance. Further, a percentage point increase in capacity utilisation reduced access to investment finance by about 0.13 percentage points. Lastly, a million increase in the population of the firm's host city was associated with a 6-percentage point increase in the firm's access to investment finance.

c. Domestic private ownership

$$DPO = 336.12 + 0.19ODA + 0.09IWC - 1.15MVA - 5.89FT - 0.13NW - 2.14LFP - 9.6TI$$

The above equation shows the domestic private ownership equation. It shows that, on average, an additional foreign aid dollar increased domestic private start-up investment by 0.19 percentage points, and in the same way, firms that were inclined to finance working capital internally were associated with higher domestic private start-up investment. On the contrary, a dollar increase in MVA per capita reduced domestic investment by 1.15 percentage points. Similarly, limited liability companies were associated with 5.89 percentage points less domestic private start-up

investment. Further, an extra worker reduced domestic private start-up investment by 0.13 percentage points and a percentage point increase in the labour force participation rate reduced domestic private start-up investment by 2.14 percentage points. Lastly, a unit increase in technology intensity reduced domestic private start-up investment by 9.6 percentage points.

d. Foreign private ownership

$$FPO = -69.57 - 0.2ODA + 0.91MVA + 8.657FT + 0.12NW + 0.9UR + 0.03II + 8.3TI$$

The above equation shows the foreign private ownership equation. It shows that, on average, an extra foreign aid dollar decreased foreign private start-up investment by 0.2 percentage points while a dollar increase in manufacturing output increased foreign private start-up investment by 0.91 percentage points. Further, limited liability firms were associated with 8.66 percentage points higher foreign private start-up investment with an extra worker associated with a 0.12 percentage point increase in foreign private start-up investment. Furthermore, an increase in the unemployment rate raised foreign private start-up investment by 0.9 percentage points, a percentage point increase in imported inputs was associated with a 0.03 percentage point increase in foreign private start-up investment and a unit increase in technology intensity raised foreign private start-up investment by 8.3 percentage points.

4.5.2. Optimisation Constraints

Table 44 below presents the constraints placed on the optimisation. As the optimisation was on the Zambian system, the constraints were drawn from the values that have previously prevailed in the Zambian case so that it is not out of the scope of reason that they are attainable. Other constraints include mathematical constraints (see appendix F) to align the results to all the equations generated by the SEM models as well as consistency restrictions aimed at keeping results in economically sound limits, e.g., ownership share lying between 0 and 100 percent.

Table 44: Optimisation constraints

S/n	Type	Variables	Minimum	Maximum
1	Input	ODA per capita	1	234
2	Input	Internal working capital	0	100
3	Input	MVA per capita	97	118
4	Input	Firm type	0	1

S/n	Type	Variables	Minimum	Maximum
5	Input	Number of workers	1	2500
7	Input	Labour force participation	73	80
8	Input	Technology intensity	1	4
9	Input	Unemployment rate	7	20
10	Input	Imported inputs	0	100
11	Input	Taxation constraints	0	1
12	Input	Annual sales	0.02	3000
13	Input	Fixed assets	0	1
14	Input	Capacity utilisation	2	100
15	Input	City population	0.1	4
16	Output	Access to working capital finance	0	100
17	Output	Access to investment finance	0	100
18	Output	Domestic private ownership	0	100
19	Output	Foreign private ownership	0	100

4.5.3. Optimisation Results

4,985 non-dominated solutions were generated from maximising the multi-objective equations subject to their constraints. This section presents analyses of the non-dominated solutions. As stated above, a fair amount of value judgement is needed to select the appropriate policy targets from the non-dominated solutions. Considerations include prevailing policy priorities, the implementation costs and benefits and a priori benchmarks. In this section, the latter consideration is made using the South Korea, NICs and Zambian average as benchmarks, considering solutions that were at least as good or at least as close to the benchmarks in terms of access to finance and start-up investment finance, excluding extreme cases while ensuring manufacturing value added per capita remained within 1 percent of the highest historical value. The former two considerations are addressed in the next chapter.

While it is emphasised that ultimate policy direction should consider the non-dominated solutions that most align with the extant policy priority framework, which expectedly changes relatively frequently, two statistical frameworks are arbitrarily adopted here to assess the veracity of the generated solutions. Firstly, the solution statistically closest to the 2019 actualised performance on the input side (here on, statistically least effort optimal solution, table 48), and secondly the three common solutions across the three benchmarks (here on, three common benchmark solutions,

presented in bold text). The former adopts the solution with the minimum sum of the squared differences between the 2019 performance inputs and the inputs of each of the 14 benchmark solutions.

4.5.3.1. Non-Dominated Solution Benchmarks

Of the 4,985 non-dominated solutions, as shown in table 45 below, 6 satisfied the South Korean benchmark allowing for up to 25 percent less domestic private ownership. Further, 5 satisfied the South Korean benchmark allowing for up to 25 percent less domestic private ownership as shown in table 46 below, all of which also satisfied the South Korean benchmark. Lastly, as shown in table 47 below, 9 solutions satisfied the 2019 Zambia benchmark allowing for up to 10 percent less domestic private ownership., three of which appeared under both the South Korean and NICs benchmarks. Figure 47 below shows a stationary version of a four-dimensional plot of the benchmark solutions.

Table 45: Optimisation benchmark: South Korea

Solution no.	**351**	**1469**	**2103**	**2552**	**2779**	**2848**
ODA per capita	101.5	**162.4**	**150.9**	143.2	116.7	**190.3**
Internal working capital	72.6	**59.1**	**79.1**	65.5	57.7	**73.4**
MVA per capita	101.0	**102.4**	**102.7**	101.2	102.3	**101.8**
Firm type	0.7	**0.8**	**0.9**	0.7	0.7	**0.6**
Number of workers	20	**34**	**120**	73	132	**66**
Labour force participation	76.3	**76.2**	**76.5**	76.2	75.3	**76.8**
Technology intensity	3.3	**1.6**	**2.0**	2.6	2.3	**1.8**
Unemployment rate	16.8	**16.5**	**17.2**	17.1	16.6	**17.2**
Imported inputs	30.0	**37.4**	**26.3**	32.4	32.0	**56.3**
Taxation constraints	0.7	**0.8**	**0.6**	0.9	0.8	**0.8**
Annual sales	2862.4	**2917.5**	**2916.3**	2949.6	2980.0	**2989.7**
Fixed assets	0.6	**0.7**	**0.7**	0.6	0.6	**0.7**
Capacity utilisation	36.3	**16.1**	**14.1**	40.6	9.3	**18.1**
City population	0.9	**2.0**	**2.6**	1.0	1.8	**2.4**
Domestic private ownership	66.8	**70.7**	**67.0**	69.0	67.2	**67.1**
Foreign private ownership	18.0	**28.7**	**31.3**	16.7	24.7	**30.8**
Access to working capital finance	44.1	**67.3**	**50.3**	52.6	41.9	**68.5**
Access to investment finance	55.8	**32.1**	**49.5**	46.6	57.7	**30.9**

Table 46: Optimisation benchmark: NICs

Solution no.	**1469**	**2103**	**2552**	**2779**	**2848**
ODA per capita	**162.4**	**150.9**	143.2	116.7	**190.3**
Internal working capital	**59.1**	**79.1**	65.5	57.7	**73.4**
MVA per capita	**102.4**	**102.7**	101.2	102.3	**101.8**
Firm type	**0.8**	**0.9**	0.7	0.7	**0.6**
Number of workers	**34**	**120**	73	132	**66**
Labour force participation	**76.2**	**76.5**	76.2	75.3	**76.8**
Technology intensity	**1.6**	**2.0**	2.6	2.3	**1.8**
Unemployment rate	**16.5**	**17.2**	17.1	16.6	**17.2**
Imported inputs	**37.4**	**26.3**	32.4	32.0	**56.3**
Taxation constraints	**0.8**	**0.6**	0.9	0.8	**0.8**
Annual sales	**2917.5**	**2916.3**	2949.6	2980.0	**2989.7**
Fixed assets	**0.7**	**0.7**	0.6	0.6	**0.7**
Capacity utilisation	**16.1**	**14.1**	40.6	9.3	**18.1**
City population	**2.0**	**2.6**	1.0	1.8	**2.4**
Domestic private ownership	**70.7**	**67.0**	69.0	67.2	**67.1**
Foreign private ownership	**28.7**	**31.3**	16.7	24.7	**30.8**
Access to working capital finance	**67.3**	**50.3**	52.6	41.9	**68.5**
Access to investment finance	**32.1**	**49.5**	46.6	57.7	**30.9**

Table 47: Optimisation benchmark: 2019 Zambian

Solution no.	**1469**	**1886**	**1989**	**2103**	**2268**	**2848**	**3258**	**4016**	**4488**
ODA per capita	**162.4**	149.8	160.3	**150.9**	120.3	**190.3**	62.2	109.0	221.4
Internal working capital	**59.1**	65.6	67.1	**79.1**	70.3	**73.4**	79.2	69.5	57.4
MVA per capita	**102.4**	101.3	101.2	**102.7**	102.0	**101.8**	101.4	102.5	101.9
Firm type	**0.8**	0.7	0.9	**0.9**	0.7	**0.6**	0.9	0.6	0.9
Number of workers	**34**	143	74	**120**	108	**66**	135	8	25
Labour force participation	**76.2**	76.0	76.0	**76.5**	76.5	**76.8**	76.8	77.0	76.6
Technology intensity	**1.6**	1.8	3.3	**2.0**	1.4	**1.8**	2.4	2.1	1.4
Unemployment rate	**16.5**	17.2	17.0	**17.2**	17.3	**17.2**	17.5	17.6	17.5
Imported inputs	**37.4**	37.7	31.5	**26.3**	35.3	**56.3**	24.2	48.7	40.1

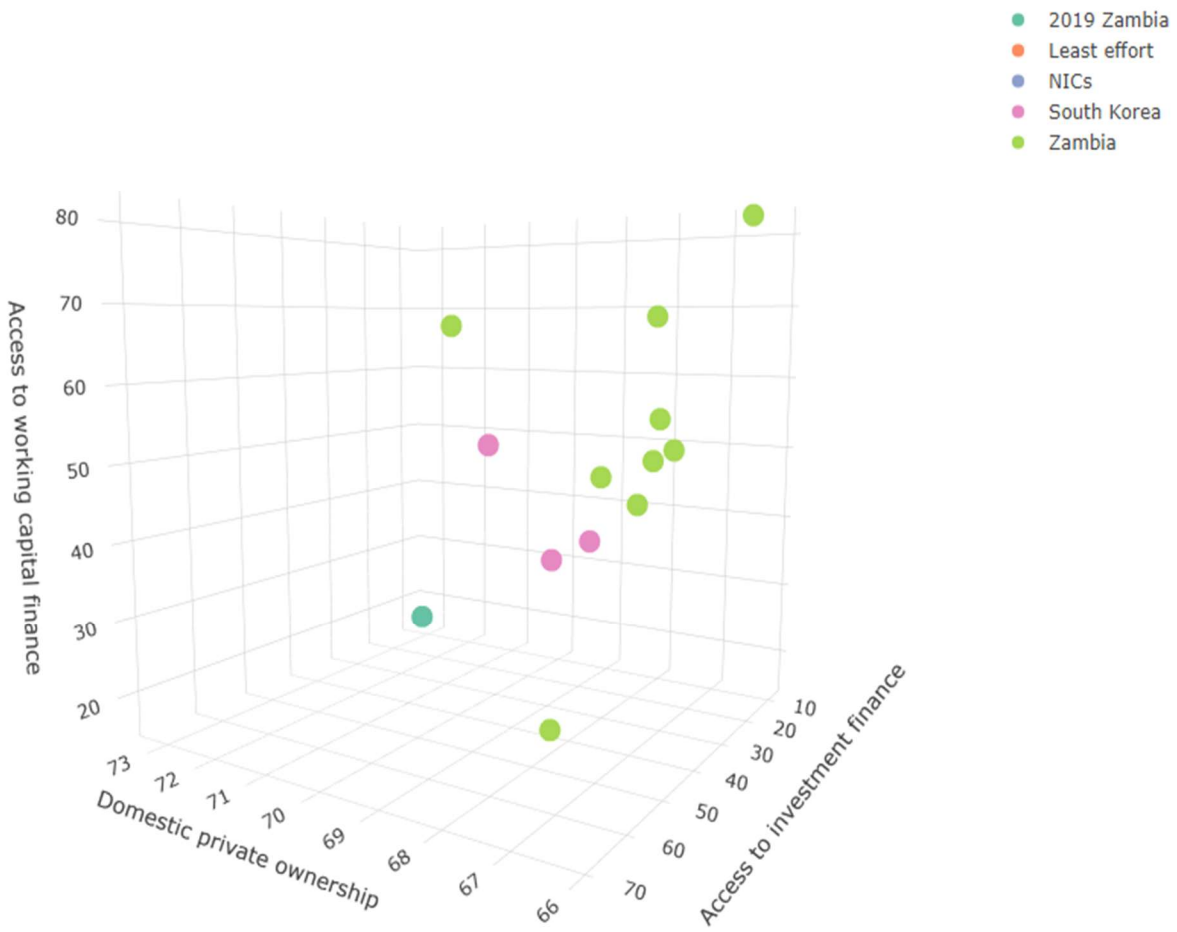
Solution no.	1469	1886	1989	2103	2268	2848	3258	4016	4488
Taxation constraints	**0.8**	0.9	0.6	**0.6**	0.7	**0.8**	0.7	0.9	0.7
Annual sales	**2917.5**	2921.4	2744.2	**2916.3**	2977.9	**2989.7**	2866.0	2831.7	2598.7
Fixed assets	**0.7**	0.6	0.8	**0.7**	0.7	**0.7**	0.9	0.8	0.8
Capacity utilisation	**16.1**	27.3	26.5	**14.1**	14.5	**18.1**	19.3	28.1	21.3
City population	**2.0**	2.3	2.4	**2.6**	1.5	**2.4**	1.4	2.8	2.6
Domestic private ownership	**70.7**	66.4	66.4	**67.0**	66.1	**67.1**	66.4	66.5	66.2
Foreign private ownership	**28.7**	26.5	31.6	**31.3**	25.8	**30.8**	27.0	33.4	31.6
Access to working capital finance	**67.3**	52.3	47.9	**50.3**	53.5	**68.5**	28.4	56.7	81.7
Access to investment finance	**32.1**	47.3	51.8	**49.5**	46.2	**30.9**	71.4	43.0	17.9

Table 48: Optimisation benchmark: statistically least effort optimal solution

Solution no.	4488	1989	4016	351	2019 Zambia
Rank	1	2	3	4	
ODA per capita	221.4	160.3	109.0	101.5	55.8
Internal working capital	57.4	67.1	69.5	72.6	80.8
MVA per capita	101.9	101.2	102.5	101.0	101.6
Firm type	0.9	0.9	0.6	0.7	0.2
Number of workers	25.0	74.0	8.0	20.0	70.1
Labour force participation	76.6	76.0	77.0	76.3	74.1
Technology intensity	1.4	3.3	2.1	3.3	1.4
Unemployment rate	17.5	17.0	17.6	16.8	12.4
Imported inputs	40.1	31.5	48.7	30.0	23.4
Taxation constraints	0.7	0.6	0.9	0.7	0.3
Annual sales	2,598.7	2,744.2	2,831.7	2,862.4	34.9
Fixed assets	0.8	0.8	0.8	0.6	48.5
Capacity utilisation	21.3	26.5	28.1	36.3	70.1
City population	2.6	2.4	2.8	0.9	0.5
Domestic private ownership	66.2	66.4	66.5	66.8	73.4
Foreign private ownership	31.6	31.6	33.4	18.0	24.8
Access to working capital finance	81.7	47.9	56.7	44.1	16.0

Solution no.	4488	1989	4016	351	2019 Zambia
Access to investment finance	17.9	51.8	43.0	55.8	6.9

Figure 47: Optimisation summary, Benchmarks



4.6. Chapter Summary

This chapter has presented and interpreted, without discussion, the study results. It showed that the study results were statistically significant and satisfied the post estimation requirements recommended by the literature. For a streamlined presentation, robustness checks and pre-estimation analyses were relegated to appendix D. The next chapter builds on the interpretations by showing how the results fit in extant literature and their potential applications.

CHAPTER V. DISCUSSION

5.1. Introduction

This study sought to model Zambia's manufacturing finance based on the NICs model. This was implemented by firstly thematically benchmarking Zambia's national and firm level manufacturing finance themes against comparable NICs. The benchmarking revealed the key differences and similarities between NICs and Zambia in terms of performance, process, and policy, contrasting Zambia from NICs and therefore highlighting key development and efficiency gaps in Zambia's manufacturing finance. Structural models of NICs and Zambian firms were then developed, revealing differences and similarities in how manufacturing finance associated variables relate. These relationships then motivated the optimisation of the Zambian model, paying due attention to the benchmark lessons and the efficient manufacturing finance relationships revealed in the NIC models. Intuitively, this benchmarking, modelling and optimisation strategy answered the question; using the example of the most efficient and successful manufacturing finance systems, what actions are needed to shift Zambia's manufacturing finance onto the efficiency frontier?

This chapter discusses the results of the foregoing. It shows how the results of the study are related to extant literature and how they may be applied in the development of manufacturing finance policy in developing countries with special focus on Zambia. The chapter is presented in four sub sections, benchmarking, access to finance and start-up investment, the optimal cases and a chapter summary.

5.2. Benchmarking (Objectives One and Two)

Based on the analysis in section 2.3, the study adopted India, Indonesia, Malaysia, Philippines, Singapore, South Africa and South Korea as the benchmark countries, with Singapore being further dropped due to data unavailability. The results show that South Korea by far had the highest manufacturing development among the study countries. This finding is not surprising as the country is widely recognised as the paragon of industrialisation with some scholars arguing that new economic development theory needs to be weighed against South Korea's development experience to prove validity (Lindauer & Pritchett, 2002). Zambia had the least manufacturing

development. This is in line with the findings of Chansa et al. (2019), in their comparison between Zambia and South Korea, showing that while Zambia and South Korea were at about the same level of development in the mid-1960s, South Korea accelerated to become a manufacturing development leader. It is no wonder developing countries and Zambia have over the last decade shown proclivity to modelling their industrial development on South Korea or similarly evolved NICs. As shown above, NICs such as South Korea achieved such manufacturing development by evolving their developmental states into industrial states, through among other channels, instituting robust manufacturing finance policies, an evolution deficit in the Zambian case. Further, studies such as Prasad and Nickow (2016) in analysing South Korea and Pakistan, or Lee (2019) in drawing lessons for Africa from South Korea, all note South Korea's outstanding industrialisation and manufacturing development performance and the significance of manufacturing finance in this process. This is in line with the big push theory which argues for the significance of large and consistent financing in manufacturing development. To reposition Zambia on the industrial state path, the country may gain from instituting explicit manufacturing finance policy, separate from financial and industrial finance sector policies. This will allow explicit address of manufacturing sector finance challenges within the broader industrial and financial sector spheres. This, as previously discussed, is necessitated by the unique manufacturing sector financial needs, which differ in both scope and size from general firm finance and industrial sector finance. The implicit manufacturing finance policy status quo will likely perpetuate sub-optimal manufacturing development outcomes. Care should nonetheless be taken, as prescribed by the Mckinnon-Shaw hypothesis, to ensure that this state intervention does not stifle broader financial liberalisation.

South Korea had the highest access to investment finance with India recording the highest access to working capital finance. Excluding Philippines and South Africa that had relatively high reports of firms not needing loans, Zambia had the worst access to working capital finance and second worst access to investment finance while also having the highest number of firms reporting that they needed loans. This result is aligned with contemporary literature on the generally high access to finance in South Korea (Chansa et al., 2019; Lee, 2019; Prasad & Nickow, 2016). Further, Zambia had the third highest internally financed working capital and the highest internally financed investments. Because South Africa and Philippines had the highest reports of not needing a loan, Zambia may be argued to have had the highest unintended internally financed working

capital and investment. This is in line with extant literature on access to finance being a challenge in Zambia (Fessehaie et al., 2015; GRZ, 2017). Among the most efficient firms, South Korea had the highest access to working capital and investment finance. Excluding South Africa, which had the largest average of efficient firms reporting that they did not need loans, Zambian efficient firms had the lowest access to both types of finance. Further, excluding South Africa, Zambia had the highest internally financed investments and working capital. This shows that even among the best performers in the respective countries, Zambia had low access to finance and consequently high internal finance despite the firms reporting that they needed loans.

While South Korea recorded a relative value score of 1.6 in lending interest rate, Zambia recorded 7.0, a close third highest rank among the study countries. Indonesia had the highest lending interest rate with a corresponding 0.7 relative value score in access to investment finance. Further, Malaysia had the lowest lending interest rate, a finding consistent with Rasiah (2011). The generally low overall interest rate in South Korea (Cho, 2002; Lee, 2019; Mikheeva, 2019) and high rates in Zambia (BoZ et al., 2019; Fessehaie et al., 2015; GRZ, 2017) have strong support in extant literature with its subsequent effects of access to finance consistently predicted by the Neoclassical Theory. Furthermore, the Zambian banking and non-banking sectors performed relatively poorly compared to NICs in terms of both level and efficiency. Despite demand side improvements and complimentary manufacturing finance system improvements, the supply side of Zambia's manufacturing finance needs to grow for enhanced manufacturing finance and manufacturing development. An initial policy move would be consolidation of the currently apparently fragmented policy loan based private enterprise development such as CEEC and the numerous youth empowerment schemes into one main policy loan vehicle as was the case of the Korea Development Bank (Lee, 2019). With policy financing under a single umbrella, implementation of manufacturing development strategy may be more coherent and intertemporally consistent. Further supply side improvements may be required. As shown, inadequate expertise and low financial resources plague the supply side (GRZ, 2017). Specifically, adverse selection, inadequate financial product design expertise and lack of financial resources affect the supply side. To counter this, while observing that foreign investors can access finance at relatively cheaper prices from foreign financial sources, government may do well to promote the entry of foreign financial institutions on the domestic market to bring in both financial product design expertise

and financial resources on the domestic market. Further, financial deepening and inclusion should be promoted by leveraging technology and incentivising financial institutions to increase their geographical reach. This will likely increase the liquidity in the financial system as well as enhance financial literacy. Additional gains may be achieved through non-traditional financing options that are available on the Zambian market but have low utilisation such as capital market finance.

At the aggregate, numerous cross cutting factors can explain the divergence between Zambia and NICs. Chansa et al., (2019) also explore this topic and highlight numerous factors leading to the divergent manufacturing development outcomes between Zambia and South Korea. Summarily, they argue that South Korea's evolution into a developmental state led to its transformation into an industrial state. Specifically, they highlight that the South Korean developmental state had both developmental structures and played an active developmental role, which culminated into dynamic industrial policy and expedient structural transformation. They posit that finance through incentive structures, policy loans and pro-industrial growth state institutions such as the Korea Development Bank and the Technology Development Corporation accentuated structural transformation through the provision of cheaper financial resources and research and development. While focusing on the significance of finance in South Korea's industrialisation, Lee (2019) makes similar arguments, noting that the manufacturing sector policy loans channelled through the banking sector to supply affordable "growth money" played a critical role in the country's industrialisation. The foregoing was however not the case in Zambia. Chansa et al., (2019) argue that unlike South Korea, Zambia did not advance past the developmental state and thus neither instituted effective developmental structures nor played an effective developmental role. Further, deficient manufacturing finance policy in Zambia induced an inadequate supply of manufacturing finance which led to manufacturing sector stagnation across the various manufacturing development strategies, as argued above. More precisely, the supply side of manufacturing finance has been dominated by, inadequate domestic savings, unfocused FDI, inconsistent aid, mismanaged copper revenues (GRZ, 2017; Rolfe & Woodward, 2004; Seidman, 1974) and misapplied debt while low access and lack of innovation have riddled the demand side.

The low access to manufacturing finance in Zambia and subsequent divergence between NICs and Zambia can be attributed to numerous factors, including unfavourable legal climate, taxation constraints, firm size distribution, firm financial inefficiency, low firm formalization, low

technology intensity, import dependence and predominance of domestic sales. These factors are explored below within the context of the study results.

Zambia had the highest report of court constraints among the study countries. As argued by Beck and Levine (2004), legal institutions contribute to the smooth operation of financial intermediation, this finding therefore shows a salient disadvantage Zambian manufacturing firms face as they seek financing. This is further consistent with the Colonial Influence on Financial Development Theories which argue, as shown above, that former extraction states like Zambia typically face unfavourable legal climates. South Korea recorded a relative value score of 3.1 on reported court constraints. Among the most efficient firms, Zambia had the highest average of firms reporting court constraints. This implies that even among the efficient firms, courts remain a constraint and thereby affect manufacturing firm financing. Court efficiency and access may thus need to be enhanced, especially for the Industrial Relations and Commercial Divisions of the High Court of Zambia (World Bank, 2022). Such courts need to have wider geographical reach relative to the current set-up where they are localised in a few districts while aiming to serve the entire country.

Zambia had the second highest report of taxation constraints, this finding is substantiated by the 2019 Zambia investor perception survey (BoZ et al., 2019), as well as academic analyses such as Fessehaie et al. (2015) that note that corporate income taxes in Zambia exceed the regional average. On the other hand, South Korea reported a relative value score of 4.6, with Lee (2019) noting the implementation of various government policies aimed at reducing the tax burden on South Korean firms. Among the most efficient firms, Zambia had the highest average of firms reporting taxation constraints. This implies that even among the efficient firms, taxation remains a constraint and thereby affects firm financing. As shown to be practice in growth stage NICs, industry enabling tax provisions such as tax breaks need to be applied on manufacturing firms, along with improvements in tax administration as already on track through mechanisms such as online tax administration.

The largest producers in terms of annual sales were generally the most efficient across all study countries. Consistent with the Accelerator Theory, this implies that larger firms were the most efficient in minimising finance and non-finance inputs while maximising outputs. This is in line with mainstream literature that argues that larger firms typically have higher access to finance and

have stronger internal financial systems (Mertzanis, 2016). Further, Zambia had the least distribution in terms of firm financial efficiency, implying that the efficiency of Zambian firms was clustered around the same level, relative to the NICs. This clustering applied across manufacturing sub-sectors as well. In terms of number of workers, except for Malaysia which by far had the highest average number of workers per firm (South Korean data missing), Zambia was not significantly different from the rest of the NICs. Among the efficient firms however, Zambian firms had the second lowest average number of workers. At the macro-level, Zambia had the second highest level of unemployment but the highest level of labour force participation rate. Relative to NICs, this implies that while people are willing to work, they are unable to find work. This result is in line with Chansa et al. (2019) who note serious unemployment in Zambia, especially highlighting youth unemployment characterised by limited job creation in the formal sector, and informal sector growth. To enhance access to finance while noting the macro-level availability of human resource, resolve may require conglomeration and large firm formation, contrary to the current predominance of small firms (less than 20 workers), accounting for about 39 percent of Zambia's manufacturing sector (World Bank, 2021a). SMEs while helpful in developing countries may not lead to manufacturing sector scale up into higher technology output.

Zambia was on the tail end of the share of limited liability companies among general firms and the second lowest among the efficient firms. As shown in literature, higher formalisation is associated with higher access to finance due to increased transparency, stronger governance, and the independence of the firm's longevity from the owner(s) (Amornkitvikai & Harvie, 2017). Such lower levels of formalisation in Zambia may thus be inhibiting broader access to manufacturing finance. Further, Zambia had the lowest technology intensity average across both general firms and efficient firms while being on the tail end of foreign technology use in both general and efficient firms. This is in line with extant literature that argues that Zambian manufacturing is largely nascent and localised to lower levels of manufacturing output (GRZ, 2014; Yamfwa et al., 2002). It is thus positive that Zambia had the highest share of firms buying fixed assets (South Korean data missing) among all firms and the second highest average among efficient firms. This may indicate capital formation and a path to higher technology adoption. To enhance technology adoption while promoting formalisation, policy may apply import tax incentives on manufacturing scaling up technology imports for limited liability companies.

As regards sales and trade, Zambia had the highest domestic sales and the lowest direct exports, along with the third highest imported inputs. On the contrary, South Korea had the second lowest domestic sales and the second highest direct sales, along with the second highest imported inputs share. The contrast is clear, Zambia is relatively import dependent in inputs with low exports while South Korea is a leader in exports despite using significant imports to produce exports. Mudenda (2009) tracks widespread imported input dependence in Zambia's manufacturing sector through various industrialisation strategies, noting with the example of the chemicals and chemical products sector, imported input and spare part dependence over the period 1968 – 1990. Additional support for the study results can be found in the assessment by Fessehaie et al. (2015), who attribute the weak export performance to low labour productivity and capacity utilisation in Zambia, an assessment confirmed by the current study results, showing Zambia's relatively low-capacity utilisation. Among the most efficient firms, Zambia had the highest domestic sales and correspondingly the lowest direct exports. This implies that even among the most efficient manufacturing firms, the majority service the domestic market despite relying on imported inputs. The negative effects of import dependence on manufacturing finance in Zambia are well documented. During the import substitution industrialisation strategy, the import dependence trap derailed the industrialisation strategy such that it began exerting pressure on foreign exchange instead of relieving it while also creating financial market instability and distortions: negatively affecting manufacturing finance (Brownbridge, 1996; Mudenda, 2010; Seidman, 1974). To rectify this, policy may, where possible, incentivise the development of resource-based manufacturing industries. Zambia may further exploit the tariff and non-tariff provisions in multilateral trading agreements. Being a Least-Developed Country, Zambia carries various privileges in the multilateral trading system that are not available to developed countries such as non-reciprocity as well as access to various trade related capacity building programmes and trade financing mechanisms.

Beyond access to manufacturing finance and its determinants, the manufacturing firm ownership and foreign aid receipts results are noteworthy. Zambia recorded the lowest domestic private ownership, and the highest foreign domestic and government ownership among the study countries. South Korea on the other hand reported the least government ownership with the third highest domestic and foreign private ownerships. This is in line with Mertzanis (2016), that argues

that government ownership is generally higher in low-income countries. Fischer (2018) further notes that South Korea had higher domestic ownership relative to foreign ownership during its industrialisation. In support, Lee (2019) also notes high domestic private ownership of industrial firms in South Korea during its industrialisation, preferring it to multinational corporation ownership as they generally do not generate sustainable growth despite being useful knowledge transfer channels. Among the most efficient firms, Zambia had the highest foreign private investment and the second lowest domestic private investment. This further shows that relative to the other study countries, foreign ownership is relatively higher while domestic private ownership is lower even among the most efficient Zambian firms. While admittedly holding inadequate domestic resources to finance domestic investment, policy may conglomerate efficient domestic firms into large sub-sector leaders on which the domestic value chains may anchor. As in the case of Chaebols in South Korea (Chansa et al., 2019; Lee, 2019), such local champions would be large enough to facilitate growth and technology transfer within the ecosystem.

5.3. Access to Finance and Start-Up Investment (Objective three)

5.3.1. Similarities between efficient NIC and Zambian firms

Beginning with the similarities between the efficient NICs and Zambian firms in terms of access to finance. Taxation constraints were positively related to access to working capital finance in both efficient NICs and Zambian firms, with Zambian firms reporting taxation constraints having 12.33 percentage points higher access to working capital finance. Taxation has the effect of reducing profit and thus reduces the funds available to repay loans and consequently inhibits loan acquisition. In this vein, the Neoclassical Theory of Investment prescribes reduction in taxation as an investment promotion strategy through the cost of capital reduction channel (Samuel 1998). It is thus not uncommon for policy makers to offer tax incentives to investors to stimulate economic growth (Fessehaie et al., 2015; Tyson, 2017). The results show that firms at the frontier of access to working capital finance simultaneously reported the highest taxation constraints, implying that the Zambian tax regime may be inhibiting manufacturing finance. As Tyson (2017) suggests, despite there being numerous support and tax incentive structures in Zambia's formal industrial policy, they do not appear to be especially effective. Specifically, the tax regime may be preventing or at least posing challenges for firms that seek to exploit it to enhance access to manufacturing finance in the pursuit of more advanced financial services or increased access to available financial

services. As shown in the NICs, creating an enabling tax environment through such strategies as tax incentives plays a critical role in improving access to manufacturing finance and growing the manufacturing sector. Care should nonetheless be taken to ensure that the incentives benefit the intended subsectors and efficient firms (Chansa et al., 2019; Lee, 2019; Lee et al., 2016). This study thus recommends the continuation of incentivising manufacturing sector investments through fiscal channels while strengthening monitoring and evaluation to curtail investor misuse of such incentives (Gadzala, 2010; Haglund, 2008).

Fixed assets were positively related to access to investment finance in both efficient NICs and Zambian firms, with Zambian firms that had fixed assets having 18.83 percentage points higher access to investment finance. Collateral plays a significant role in firm access to finance as it guarantees the financier's investment should the business fail, with strong collateral law enforcement further enhancing such access to finance (Beck & Feyen, 2013; Musamali & Tarus, 2013). The natural affinity for financiers to prioritize profit while reducing uncertainty additionally strengthens the case for collateral over the business case (Amornkitvikai & Harvie, 2017; Wasiuzzaman et al., 2020). This finding has extensive literature support, the 2017 Zambia National Financial Sector Development Policy for instance argued that the banking sector is plagued with high collateral requirements (GRZ, 2017), a view supported by Fessehaie et al. (2015). The case for collateral has been found in numerous other settings such as in Ethiopia, where Fanta (2012) notes that availability of collateral was a key enhancer of access to bank financing, adding for instance that owning a non-residential building significantly increased the chances of obtaining a bank loan. Wasiuzzaman et al. (2020) in the Malaysian manufacturing sector also found collateral positively related to creditworthiness, arguing that SMEs that offer financiers collateral are accorded more access as they reduce the financier's risk. This study thus recommends the promotion of capital formation and accumulation among manufacturing firms through tax incentives.

Capacity utilisation was negatively related to access to investment finance in both efficient NICs and Zambian firms with a unit increase in capacity utilisation in Zambian firms resulting in a 0.13 percentage point decrease in access to investment finance. This follows natural reason, the more capacity for growth the more financiers are willing to offer financial resources to exploit the underutilised capacity, conversely, the lesser capacity for growth the less likely financiers are

willing to offer financial resources. As argued by Tyson (2017), investors typically finance operating firms that can grow, as opposed to greenfield investments which implies higher risk because they have not been tested on the associated market. The results are consistent with Wasiuzzaman et al. (2020) who found that growth potential was positively related to credit worthiness and access to finance among Malaysian manufacturing SMEs. With financiers drawn to the growth potential signalled by low-capacity utilisation, policy may tease out the growth in firms directly by promoting accelerator programs and innovation hubs.

5.3.2. Differences between efficient NIC and Zambian firms

Turning to the differences between efficient NIC and Zambian firm models in terms of access to working capital and investment finance. While limited liability companies were associated with lower access to working capital finance among the efficient NIC firms, they were associated with a 14.56 percentage point higher access among Zambian firms. The difference in effects may be due to the differences in formal firms' attitudes to sourcing working capital externally and the value placed on business formalisation in the two settings. Beyond limited liability firms in NICs showing lesser appetite for financing working capital externally, business formalisation in Zambia is associated with stronger governance and transparency, reducing the likelihood of moral hazard (Amornkitvikai & Harvie, 2017; Musamali & Tarus, 2013). Limited liability companies in Zambia carry numerous statutory compliance transparency obligations related to taxation and labour. This state transparency filter enhances the odds of successful external financing for limited liability companies above other forms of business institution. This is especially the case in developing countries rather than NICs where higher business formalisation is the rule rather than the exception, noting that the share of limited liability companies among efficient NIC firms is about twice that of Zambian firms (World Bank, 2021). In explaining similar results, Musamali and Tarus (2013) introduce the significance of the firm's ability to honour financial obligations beyond the owner's capabilities. Specifically, they argue that limited liability companies have the property of continuing to exist and honour their commitments beyond the founder's longevity, giving assurance to the financier. Mertzanis (2016) despite finding mixed results, makes a similar case, arguing that limited liability companies offer financiers greater transparency and stronger governance, consequently improving their access to finance. Policy may thus promote higher levels of business formalisation to enhance manufacturing finance by streamlining registration and

compliance requirements, and incentivising such formalisation with preferential government financing through such institutions as CEEC.

In the efficient NIC firms case, an extra worker raised access to working capital finance while an additional worker reduced access to working capital by 0.01 percentage points in the Zambian case. While there is a difference, the number of workers coefficients in both models were very close to zero. This study included both number of workers and revenue in the same analysis, a novel departure from mainstream literature such as Mertzanis (2016), Musamali and Tarus (2013) and Rasiah (2011). This approach was meant to distinguish between the firm's earning and number of workers to expose their varying effects in the context of varying labour-capital ratios between NICs and developing countries in the manufacturing sector. Discounting revenue effects, hiring more workers in a highly industrialised setting may imply hiring more specialised workers in the core and support functions such as financing and investment, leading to higher investment in financing capacity and thus better access to finance. This rationale does not appear to hold in the Zambian case, where hiring more workers may be a function of low industrialisation than investment in higher skilled core or support personnel with finance specialisation.

In the efficient NIC firms case, annual sales had a negative effect on access to working capital finance while a million kwacha increase in sales in the Zambian case raised access by 0.01 percentage points. While high annual sales among efficient NIC firms appears to imply firms that have such high revenues that they finance their working capital internally, the Zambian case appears to be different. The Zambian case suggests that high revenue firms still require external financing. This disparity is consistent with the financial system liquidity constraints endemic in Zambia relative to NICs and the use of high revenue as a success factor in loan applications (Amornkitvikai & Harvie, 2017). The results are further consistent with Wasiuzzaman et al. (2020) who study Malaysian manufacturing firms and argue that credit worthiness and access to finance are strongly influenced by a firm's capacity to repay credit, which is strongly linked to its sales. The predominance of small firms (less than 20 employees) in Zambia's manufacturing sector, accounting for about 39 percent compared to large firms (greater than 99 employees) which accounted for about 24 percent in 2019 coupled with low technology intensity (OECD, 2011; World Bank, 2021a) gears the manufacturing sector towards low output and thus lower access to

manufacturing finance. In this view, policy may promote conglomeration of existing firms and large business formation to enhance access to manufacturing finance.

Lastly, a million increase in the population of the firm's host city in Zambia raised access to investment finance by 5.74 percentage points. With population used as a proxy for urbanisation, the result follows natural logic, bigger cities have more financial institutions and easier monitoring infrastructure relative to smaller ones (GRZ, 2014, 2017). Specifically, bigger cities have easier transport and communication channels through which financiers can monitor the business performance of their investment through site visits and virtual interaction (Mertzanis, 2016). Further, bigger cities provide bigger markets onto which firms can sell their output from production growth, increasing the business case of an investment finance application. This argument is supported by Fanta (2012), who finds the existence of a market to be the major driver behind manufacturing firms' production capacity expansion plans. In addition, Mertzanis (2016) argues that firms located in urban areas in close proximity to the financiers have higher chances of accessing finance due to the availability of soft qualitative information about the firm, further finding evidence that firms that operate outside large cities face more binding financial constraints. In the current context, the 2017 Zambian National Financial Sector Development Policy notes that while only 15 percent of MSMEs are unbanked in urban areas, about 85 percent are unbanked in rural areas, highlighting the scarcity of financial services in rural areas (GRZ, 2017). Furthermore, a 2014 Zambian Manufacturing Sector Study highlighted that information asymmetry in access to finance affected manufacturing SMEs in rural areas more than it did SMEs in urban areas (GRZ, 2014). With population growth fairly stable and difficult to influence in the short term, delineating the benefits of a large population from the actual population may be helpful in policy formulation. Specifically, policy may promote geographical coverage in financial institutions through tax incentives or moral suasion to enhance access to financial services.

5.3.3. Start-up investment

Turning to the start-up investment models. ODA per capita in relation to domestic private ownership in Zambia had a similar effect in the Indian, Philippine, Malaysian and South African models, with an additional foreign aid dollar in Zambia associated with a 0.19 percentage point increase in domestic private start-up investment. On the other hand, ODA per capita in relation to

foreign private start-up investment in Zambia had similar effects in the Indian and South African models with an extra foreign aid dollar in Zambia associated with a 0.2 percentage point decrease in foreign private start-up investment. Rajan and Subramanian (2011) argue that aid has the effect of over appreciating the exchange rate and adversely affecting the exportable industries. An overvalued domestic currency has two effects on foreign private start-up investment. Firstly, it reduces the value of foreign currency and thus discourages foreign investors from starting up businesses. Secondly, it makes exports less competitive on the international markets. With foreign private investors in the manufacturing sector typically interested in scaling up to regional markets, foreign private start-up investment gets negatively affected (Amornkitvikai & Harvie, 2017). Further, Inanga and Mandah (2008), note that foreign aid in Zambia has been a large source of manufacturing finance, citing the case of the Enterprise Development Fund, where manufacturing was the largest and second largest beneficiary under two respective subcomponents of the fund. In the same vein, Benmamoun and Lehnert (2013) find strong evidence of the developmental effects of ODA in low-income countries, arguing for the optimisation of aid receipts by channelling them into domestic private start-ups. Lastly, Tsaurai (2018) argues that the complementarity effects of aid and financial development have positive effects on economic growth. Specifically, foreign aid through its reinforcing of the financial sector may lead to economic growth, manufacturing sector growth along with it, as seen in NICs (Benmamoun & Lehnert, 2013; Fischer, 2018; Lee, 2019; Prasad & Nickow, 2016). Summarily, foreign aid influences manufacturing finance through numerous channels with evidently opposite effects on domestic and foreign private start-up investment. It increases the domestic financial resource pool, enhancing domestic private start-up investment directly through cash transfers and indirectly through the financial development complimentary channel. Foreign aid conversely has negative effects on foreign private start-up investment through the over appreciation of the exchange rate which reduces the value of foreign currencies and discourages foreign investment. Policy should nonetheless ensure that its negative effects are minimised, specifically, foreign aid directed at manufacturing firm creation may be channelled through the commercial financial system to enhance the veracity of the funded enterprises, as was implemented through the Korea Development Bank in South Korea (Lee, 2019).

Internal working capital in relation to domestic private start-up investment in Zambia had a similar effect in the Indian firms start-up investment model, with a percentage point increase in internal working capital in Zambia associated with a 0.09 percentage point increase in domestic private start-up investment. Using internal working capital as a proxy for the affinity to finance business start-ups internally or through family and friends, this result appears to follow natural reason. Specifically, domestic private start-ups are positively associated with internal financing as they typically lack the start-up resources necessary to secure external financing such as collateral (Amornkitvikai & Harvie, 2017). This result is supported by Fanta (2012) in the case of Ethiopian manufacturing SMEs, who finds that 76 percent of SME owners believed raising start-up investment was the most daunting challenge in setting up a firm, additionally noting that in developing countries, financier rigidity on collateral requirements is a major impediment to manufacturing development. Policy may remedy this in two ways. Firstly, promotion of innovation hubs may strengthen nascent business projects into fully fledged bankable projects. Secondly, government may mainstream credit guarantee schemes for well vetted manufacturing projects.

MVA per capita in relation to domestic private start-up investment in Zambia had a similar effect in the South African case with a dollar increase in manufacturing value added in Zambia associated with a 1.15 percentage point decrease in domestic private start-up investment. MVA per capita in relation to foreign private start-up investment in Zambia had a similar positive effect in the South African case with a dollar increase in manufacturing value added per capita in Zambia associated with a 0.91 percentage point increase in foreign private start-up investment. Changes in manufacturing output affects start-up investment through numerous channels. Firstly, holding incomes constant, an increase in manufacturing output has the effect of increasing consumption expenditure and reducing the domestic savings required to pursue investment. Specifically, when there is more and newer products on the market, consumers spend their disposable income on final consumption reducing the resources necessary to build new firms. On the other hand, a booming manufacturing sector may be attractive to foreign private investors as their financial resources are not incumbered by domestic final expenditure in their drive to exploit the value chain opportunities presented by a thriving manufacturing sector. The corollary is also true, FDI has the effect of enhancing manufacturing sector output. These results are consistent with Benmamoun and Lehnert (2013), who find a positive relationship between FDI and growth, arguing that foreign investment

may stimulate local supply of inputs, thereby enhancing overall output. In the same way, Keskinsoy (2017) finds that besides enhancing technology transfer and managerial knowledge, foreign investment has the effect of boosting economic growth. In the current context, the 2019 Zambian Foreign Private Investment and Investor Perceptions Survey showed that domestic economic growth was the foremost significant factor influencing foreign investors among macroeconomic and financial variables (BoZ et al., 2019). Evidently, the significance of foreign investment to the manufacturing sector is invaluable and policy needs to continue promoting foreign investment while ensuring that it is focused on developing domestic value chains and transferring technology and remains aligned to the country's long term national development strategy.

Firm type in relation to domestic private start-up investment in Zambia had similar effects in Indonesian, Philippine and Malaysian models with limited liability firms in Zambia associated with 5.88 percentage points lesser domestic private start-up investment. On the other hand, firm type in relation to foreign private start-up investment in Zambia had similar effects in the Indian, Philippine and Malaysian cases with limited liability companies associated with an 8.66 percentage point increase in foreign private start-up investment. These results follow natural reason. Foreign investment regulations in Zambia place restrictions on foreign investment inflows, such restrictions further tend to gear foreign start-ups higher on the hierarchy of business formalisation. The 2017 Zambia Development Agency for instance notes that while there's no investment limit, investor permits or eligibility for tax incentives require minimums of USD 250,000 and USD 500,000, respectively (ZDA, 2017). Such gearing inadvertently leads foreign start-ups to higher institutional formalisations as higher amounts require more transparency and accountability. On the contrary, domestic start-up investments may have more incentive to start out informal and later drift to more formal organisational structures because of the high bureaucratic burden of more formal organisational structures. As argued above, policy may promote higher business formalisation through streamlining compliance requirements and attaching higher formalisation to government enterprise financing programs.

Number of workers in relation to domestic private start-up investment in Zambia had similar effects in the Indonesian, Philippine, Malaysian and South African models with an extra worker in Zambia associated with a 0.13 percentage point decrease in domestic private start-up

investment. On the other hand, number of workers in relation to foreign private start-up investment in Zambia had similar effects in the Philippine, Malaysian and South African cases with an extra worker in the Zambian case associated with a 0.12 percentage point increase in foreign start-up investment. These results are consistent with literature and common reason, domestic private start-ups are generally smaller and consequently hire fewer workers with lesser inclination towards scaling. Foreign private start-ups on the other hand tend to be larger and more sophisticated with higher gearing towards scaling. Expectedly, domestic start-ups typically struggle with resource mobilisation and therefore pursue smaller holdings compared to foreign start-ups. These results can further be confirmed by simple correlation analyses which show that while the correlation between foreign private ownership and number of workers among manufacturing firms in Zambia was 0.42, the correlation between domestic private ownership and number of workers was -0.38 (World Bank, 2021). As argued above, policy may promote business incubation hubs to enhance the scalability of domestic start-ups.

Labour force participation in relation to domestic private start-up investment in Zambia had a similar effect to the South African case, with a percentage point increase in the labour force participation rate in Zambia associated with a 2.14 percentage point decrease in domestic private start-up investment. This result follows natural logic, the more people participate in the labour force, the lesser time they have to pursue engaging entrepreneurial ventures such as manufacturing. Unemployment rate in relation to foreign private start-up investment in Zambia had a similar effect in the South African case with a percentage point increase in the unemployment rate in Zambia associated with a 0.9 percentage point increase in the foreign private start-up investment. This result follows naturally, increases in unemployment are associated with lower wages. With foreign manufacturing investors increasingly trying to minimise production costs across geographies, foreign private start-up investment is expected to be positively related to unemployment rate through the wage bill reduction and human resource availability channels (GRZ, 2014). Lee (2019), notes this phenomenon in South Korean firms upwards of 1980s when they began to move production to developing countries that had cheaper labour costs. These results are further consistent with the 2019 Zambia Foreign Private Investment and Investor Perceptions Survey that found that availability of professional staff was the largest positive influence on foreign investment, followed by social protection, with cost of skilled labour and minimum wage levels

respectively recording over 53 percent from the survey participants (BoZ et al., 2019). In this view, to attract foreign investment while ensuring high wages, policy may focus on harnessing an educated and healthy workforce through increased education and health expenditure on one hand and enforcement of health and safety regulations in the workplace (Gadzala, 2010).

Technology intensity in relation to domestic private start-up investment in Zambia had similar effects to the Philippine and Malaysian models with a unit increase on the technology scale associated with a 9.61 percentage point decrease in domestic private start-up investment. On the other hand, technology intensity in relation to foreign private start-up investment in Zambia had similar effects in the Philippine and Malaysian cases with a unit increase in technology intensity in Zambia associated with an 8.3 percentage point increase in foreign private start-up investment. This result is consistent with extant literature, domestic private start-up investments are usually low on the technology intensity scale with generally higher labour-capital ratios (Bwalya, 2006; Chansa et al., 2019; GRZ, 2014). This can be further seen by simple correlation analysis, which shows that foreign private ownership is positively related to technology intensity while domestic private ownership is negatively related to technology intensity (World Bank, 2021). In Zambia, where the bulk of manufacturing technology is imported, the high cost of licensing, installation and staff training tends to bar domestic private start-ups from establishing technologically intensive operations. The staggard technology transfer between foreign and domestic firms does not help the situation. Bwalya (2006) finds little evidence of technology spillovers from foreign to local firms in Zambian manufacturing firms with the productivity of local firms reducing as foreign firms overwhelm a sector. This further exacerbates the already fragile technology uptake among domestic firms, albeit showing signs of technology spillovers through backward linkages to facilitate domestic supply of intermediate goods for foreign firms (Benmamoun & Lehnert, 2013; Bwalya, 2006). Notwithstanding the foregoing, the 2014 Zambia Manufacturing Sector Study nonetheless argues that FDI infusion in the manufacturing sector prior to the Fifth National Development Plan (2006 – 2010) was meant to drive up productivity, manufacturing finance and technology (GRZ, 2014). On the contrary, foreign private start-up investment is highly associated with high technology intensity with literature expectedly advocating for foreign investment because of its technology spillover effects (Amornkitvikai & Harvie, 2017; Andersson & Djeflat, 2013; Bwalya, 2006; Lee et al., 2016). To enhance technology adoption in the manufacturing

sector, policy while promoting FDI induced technology transfer may use import tax incentives and research and development tax rebates. Further, government may finance or conduct base public research and development for further commercialisation, as is common in NICs.

Imported inputs in relation to foreign private start-up investment in Zambia had a similar effect in the South African case with a percentage point increase in imported inputs in Zambia associated with a 0.03 percentage point increase in foreign private start-up investment. This result is consistent with extant literature and can be confirmed with simple correlation analysis, showing that foreign private ownership and imported inputs had a correlation of 0.22 while domestic private ownership and imported inputs had a correlation of -0.15 (World Bank, 2021a). Foreign private start-up investments are strongly associated with imported production inputs, this stems from their exposure to international input markets which present more diverse input options relative to domestic input markets (Amornkitvikai & Harvie, 2017). To avoid the input dependence trap experienced in Zambia during import substitution industrialisation (Chansa et al., 2019; Mudenda, 2010), policy may, where possible, incentivise resource-based manufacturing industries.

5.4. The Optimal Cases (Objective Four)

5.4.1. Outputs

Over the study period, the actualised weighted average access to working capital finance had a maximum of 29.96 percent and a minimum of 15.9 percent while the 2019 performance stood at 15.99 percent. The statistically least effort optimal solution had 81.7 percent while the three common benchmark solutions had a maximum of 68.5 percent and minimum of 50.3 percent. Further, the actualised weighted average access to investment finance over the study period had a maximum of 7.4 percent and a minimum of 6.3 percent while the 2019 performance stood at 6.9 percent. The statistically least effort optimal solution had 17.9 percent while the three common benchmark solutions had a maximum of 49.5 percent and minimum of 30.9 percent. This implies that Zambia's current performance is below its own potential as reconfiguration, keeping exogenous resources such as the level of manufacturing output constant, would yield better outcomes.

As regards ownership, over the study period, the actualised weighted average domestic private ownership had a maximum of 78.0 percent and a minimum of 71.5 percent while the 2019 performance stood at 73.4 percent. The statistically least effort optimal solution had 66.2 percent while the three common benchmark solutions had a maximum of 70.7 percent and minimum of 67 percent. Further, the actualised weighted average foreign private ownership over the study period had a maximum of 24.8 percent and a minimum of 19.3 percent with the 2019 performance having been the maximum. The statistically least effort optimal solution had 31.6 percent while the three common benchmark solutions had a maximum of 28.7 percent and minimum of 31.3 percent. While higher domestic private ownership is preferred, the price of admission is more domestic financial resources. As shown in the benchmarking and modelling results and extant literature, domestic resources do not appear sufficient in Zambia, as with many least developed countries. Infusion through foreign aid and private investment are thus necessary for more optimal manufacturing finance outcomes. As pointed out by Lee (2019) and Fischer (2018), domestic ownership is preferred to foreign ownership because it stimulates domestic value chains, spurs reinvestment and reduces foreign influence on the domestic market. There is however a trade-off in the case of developing countries for whom domestic resources do not permit higher levels of domestic ownership, as rightly considered by including foreign private ownership and other related factors in the analysis.

5.4.2. Inputs

Focusing on the inputs. Over the study period, actualised ODA per capita recorded a maximum of USD 234 over the study period and averaged USD 56 in 2019. The statistically least effort optimal solution had USD 221 while the three common benchmark solutions had a maximum of USD 190.32 and minimum of USD 162. Evidently, this study recommends increasing foreign aid into the country to enhance manufacturing finance. Despite some caution on the foreign aid, literature appears conclusive on the potential benefits of foreign aid when applied correctly, more so in relation to manufacturing development. This recommendation is in line with Inanga and Mandah (2008) who based on the study of foreign aid effects on economic development (with special focus on manufacturing) in Zambia conclude that under some conditions, effectively utilised foreign aid finance can generate economic growth. In the same vein but within the broader context of industrialisation, Fischer (2018) argues that aid can partly absorb the trade deficits with which

industrial development comes as in the case of South Korean industrialisation. Similar conclusions and recommendations may be found in Benmamoun and Lehnert (2013), Lee (2019), Rajan and Subramanian (2011) and Tsaurai (2018), to mention a few. In practice, foreign aid may be attracted by enhancing institutional transparency and accountability, proactively fighting corruption and increasing funding to the judiciary and law enforcement agencies (Asongu, 2015; Inanga & Mandah, 2008; Prasad & Nickow, 2016; Rajan & Subramanian, 2011). Such aid accumulation may further be channelled through the commercial financial sector to increase its effectiveness, as was the case in South Korea (Lee, 2019).

Over the study period, the actualised weighted average internally financed working capital recorded a maximum of 81 percent and a minimum of 67 percent with 2019 having been the maximum. The statistically least effort optimal solution had 57 percent while the three common benchmark solutions had a maximum of 79 percent and minimum of 59 percent. This study recommends a reduction in internally financing start-ups. While an attractive option, self-financing leads to small and unscalable enterprises that later fail to access external finance. This recommendation is in line with Girma and Vencappa (2014) that argue that external financing leads to higher firm productivity relative to internal financing. The study recommendation is also in line with Ayodeji and Balcioglu (2010) who find that the source of start-up investment affects access to finance and consequently industrialisation. As an alternative, this study proposes use of innovation hubs to ready enterprises for proper financing and scalable launch.

Over the study period, the actualised MVA per capita recorded a maximum of USD 102 and a minimum of USD 84 with 2019 having recorded the maximum. The statistically least effort optimal solution had USD 102 while the three common benchmark solutions had a maximum of USD 103 and minimum of USD 102. By design, the analysis of the non-dominated solutions returned solutions that preserved the highest historical manufacturing sector output. This was implemented to show that higher access to manufacturing finance outcomes were possible at the current level of manufacturing output.

The 2019 and 2013 actualised weighted average share of limited liability companies were 18 percent and 21 percent, respectively. The statistically least effort optimal solution had 90 percent while the three common benchmark solutions had a maximum of 92 percent and minimum of 64

percent. Evidently, the level of formalisation is significantly below the model prescribed levels with expectedly significant ramifications on manufacturing finance. As demonstrated above, formalisation enhances access to manufacturing finance and propagates manufacturing development. This recommendation is in line with Musamali and Tarus (2013), who note the significance of perpetual existence of the firm in access to finance. Similarly, Mertzanis (2016) argues for increased business formalisation to increase access to finance. Such enhancement of firm formalisation in Zambia may be achieved by streamlining formal business registration and the associated compliance requirements as well as attaching higher business formalisation to government enterprise financing.

Over the study period, the actualised number of workers recorded a maximum of 900 workers, while the weighted average number of workers had a maximum of 74 workers and minimum of 32 workers, with 71 workers recorded in 2019. The statistically least effort optimal solution had 25 workers while the three common benchmark solutions had a maximum of 120 workers and minimum of 34 workers. The variation across the optimal solutions on number of workers suggests that numerous firm size options exist, albeit with trade-offs. For instance, the decrease in number of workers from 120 to 25 is associated with a decrease in access to investment finance but an increase in access to working capital. The moderate 66 number of workers appears to produce a more moderate distribution between access to working capital and investment finance. In such situations, policy should then consider other related inputs and assess its priorities given such options.

Over the study period, the actualised labour force participation recorded a maximum of 80 percent with 74 percent recorded in 2019. The statistically least effort optimal solution had 77 percent while the three common benchmark solutions had a maximum of 77 percent and minimum of 77 percent. Labour force participation appears stable across the three solutions and proximal to the actualised values. As in the case of number of workers, policy has leeway to consider other factors as the reference variable can lead to diverging outcomes.

Over the study period, the actualised technology intensity recorded a maximum of level four (high technology industries) featuring Radio, TV and communications equipment, with a weighted average of level one (low technology industries) in 2019, featuring Food, beverages and tobacco.

The statistically least effort optimal solution had level one while the three common benchmark solutions had a maximum and minimum of approximately level two (medium-low technology industries). Given the variation among the optimal solutions, preference may appear geared towards higher technology intensity. In the three competing solutions, higher technology intensity appears associated with higher employment, which may imply higher recruitments in more skilled workers and consequently higher wages. The study thus recommends moving up the technology intensity scale. As recommended by Lee (2019), escaping the middle-income trap requires that manufacturing moves up the value chain into producing higher value goods. This evidently requires adoption of more advanced technologies and developing domestic ecosystems for higher value products. This recommendation is also supported by industrial catch-up literature (Chandra et al., 2013; Landini et al., 2017; Lee et al., 2016; Lin et al., 2021; Zhu et al., 2017). In practice, policy may incentivise technology adoption through import tax incentives on desired technological products and facilitate and finance base research that could be latter commercialised.

Over the study period, the actualised unemployment rate recorded a maximum of 20 percent and 12 percent in 2019. The statistically least effort optimal solution had 18 percent while the three common benchmark solutions had a maximum of 17 percent and minimum of 17 percent. Evidently, the optimal solutions appear to lean towards higher unemployment rate than experienced in 2019 but lesser than the highest over the review period. As shown in literature, higher unemployment rate tends to attract foreign investment through the labour availability and lower wages channel (GRZ, 2014; Lee, 2019). Because higher unemployment is undesirable, it may be prudent to pursue policy that preserves the benefits of unemployment without the actual unemployment. This may be achieved by enhancing the quality and quantity of labour available through increasing education and health funding and enforcing work health and safety regulations (BoZ et al., 2019; GRZ, 2014).

Over the study period, the actualised weighted average imported inputs recorded a maximum of 40 percent and a minimum of 23 percent, with the latter recorded in 2019. The statistically least effort optimal solution had 40 percent while the three common benchmark solutions had a maximum of 56 percent and minimum of 26 percent. The optimal solutions appear to lean towards higher imported input shares than experienced in 2019. As shown in analyses such as Fischer (2018) and Lee (2019), the industrialisation transition comes with transitory trade deficits

associated with production imports. While this study recommends accommodating such imports, care should be taken to ensure that domestic manufacturing sector building imports are prioritised. As shown by Chansa et al. (2019) and Mudenda (2009), Zambia has previously endured the imported input dependence trap where the manufacturing sector's foreign exchange earnings were overwhelmed by its input imports. Policy may thus, where possible, incentivise resource-based manufacturing industries.

Over the study period, the actualised weighted average taxation constraints recorded a maximum of 34 percent and a minimum of 20 percent, with 2019 recording the maximum. The statistically least effort optimal solution had 72 percent while the three common benchmark solutions had a maximum of 84 percent and minimum of 58 percent. The optimal solutions appear to lean to higher taxation constraints reports than experienced in 2019. The interpretation of taxation constraint reports is significant here. A fair amount of friction is expected between manufacturing firm compliance officers and taxation officers as the two have opposing objectives. Specifically, with taxation reducing profit and increasing government revenue, compliance officers would try to reduce the tax paid by the firm while tax officers would try to increase it. Low taxation constraint reports may thus be attributed to the predominance of small firms (less than 20 employees) in 2019, accounting for about 39 percent compared to 24 percent of large firms (greater than 99 employees) (World Bank, 2021a). The low taxation constraints may additionally signal weaker financial literacy in firms and their ability to exploit the taxation system to the point of encountering inefficiencies given that in general taxation systems in developing countries are not very efficient (Prasad & Nickow, 2016). The study thus recommends enhancing financial literacy among firms. Notwithstanding the foregoing argument, as argued by Chansa et al. (2019), El-haddad (2010), Lee (2019) and Romana and Leonardo (2014), South Korea's enabling tax policy to the manufacturing sector was a key success factor and policy needs to ensure that it deliberately incentivises manufacturing sector investment.

Over the study period, the actualised annual sales recorded a maximum of K 1.7 billion with a weighted average of K 35 million in 2019. The statistically least effort optimal solution was K 2.6 billion while the three common benchmark solutions had a maximum of K 2.99 billion and a minimum of K 2.91 billion. Evidently, the optimal solutions are geared towards higher output. As a plethora of literature shows, there exists a positive association between firm output and access

to finance (Wasiuzzaman et al., 2020). The predominance of small firms in Zambian manufacturing (World Bank, 2021a), significantly affects the overall access to finance, and as in the case of Nigeria (Ayodeji & Balcioglu, 2010), consequently affects industrialisation. This study thus recommends conglomeration, promoting mergers and large firm formation to achieve the effects a big business manufacturing sector structure achieved in South Korea (Lee, 2019).

Over the study period, the actualised weighted average share of firms buying fixed assets recorded a maximum of 49 percent and a minimum of 42 percent, with the maximum recorded in 2019. The statistically least effort optimal solution had 77 percent while the three common benchmark solutions had a maximum of 75 percent and minimum of 69 percent. Evidently, the optimal solutions lean towards higher collateral accumulation for desirable manufacturing finance outcomes. As literature has shown, collateral plays a significant role in financial contracting especially in liquidity constrained financial systems (Amornkitvikai & Harvie, 2017; Beck & Feyen, 2013; Fessehaie et al., 2015; GRZ, 2017; Musamali & Tarus, 2013; Wasiuzzaman et al., 2020). The study thus naturally recommends promotion of firm asset ownership coupled with higher institutional formalisations through fixed asset enabling policies via interest rate and liquidity channels.

Over the study period, the actualised weighted average capacity utilisation recorded a maximum of 70 percent and a minimum of 67 percent, with the maximum recorded in 2019. The statistically least effort optimal solution had 21 percent while the three common benchmark solutions had a maximum of 18 percent and minimum of 14 percent. The interpretation of capacity utilisation is important here, as discussed above, capacity indicates the growth potential from the financier's perspective. Expectedly, lower capacity utilisation is very attractive to financiers as they stand to exploit a mere expansion of an industry tested product (Tyson, 2017; Wasiuzzaman et al., 2020). With the benefits of low-capacity utilisation delineated from the low-capacity utilisation, this study recommends the establishment of innovation hubs and business support services to enhance the growth orientation of the manufacturing sector. This would have the effect of enhancing growth potential beyond plant size enhancements.

Over the study period, the actualised host city population recorded a maximum of 2.6 million people and averaged 1 million people in 2019. The statistically least effort optimal solution had

2.6 million people while the three common benchmark solutions had a maximum of 2.6 million people and minimum of 2 million people. The interpretation of population is significant here, urbanisation, proxied by population implies better communication and transport infrastructure, a bigger market, greater value chain development and higher concentration of financial institutions. Given that population growth is generally stable and predictable, and cannot be affected radically in the short to the medium term, policy may attempt to stimulate the benefits of urbanisation directly. Incentivising financial institutions to cover the unbanked may for instance raise the concentration of financial institutions. This assessment and recommendation are in line with a plethora of literature (Fanta, 2012; GRZ, 2014, 2017; Mertzanis, 2016).

5.5. Chapter Summary

This chapter presented the discussion of the study results. It showed that while the main results are aligned with extant literature; pioneering work in an insufficiently researched subfield, the novel and wholistic methodological approaches, and specificity of recommendations and simulation model proposed by the study were worthwhile contributions to knowledge. The next chapter concludes the study.

CHAPTER VI. POLICY RECOMMENDATIONS, LIMITATIONS AND CONCLUSION

6.1. Introduction

This chapter concludes the study. It summarises the policy recommendations, highlights the study limitations, and then provides a general conclusion and further, the contribution of the thesis and areas for further research.

6.2. Policy Recommendations

Having contextualised and embedded the policy recommendations resulting from the study in the discussion section above. This section attempts to summarise the qualitative aspects of the policy recommendations into the functional categories of the study conceptual framework (as shown in figure 3 above). To avoid repetition, access to finance and household related recommendations are presented under related headings.

6.2.1. Financial system

Manufacturing is an engine for growth. With manufacturing finance being a necessary condition for manufacturing development, Zambia needs to institute explicit manufacturing finance policy, separate from financial and industrial finance sector policies. This will allow explicit address of manufacturing sector finance challenges within the broader industrial and financial sector spheres. This, as previously discussed, is necessitated by the unique manufacturing sector financial needs, which differ in both scope and size from general firm finance and industrial sector finance. The continuation of implicit manufacturing finance policy will likely perpetuate sub-optimal manufacturing development outcomes. Further, Zambia's manufacturing finance trajectory is lower than NICs and below its own potential. With emerging economies catching up in development and establishing their role in global value chains, there appears to be a time constraint in the implementation of key manufacturing finance and manufacturing development policies. As such, expedient implementation of the above policies is necessary to avoid late industrialisation challenges such as global value chain entry barriers.

The study showed a relatively weak supply of manufacturing finance with a disproportionate number of firms needing loans but paradoxically also internally financing their operations. The study recommended promotion of financial literacy programs and leveraging technology to enhance financial deepening. This approach may have the effect of increasing access to finance while also increasing the resource pool. With urbanisation shown to have positive effects on access to investment finance, policy may also use tax and moral suasion to nudge financial sector institutions towards greater geographical coverage, additionally furthering financial deepening and literacy. Lastly, mainstreaming credit guarantee schemes at various levels of the financial system may increase overall financial sector participation and manufacturing finance development.

6.2.2. Political system

The study showed relatively high reports of firms facing taxation constraints. With an enabling tax policy having played a critical role in incentivising manufacturing sector investment in NICs while also having an impact on access to working capital finance in the Zambian context, this study recommended the use of taxation to incentivise manufacturing sector investment with special emphasis on feasibility study backed positive net value resource-based manufacturing, technology adoption and capital formation and base research and development. Streamlining tax compliance requirements may further enhance formalisation. As shown, higher levels of formalisation lead to greater access to manufacturing finance. This approach may also increase the tax base, with positive tax revenue ramifications.

As shown, Zambian firms are relatively import dependent for inputs with relatively low exports. This has negative feedback loops on the financial sector through the real effective exchange rate channel. To increase export competitiveness while preserving financial sector strength, Zambia may do well to make use of the tariff and non-tariff provisions in multilateral trading agreements. Being an LDC, Zambia carries various privileges in the multilateral trading system that are not available to developed countries such as non-reciprocity as well as access to various trade related capacity building programmes and financing mechanisms.

Further, consolidation of manufacturing sector policy financing through a few dedicated institutions may expedite manufacturing finance development as it did South Korea through such institutions as the Korea Development Bank. Such mechanisms aimed at incentivising and

rewarding local champions require strengthened institutional transparency and accountability to enhance monitoring and curtail abuse. Lastly, at the aggregate, policy may wish to increase education funding in manufacturing sector fields while also improving health delivery to enhance the quality of the workforce.

6.2.3. Legal system

With relatively high reports of court constraints, the study recommended decentralising business-related courts and enhancing access to legal services across the country. As shown in the literature, the legal system is the basis of all financial contracting. Court efficiency and access to legal services may thus need to be enhanced. Decentralising such courts as the Economic and Financial Crimes Court, and the Industrial Relations and Commercial Divisions of the High Court of Zambia will enhance speedy adjudication and regional access to the judicial system strengthening contract enforcement. Such courts need to have wider geographical reach relative to the current set-up where they are localised in a few places while aiming to serve the entire country. Wider access to legal services will additionally lead to higher quality financial contracts, enhancing enforcement and promoting boutique financial services.

Further, enhancing public awareness of the fiscal and tax incentive frameworks and work health and safety regulations may empower stakeholders with knowledge of their rights and obligations. Such empowerment may lead to greater efficiency and effectiveness in the allocation of tax and fiscal incentives, and adherence to work health and safety regulations.

6.2.4. Banking and non-banking sectors

As shown, supply side gaps are functions of inadequate expertise and poor liquidity. Specifically, adverse selection, inadequate financial product design expertise and lack of financial resources affect the supply side. To counter this, while observing that foreign financial investors can access finance at relatively cheap prices from foreign financial sources, government may do well to promote the entry of foreign banks on the domestic market to bring in both financial product design expertise and financial resources. This may be achieved through streamlining licensing requirements and tax incentives. Such institutions may be further incentivised to provide capital formation and technology adoption enhancing financial products to manufacturing sector firms.

As regards the non-banking sector, the weak sector performance may gain from the use of tax incentives and streamlining of licensing requirements to promote uptake of non-traditional financial products. Further, multinationals may in this view be incentivised to utilise Kwacha denominated capital market hedging products, diversifying them away from government securities as a supply side measure.

6.2.5. Foreign investment

The study has shown the significance of foreign investment to Zambia's manufacturing finance and development. The various granular results detailed in the discussion section above have thus led to numerous foreign investments promoting policies. Specifically, the study recommended harnessing a healthy and educated workforce through increased education financing and strict enforcement of workplace health and safety regulations. Further, incentivising wider reach of financial and legal services, may also strengthen investor confidence. While the use of tax and fiscal incentives is not rejected, the study recommends reinforcing FDI guardrails to ensure that such incentives ultimately benefit the domestic economy.

6.2.6. Foreign aid

The study demonstrated the significance of foreign aid to domestic private start-up investment and documented the importance of well harnessed aid to NIC manufacturing finance development and industrialisation. In this view, the study recommended channelling aid through the commercial financial system via policy loan institutions such as CEEC and DBZ. As shown, the South Korean strategy of channelling aid through its policy loan institutions such as the Korea Development Bank proved successful in enhancing the supply of manufacturing finance while ensuring accountability, allocative efficiency and transparency. This approach thus appears feasible in the Zambian context, which, as was the case in the formative stages of South Korean industrialisation, enjoys healthy foreign aid inflows. Overall institutional strengthening by proactively fighting corruption and promoting meritocracy in the bureaucratic institutions may also enhance cooperating partner confidence.

6.2.7. Public sector

With expectedly inadequate public sector financing for large scale private sector intervention, the study recommended ensuring optimal returns from the available resources. Specifically, the study recommended the consolidation of government manufacturing sector policy financing programmes such as CEEC, DBZ and the multiplicity of youth empowerment programmes. Housing such financing under a single umbrella may promote coherence and consistency in manufacturing finance policy implementation. Further, while financing manufacturing SMEs may have poverty reduction appeal, the study recommended focussing government financing on larger, high-technology and more formal firms as they have higher net value added and make greater contribution to the domestic value chain. An alternative approach may be conglomerating SMEs into large firms prior to financing. Limiting start-up policy loan financing to innovation hub incubated firms may also enhance the returns on such government intervention. Public sector intervention into the manufacturing sector may also be implemented through enhancing the sub-contracting of manufacturing components of public infrastructure projects to domestic manufacturing firms.

6.2.8. Domestic start-up investment finance

The balance between foreign and domestic private ownership in Zambia appears unhealthy, relative to NICs. As discussed, the unhealthy proportion of foreign ownership reduces reinvestment and inhibits domestic value chain development. As the study discussed numerous impediments to domestic manufacturing firm development. To conserve space, only a few are repeated here. The study recommended conglomeration and large firm formation as opposed to harnessing an SME dominated manufacturing sector. For the previously discussed reasons, SMEs have lesser access to finance and contribute lesser to value chain development and the sector's net value added. Mainstreaming innovation hubs as discussed may enhance the bankability and success of domestic firms, government may thus use tax incentives and subsidies to promote innovation hub formation. Mainstreaming of credit guarantee schemes, promotion of literacy, incentivising higher formalisation and fixed asset ownership, promoting technology adoption, and enforcing merit-based access to foreign aid business financing may further enhance the efficient launch and operation of domestic owned manufacturing firms. Lastly, with results showing that

firm finance efficiency is not only generally low, but clustered in Zambia, policy needs to be directed at improving finance efficiency among manufacturing firms to bridge demand side gaps.

6.3. Limitations

The study carried two key limitations, unavailability of an objective measurement of taxation and court constraints, and lack of firm level measurement of lending interest rate and foreign aid receipts. In the first instance, while the use of reported constraints has its flaws, a survey and operationalisation of a firm level quantitative measurement of taxation and court constraints alongside other financial and business modules appeared unnecessarily resource intensive given that the world bank enterprise surveys provided consistent cross-country data on a broad spectrum of the study data needs. Further, because government bureaucracy related constraints are unique to each firm, reports of such constraints by firms may fairly represent such constraints without the need for objective quantification at firm level.

Furthermore, lending interest rates typically vary from loan to loan even within the same firm, survey and calculation of overall lending interest rate by a firm per year across study countries appeared unnecessarily resource intensive given the availability of the supply side lending interest rates across countries over the study period. Lastly, data on foreign aid direct assistance to manufacturing firms remains elusive with most aid offering concessional loans and in-kind assistance rather than grants. As in previous cases, a survey of firms receiving such assistance appeared unnecessarily resource intensive given that the national level variable was readily available and offered sufficient supply side information.

6.4. Conclusion

This study has presented a case for modelling Zambia's manufacturing finance based on NIC experiences. It carried four objectives: determining the NICs on which Zambia's manufacturing finance may be benchmarked, benchmarking Zambia against these NICs, modelling Zambia based on NIC models and optimising Zambia's demand and supply of manufacturing finance. The study began by mapping the manufacturing finance ecosystem at firm- and country-level, and from both the supply and demand sides to create a multi-dimensional cascade of manufacturing finance interrelationships. It then multi-dimensionally benchmarked Zambia's manufacturing finance

against six NICs, selected based on their policy compatibility with Zambia, highlighting the divergence and consequently areas for improvement. The study then simultaneously modelled NICs and Zambian manufacturing finance, showing the similarities and disparities in manufacturing finance relationships and consequently highlighting the NICs policies that may be effective in the Zambian context. The study finally multi-objectively optimised the Zambian model, applying the benchmark and modelling lessons, to generate quantified non-dominated policy options and a manufacturing finance simulation model.

The study has shown that manufacturing finance is a necessary condition for manufacturing development, which itself is an engine for economic growth. It has demonstrated that manufacturing finance has strong linkages with other dimensions of the economy including the financial, legal, and political systems. It has proposed that addressing these factors favourably is critical to enhancing manufacturing finance and consequently manufacturing development. At the aggregate, it showed that while NICs such as South Korea evolved their developmental state into industrial states through instituting effective developmental structures and playing active developmental roles, Zambia did not advance to such an industrial state, as evidenced by the deficient manufacturing finance and correspondingly stagnated manufacturing development.

The study statistically showed that Zambian manufacturing firms' access to finance was on the tail end of the study countries, even when only efficient firms were considered. In exploring the determinants of access to manufacturing finance, the study showed that high cost of capital, unfavourable legal climate, taxation constraints, firm size distribution, firm financial inefficiency, low firm formalization, low technology intensity, import dependence and predominance of domestic sales in Zambia negatively affects manufacturing firm access to finance. It further highlighted deficiencies in the composition of manufacturing firm ownership in Zambia and the utilisation of foreign aid.

The cascade of NICs consistently outperforming Zambia on manufacturing finance and correspondingly manufacturing development highlights the potential policy development benefits of exploring and remediating the determinants of manufacturing finance in Zambia. The study demonstrated that similarities and differences exist between NIC and Zambian firms, and across NICs; showing variations in variable effects across contexts owing to varying political and

economic conditions. While acknowledging that NICs carry the more efficient and effective manufacturing finance models, the study argued that effective policy learning requires further analyses into the functional level variations in the learning and exemplar countries.

This study has shown that beyond generic recommendations about how developing countries can emulate NIC manufacturing finance policy, analysis needs to offer wholistic and quantified policy options to be effective. This approach allows consideration of related policy interests and helps assess the costs and benefits of competing policy options. The study has demonstrated that, holding exogenous factors such as manufacturing output constant, Zambia's prevailing manufacturing finance is below its potential. This implies that a reconfiguration on the input side may yield better outcomes, with positive ramifications on manufacturing development.

6.5. Contribution of the Thesis

This thesis provides seven major contributions to theory, methodology and practice. Firstly, through an iterative quantitative indicator selection method, the study mapped and structured a generic manufacturing finance eco-system at both firm and national levels. This mapping, developed under exploratory research philosophy may be useful to policy makers and researchers attempting manufacturing finance analysis as it provides a comprehensive starting point for analysis. Because the mapping took a statistical approach with limited theoretical underpinnings, it may with only minor alterations, be applied to a wide range of theoretical frameworks. With previous studies having either focused on either firm or national level, or supply or demand, the study's approach of linking the two sides and at both levels in a quantitative way has also wholistically laid the foundation into a specialised study area on which further research may build.

Secondly, it pioneers a novel application of data envelopment and relative value analyses on firm manufacturing finance efficiency across countries. Creating sub-populations of efficient firms and analysing them alongside general firms across countries accentuates the reference points in that the "best of the best" are used as benchmarks. This approach may be applied to other areas of benchmarking in which the profiles of DMUs are comparable across aggregations.

Third, the study provides the first quantitative benchmarking of Zambia's (and presumably first developing country) manufacturing finance against South Korea (and NICs in general). While

literature documents qualitative comparisons between NICs and developing countries on general industrial development (Chansa et al., 2019; El-haddad, 2010; Lee, 2019), this study purports to be the first effort to quantitatively and qualitatively implement such a benchmark on manufacturing finance. This offers methodological precedence in manufacturing finance research as a distinct field of study.

Fourth, while extant literature presents statistical and qualitative comparisons between NICs and developing countries for policy learning (Chansa et al., 2019; El-haddad, 2010; Lee, 2019; Prasad & Nickow, 2016; Romana & Leonardo, 2014), comparison of the functional models is rarely addressed. This study attempts to fill this literature gap, as effective policy learning needs to go beyond comparison of output statistics and assess the functional relationships between policy instruments and targets in both NICs and developing countries.

Fifth, while finance literature focuses on generic access to finance (Fowowe, 2017; Mertzanis, 2016; Musamali & Tarus, 2013; Sibanda et al., 2018; Wasiuzzaman et al., 2020) by operating firms, this study simultaneously analyses four disaggregations of access to finance, namely, working capital finance, investment finance, domestic private start-up investment and foreign private start-up investment. These disaggregations appear to be necessary. Working capital and investment finance for operating firms serve different purposes; with firms facing varying degrees of access difficulty between the two, policy needs to approach them separately to be effective. In the same way, the study argues that start-up investment and access to finance for existing firms need to be delineated. Because firm ownership largely speaks to the investment conditions that prevailed at firm establishment, this type of investment should not be unconditionally linked to prevailing firm characteristics and macroeconomic conditions. This distinction aides the understanding of firm creation investment among domestic and foreign actors, their determinants, and the appropriate policy tools needed to promote them.

Sixth, the study pioneers a novel approach to manufacturing finance policy generation in which policy makers are given numerous non-dominated quantified policy options. This approach allows policy makers to accurately weigh the costs and benefits of competing policy options. Despite the plethora of NIC policy learning literature, rarely are concrete policy recommendations offered beyond generic statements about what needs to be done.

Lastly, it offers a customisable optimised manufacturing finance model on which policy simulations may be conducted. Because literature tends to provide assumption-linked recommendations, the dynamic nature of economic phenomena limits their shelf life and utility as policy makers are unable to ascertain the quantitative implications of assumption changes. In this view, a customisable model allows real time adjustment and assessment of recommendations as conditions evolve.

6.6. Areas for Further Research

Use of benchmarking, modelling and statistical optimisation to generate instrument level non-dominated policy options appears to be a critical area for further research. Focus may also be taken on testing the modelling approach presented in this study against computable general equilibrium models. With lesser importance, assessment of the effects of objectively measured political and legal system constraints on access to manufacturing finance, and the firm level effects of foreign aid finance may also need further research.

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APPENDICES

Appendix A: Variable Justification

Variable Justification Table

S/n	Variable	Justification
1	Access to Investment finance	An indicator of the level of access to investment finance, a component of manufacturing finance.
2	Access to working capital finance	An indicator of the level of access to working capital finance, a component of manufacturing finance.
3	Annual sales	A proxy for firm performance/output, to inform the relationship between firm performance/output and manufacturing finance.
4	Banking sector credit	An indicator of the level of manufacturing finance sourced from the banking sector, to inform the influence of banking sector sourced manufacturing finance on access to manufacturing finance.
5	Capacity utilisation	To proxy overall firm productivity and efficiency, to inform the relationship between productivity and efficiency, and manufacturing finance.
6	Courts as a constraint	A proxy for legal system efficiency and effectiveness, which is an enabler of manufacturing finance.
7	Direct exports	To investigate the relationship between manufacturing finance and exports.
8	Domestic inputs	A proxy for firm orientation to domestic input markets to explore the relationship between domestic input market orientation and manufacturing finance.
9	Domestic private ownership	A proxy for access to domestic start-up manufacturing finance, a component of manufacturing finance.
10	Domestic sales	A proxy for firm orientation to domestic output markets to explore the relationship between domestic output market orientation and manufacturing finance.
11	External auditor	A proxy for firm transparency, an enabler of firm access to finance.
12	Firm age	A proxy for firm experience in manufacturing, to explore the relationship between such experience and access to manufacturing finance.
13	Firm type	A proxy for firm corporate governance and formalisation, to explore the relationship between such corporate governance and formalisation and access to manufacturing finance.
14	Foreign private ownership	A proxy for access to foreign start-up manufacturing finance and foreign interest on the domestic market, a component of manufacturing finance.

15	Foreign technology	A proxy for firm access to international technology markets, to explore the relationship between access to foreign technology and access to manufacturing finance.
16	Government ownership	A proxy for active government participation in manufacturing finance, to explore the relationship between government participation and access to manufacturing finance.
17	Imported inputs	A proxy for import dependence in production, to explore the independence of the manufacturing sector from international markets in production and consequently the effects on foreign exchange markets' interaction with manufacturing finance.
18	Indirect exports	A nuanced firm export indicator to explore whether indirect exporting carries a nuanced relationship with manufacturing finance.
19	Internally financed investments	To explore how access to internal investment finance relates to access to external manufacturing finance.
20	Internally financed working capital	to explore how access to internal working capital finance relates to access to external manufacturing finance.
21	Lending interest rate	A proxy for the cost of capital to explore how the cost of capital relates to manufacturing finance.
22	Manager's experience	A proxy for firm competence in applying for manufacturing finance to explore how such competence influences access to finance.
23	Market capitalisation	A proxy for non-banking sector manufacturing finance, a key source of manufacturing finance.
24	MVA per capita	A proxy for manufacturing sector output to explore how manufacturing finance relates to the real sector.
25	Net ODA received per capita	A proxy for foreign aid support to manufacturing firms, a key source of manufacturing finance.
26	Not needing a loan	A proxy for the insignificance of external manufacturing finance firms, to explore the relationship between not needing external finance and accessing external manufacturing finance.
27	Number of workers	A proxy for firm size and its underlying properties such as networks to explore the relationship between firm size and access to manufacturing finance.
28	Real effective exchange rate	A proxy for domestic currency foreign exchange performance in the financial system to explore its effects on manufacturing finance.
29	Taxation as a constraint	A proxy for tax/political system efficiency and effectiveness, which is an enabler of manufacturing finance.

Appendix B: Variable Treatments

S/n	Variable	Transformation
1	Access to investment finance	Log transformed for SEM
2	Access to working capital finance	Log transformed for SEM
3	Market capitalization	Log transformed for SEM
4	Number of workers	Log transformed for SEM
5	Manager's experience	Log transformed for SEM
6	Access to investment finance	Proportion of bank financed investment plus non-bank financed investment.
7	Access to working capital finance	Proportion of bank financed working capital plus non-bank financed working capital.
8	Courts as a constraint	Firm identifies courts as a major constraint and marked courts as an obstacle.
9	Firm type	Publicly listed and privately held limited liability companies.
10	Taxation as a constraint	Firm identifies tax rates and tax administration as major constraints.

Appendix C: Data replacements

```
replace employmentpersonsnumberofle_pe_n=3.63e+08 if id=="India2006"
        *used 2005
replace employmentpersonsnumberofle_pe_n=3.83e+08 if id=="India2013"
        *used 2012
replace employmentpersonsnumberofle_pe_n=4131531 if id=="Zambia2006"
        *used 2005
replace financialaccountnetlendingnetbor=2.696e+08 if id=="Zambia2006"
        *used 2009
replace grossdomesticproductnominaldomes=8.214e+11 if id=="Malaysia2006"
        *used 2010
replace adjustednetnationalincomecurrent=2.8e+11 if id=="Southafrica2020"
        *used 2019
replace adjustednetnationalincomecurrent=1.9e+10 if id=="Zambia2020"
        *used 2019
replace var10=4862.22 if id=="Southafrica2020"
        *used 2019
replace var10=1049.04 if id=="Zambia2020"
        *used 2019
replace var18=4.9e+10 if id=="Southafrica2020"
        *used 2019
replace var18=3.9e+09 if id=="Zambia2020"
        *used 2019
replace adjustedsavingseducationexpendit=6.41361 if id=="Southafrica2020"
        *used 2019
replace adjustedsavingseducationexpendit=3.56386 if id=="Zambia2020"
        *used 2019
replace adjustedsavingsmineraldepletiono=1.07656 if id=="Southafrica2020"
        *used 2019
replace adjustedsavingsmineraldepletiono=1.20367 if id=="Zambia2020"
        *used 2019
replace adjustedsavingsnaturalresourcesd=2.18029 if id=="Southafrica2020"
        *used 2019
replace adjustedsavingsnaturalresourcesd=1.20702 if id=="Zambia2020"
        *used 2019
replace adjustedsavingsnetnationalsaving=.929642 if id=="Southafrica2020"
        *used 2019
replace adjustedsavingsnetnationalsaving=16.5608 if id=="Zambia2006"
        *used 2010
replace adjustedsavingsnetnationalsaving=23.4213 if id=="Zambia2020"
        *used 2019
replace finalconsumptionexpenditureofgdp=63.9714 if id=="Zambia2006"
        *used 2010
replace grantsexcludingtechnicalcooperat=6.1e+08 if id=="Southafrica2020"
        *used 2019
```

```
replace grantsexcludingtechnicalcooperat=7.0e+08 if id=="Zambia2020"
        *used 2019
replace grosscapitalformationofgdpnegdit=29.8775 if id=="Zambia2006"
        *used 2010
replace grossdomesticsavingsofgdpnygdsto=36.0286 if id=="Zambia2006"
        *used 2010
replace grossfixedcapitalformationofgdpn=25.8947 if id=="Zambia2006"
        *used 2010
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Appendix D: SEM Robustness Checks

D.1 SEM Correlations

a. Access to finance

NICs - access to finance	External auditing	Manager's experience	Number of workers	Lending interest rate	Firm type	Taxation as a constraint	Courts as a constraint	Access to working capital finance	Access to investment finance	Banking sector credit	Market capitalisation
External auditing	1.00										
Manager's experience	0.05	1.00									
Number of workers	0.21	0.03	1.00								
Lending interest rate	-0.17	0.00	-0.12	1.00							
Firm type	0.05	0.03	0.27	-0.38	1.00						
Taxation as a constraint	0.11	0.03	0.05	-0.04	-0.04	1.00					
Courts as a constraint	-0.01	0.02	0.00	0.00	-0.05	0.18	1.00				
Access to working capital finance	0.09	-0.04	0.12	0.01	-0.02	0.09	-0.03	1.00			
Access to investment finance	0.12	0.01	0.17	-0.10	0.11	0.04	0.01	0.27	1.00		
Banking sector credit	0.03	-0.14	0.11	-0.63	0.22	0.00	-0.04	0.20	0.15	1.00	
Market capitalisation	0.01	-0.04	0.04	-0.36	0.37	-0.09	-0.06	0.09	0.09	0.63	1.00

Zambia - access to finance	External auditing	Manager's experience	Number of workers	Lending interest rate	Firm type	Taxation as a constraint	Courts as a constraint	Access to working capital finance	Access to investment finance	Banking sector credit	Market capitalisation
External auditing	1										
Manager's experience	0.074	1									
Number of workers	0.4249	0.1948	1								
Lending interest rate	0.1378	-0.1809	0.0189	1							
Firm type	0.2348	-0.0197	0.2713	0.4846	1						

Taxation as a constraint	0.0804	0.0357	0.0804	0.0323	0.0806	1					
Courts as a constraint	0.0209	0.0729	0.0316	-0.1532	-0.0993	0.1781	1				
Access to working capital finance	0.172	-0.0069	0.1766	0.3543	0.2811	0.0691	-0.0465	1			
Access to investment finance	0.0732	0.0234	0.1571	-0.0028	0.038	0.037	0.0167	0.2926	1		
Banking sector credit	-0.1233	0.1896	0.0076	-0.9887	-0.4667	-0.0188	0.1635	-0.3376	0.0076	1	
Market capitalisation	-0.0267	-0.1397	-0.1554	0.4041	0.1138	-0.0691	-0.1383	0.0635	-0.0321	-0.536	1

b. Start-up Investment

NICs start -up	**Domestic private ownership**	**Foreign private ownership**	**Banking sector credit**	**Lending interest rate**	**Real effective exchange rate**	**Market capitalisation**
Domestic private ownership	1					
Foreign private ownership	-0.9612	1				
Banking sector credit	0.0345	-0.0609	1			
Lending interest rate	0.0891	-0.0647	-0.1958	1		
Real effective exchange rate	0.0894	-0.0998	0.3643	0.1641	1	
Market capitalisation	0.1339	-0.1639	0.4451	0.131	0.1405	1

Zambia start-up	**Domestic private ownership**	**Foreign private ownership**	**Banking sector credit**	**Lending interest rate**	**Real effective exchange rate**	**Market capitalisation**
Domestic private ownership	1					
Foreign private ownership	-0.9473	1				
Banking sector credit	-0.0912	0.087	1			
Lending interest rate	0.0762	-0.0635	-0.8146	1		
Real effective exchange rate	-0.0524	0.0427	0.7092	-0.8151	1	
Market capitalisation	-0.0513	0.0283	0.5855	-0.8202	0.6933	1

D.2 Non-Normality Robustness

a. SEM Robustness – Efficient NICs Bootstrap Standard Errors

Access to working capital finance	Estimate	Standard Error	Z-Value	P-Value
Intercept	5.232	1.117	4.685	0.000
Firm type	-2.410	0.335	-7.203	0.000
Court constraints	-1.086	0.653	-1.664	0.096
Number of workers	0.569	0.159	3.576	0.000
Taxation constraints	0.727	0.404	1.802	0.072
Capacity utilisation	-0.018	0.007	-2.746	0.006
Annual sales	-0.252	0.081	-3.111	0.002
Foreign technology	0.709	0.377	1.881	0.060
Access to investment finance	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	-2.943	0.567	-5.188	0.000
Court constraints	0.658	0.288	2.283	0.022
Number of workers	0.233	0.085	2.733	0.006
Capacity utilisation	-0.011	0.003	-3.167	0.002
Fixed assets	6.784	0.282	24.064	0.000
Foreign ownership	-0.013	0.005	-2.372	0.018
Annual sales	-0.107	0.043	-2.472	0.013
External auditing	-0.359	0.140	-2.560	0.010
Government ownership	-0.031	0.021	-1.438	0.151
Manager's experience	0.017	0.010	1.685	0.092

b. SEM Robustness – Zambia Bootstrap Standard Errors

Access to working capital finance	Estimate	Standard Error	Z-Value	P-Value
Intercept	13.574	2.531	5.363	0.000
Firm type	14.556	5.223	2.787	0.005
Taxation constraints	12.338	4.767	2.588	0.010
Number of workers	-0.018	0.015	-1.263	0.207
Annual sales	0.012	0.007	1.657	0.097
Access to investment finance	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	5.171	4.599	1.124	0.261
Fixed assets	18.825	3.526	5.340	0.000
Capacity utilisation	-0.126	0.059	-2.127	0.033
City population	5.736	3.923	1.462	0.144

c. SEM Robustness – India Bootstrap Standard Errors SI

Domestic private ownership	Estimate	Standard Error	Z-Value	P-Value
Intercept	101.714	1.380	73.703	0.000
ODA per capita	0.811	0.331	2.454	0.014
Internal working capital	0.003	0.002	1.475	0.140
Banking sector credit	-0.082	0.041	-2.019	0.044
Foreign private ownership	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	-3.067	1.293	-2.371	0.018
ODA per capita	-0.708	0.322	-2.198	0.028
MVA per capita	-0.012	0.006	-1.928	0.054
Firm type	0.176	0.102	1.724	0.085
Banking sector credit	0.145	0.051	2.838	0.005

d. SEM Robustness – Indonesia Bootstrap Standard Errors SI

Domestic private ownership	Estimate	Standard Error	Z-Value	P-Value
Intercept	100.812	3.846	26.215	0.000
Number of workers	-0.031	0.029	-1.061	0.289
Firm type	-22.854	8.355	-2.735	0.006
Market capitalisation	-0.258	0.164	-1.572	0.116
Foreign private ownership	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	245.387	107.415	2.284	0.022
Number of workers	0.036	0.030	1.226	0.220
MVA per capita	-0.257	0.116	-2.217	0.027
Firm type	28.295	8.037	3.520	0.000
Broad money	-2.811	1.277	-2.201	0.028
Non-resident bank loans	2.320	1.823	1.272	0.203

e. SEM Robustness – Philippines Bootstrap Standard Errors SI

Domestic private ownership	Estimate	Standard Error	Z-Value	P-Value
Intercept	-137.245	72.334	-1.897	0.058
Number of workers	-0.049	0.014	-3.548	0.000
Technology intensity	-8.848	2.267	-3.903	0.000

Firm type	-23.954	3.661	-6.544	0.000
Broad money	3.477	1.010	3.443	0.001
Trade openness	0.603	0.270	2.234	0.025
ODA per capita	0.055	0.058	0.952	0.341
Foreign private ownership	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	243.999	72.363	3.372	0.001
Number of workers	0.046	0.015	3.127	0.002
Technology intensity	8.496	2.267	3.747	0.000
Firm type	23.907	3.686	6.486	0.000
Broad money	-3.540	1.012	-3.499	0.000
Trade openness	-0.641	0.269	-2.384	0.017
FDI	0.240	0.212	1.134	0.257

f. SEM Robustness – Malaysia Bootstrap Standard Errors SI

Domestic private ownership	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	135.533	53.035	2.556	0.011
ODA per capita	0.490	0.269	1.820	0.069
Firm type	-11.347	5.382	-2.108	0.035
Number of workers	-0.025	0.018	-1.353	0.176
Technology intensity	-8.932	3.264	-2.736	0.006
Broad money	0.468	0.343	1.365	0.172
Trade openness	-0.445	0.275	-1.616	0.106
Foreign private ownership	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	-53.437	46.477	-1.150	0.250
Firm type	9.407	5.361	1.755	0.079
Number of workers	0.025	0.018	1.365	0.172
Unemployment rate	-7.690	5.055	-1.521	0.128
Technology intensity	9.972	3.116	3.200	0.001
Trade openness	0.330	0.244	1.353	0.176
FDI	2.483	1.760	1.411	0.158

g. SEM Robustness – South Africa Bootstrap Standard Errors SI

Domestic private ownership	Estimate	Standard Error	Z-Value	P-Value
Intercept	227.186	72.918	3.116	0.002
ODA per capita	0.976	0.462	2.112	0.035
Internal working capital	-0.041	0.023	-1.784	0.074
MVA per capita	-0.053	0.028	-1.872	0.061
Number of workers	-0.038	0.022	-1.726	0.084
Labour force participation	-2.140	1.005	-2.129	0.033
Technology intensity	3.744	1.715	2.183	0.029
Banking sector credit	0.371	0.194	1.909	0.056
Market capitalisation	-0.082	0.048	-1.717	0.086
Foreign private ownership	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	-36.365	24.884	-1.461	0.144
ODA per capita	-0.636	0.477	-1.333	0.182
Number of workers	0.033	0.022	1.532	0.125
Unemployment rate	1.414	0.671	2.107	0.035
Imported inputs	0.038	0.021	1.783	0.075
Technology intensity	-2.819	1.682	-1.676	0.094
Market capitalisation	0.087	0.048	1.806	0.071

h. SEM Robustness – Zambia Bootstrap Standard Errors SI

Domestic private ownership	Estimate	Standard Error	Z-Value	P-Value
Intercept	336.116	145.213	2.315	0.021
ODA per capita	0.193	0.120	1.608	0.108
Internal working capital	0.091	0.044	2.046	0.041
MVA per capita	-1.152	0.415	-2.779	0.005
Firm type	-5.882	4.372	-1.345	0.179
Number of workers	-0.130	0.028	-4.725	0.000
Labour force participation	-2.135	1.572	-1.358	0.174
Technology intensity	-9.606	3.633	-2.644	0.008
Foreign private ownership	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Intercept	-69.571	24.088	-2.888	0.004
ODA per capita	-0.201	0.108	-1.857	0.063
MVA per capita	0.905	0.274	3.306	0.001
Firm type	8.657	4.090	2.117	0.034
Number of workers	0.118	0.026	4.533	0.000

Unemployment rate	0.899	0.578	1.555	0.120
Imported inputs	0.029	0.020	1.460	0.144
Technology intensity	8.929	3.391	2.633	0.008

Appendix E: Variances and Covariances

E.1 ICs Banking sector

Covariances:	Estimate	Standard Error	Z-Value	P-Value
Access to working capital finance				
Access to investment finance	2.973	0.111	26.747	0.000
Intercepts:				
Banking sector credit	116.051	0.681	170.535	0.000
Access to working capital finance	-3.006	0.142	-21.152	0.000
Access to investment finance	-5.917	0.108	-54.577	0.000
Variances:				
Access to working capital finance	16.396	0.200	81.780	0.000
Access to investment finance	9.542	0.117	81.780	0.000
Banking sector credit	315.464	3.857	81.780	0.000

E.2 NICs Non-banking sector

Covariances:	Estimate	Standard Error	Z-Value	P-Value
Access to working capital finance				
Access to investment finance	3.179	0.113	28.021	0.000
Intercepts:				
Market capitalisation	186.842	2.119	88.174	0.000
Access to working capital finance	-2.006	0.133	-15.126	0.000
Access to investment finance	-5.382	0.094	-57.079	0.000
Variances:				
Access to working capital finance	16.806	0.205	81.780	0.000
Access to investment finance	9.645	0.118	81.780	0.000
Market capitalisation	3058.702	37.402	81.780	0.000

E.3 Zambia Banking sector

Covariances:	Estimate	Standard Error	Z-Value	P-Value
Access to working capital finance				
Access to investment finance	3.363	0.417	8.062	0.000
Intercepts:				
Banking sector credit	14.261	0.018	795.664	0.000
Access to working capital finance	8.937	1.512	5.913	0.000
Access to investment finance	-4.704	1.252	-3.759	0.000
Variances:				
Access to working capital finance	13.825	0.684	20.224	0.000
Access to investment finance	9.477	0.469	20.224	0.000

Banking sector credit	0.030	0.001	20.224	0.000

E.4 Zambia Non-banking sector

Covariances:	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Access to working capital finance				
Access to investment finance	3.349	0.430	7.787	0.000
Intercepts:				
Market capitalisation	3.084	0.029	107.582	0.000
Access to working capital finance	-4.329	1.651	-2.622	0.009
Access to investment finance	-4.401	1.274	-3.453	0.001
Variances:				
Access to working capital finance	14.777	0.731	20.224	0.000
Access to investment finance	9.478	0.469	20.224	0.000
Market capitalisation	0.077	0.004	20.224	0.000

E.5 NICs Start-Up

Covariances:	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Domestic private ownership				
Foreign private ownership	-1300.832	56.619	-22.975	0.000
Intercepts:				
Domestic private ownership	49.498	8.688	5.697	0.000
Foreign private ownership	50.962	8.422	6.051	0.000
Banking sector credit	88.437	3.648	24.241	0.000
Market capitalisation	75.569	5.571	13.565	0.000
Variances:				
Domestic private ownership	1397.026	59.569	23.452	0.000
Foreign private ownership	1312.884	55.982	23.452	0.000
Banking sector credit	1515.114	64.605	23.452	0.000
Market capitalisation	3532.493	150.626	23.452	0.000

E.6 Zambia Start-Up

Covariances:	**Estimate**	**Standard Error**	**Z-Value**	**P-Value**
Domestic private ownership				
Foreign private ownership	-1351.560	106.436	-12.698	0.000
Intercepts:				
Domestic private ownership	90.099	10.550	8.540	0.000
Foreign private ownership	8.129	10.183	0.798	0.425
Banking sector credit	12.841	0.203	63.231	0.000
Market capitalisation	46.772	1.004	46.593	0.000

Variances:				
Domestic private ownership	1478.429	113.224	13.058	0.000
Foreign private ownership	1377.371	105.485	13.058	0.000
Banking sector credit	1.464	0.112	13.058	0.000
Market capitalisation	35.781	2.740	13.058	0.000

Appendix F: Mathematical Constraints

a. $13.574 + 14.556FT + 12.338TC - 0.018NW + 0.012AS \geq 0$
b. $13.574 + 14.556FT + 12.338TC - 0.018NW + 0.012AS \leq 100$
c. $5.171 + 18.815FA - 0.126CU + 5.736CP \geq 0$
d. $5.171 + 18.815FA - 0.126CU + 5.736CP \leq 100$
e. $336.1 + 0.19ODA + 0.09IWC - 1.15MVA - 5.9FT - 0.13NW - 2.1LFP - 9.6TI \geq 0$
f. $336.1 + 0.19ODA + 0.09IWC - 1.15MVA - 5.9FT - 0.13NW - 2.1LFP - 9.6TI \leq 100$
g. $-69.57 - 0.2ODA + 0.91MVA + 8.657FT + 0.12NW + 0.9UR + 0.03II + 8.3TI \geq 0$
h. $-69.57 - 0.2ODA + 0.91MVA + 8.657FT + 0.12NW + 0.9UR + 0.03II + 8.3TI \leq 100$
i. $-69.57 - 0.2ODA + 0.91MVA + 8.657FT + 0.12NW + 0.9UR + 0.03II + 8.3TI +$
$336.1 + 0.19ODA + 0.09IWC - 1.15MVA - 5.9FT - 0.13NW - 2.1LFP - 9.6TI \leq 100$