Gordon Institute of Business Science
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Migration through the industrial forest and impact on national prosperity

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ABSTRACT

National prosperity is central to development economics. It determines the affluence of a nation and the living standard of the population. A multiplicity of factors can influence national prosperity. Industrial migration has been accredited as a driver of high and sustained economic growth across diverse nations in the world. This research sought to answer whether a conclusive relationship exists between industrial migration and national prosperity.

The research design selected was mixed-methods, which included a quantitative descriptive study and an explanatory study. Economic Complexity data was collected from the Observatory of Economic Complexity and data related to national prosperity were collected from the World Bank.

Evidence confirmed that a relationship was been found between industrial migration and national prosperity. Nations, who successfully migrated through the industrial forest, benefitted from rising income levels. The implications of these findings are critical to development economics.

KEYWORDS

Industrial Migration, National Prosperity, Economic Complexity, Product Complexity, Industrialisation, Development Economics

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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Date: 09 November 2015

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1. INTRODUCTION TO THE RESEARCH PROBLEM

1.1. DEFINITION OF INDUSTRIAL MIGRATION

Lin (2011) studied new opportunities and strategies for structural transformation in developing countries and found that the process of industrialisation, synonymously referred to as industrial migration, leads to continuous structural change, technological innovation, industrial upgrading and diversification (pp. 3). Lin (2011) additionally stated that these are characteristics of rapid and sustained economic growth and described the acceleration of growth rates in mature developed nations who have undergone structural change, migrating from agrarian based economies to industrialised economies.

The application of this reasoning to developing nations provides an understanding of why their per capita income remains lower than their developed contemporaries. Developing nations which have either failed to implement structural change or have been too slow to implement structural change, remain in the agrarian economy trapped by low income per capita.

This implies that a relationship exists between industrial migration and income per capita, referred to as national prosperity. To determine whether a relationship exists and the nature thereof, this research study has probed factors which impact industrial migration. The factors which have been selected for this research study have been derived from literature published by economic thought leaders, who have opined on differing measures of national prosperity.

1.2. RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND NATIONAL PROSPERITY

Factors which contribute to national prosperity have been studied by early classical economists and modern development economists. Adam Smith (1776) focused on specialisation and the division of labour as the foundation of national competitive advantage. In his seminal literature, The Wealth of Nations, Smith (1776) postulated that the success of European economies was based on increasing foreign commerce, which was an early reference to the economic benefit of adopting an export-promotion strategy. (pp. 330-331).

Karl Marx had an interest in socio-political economics and was strongly critical of capitalism. Marx (1906) positioned that the most favourable political system should be social in nature, either socialism or communism, in the interest of benefitting the social-wellbeing of the mass population. Marx was aware of the requisite conditions for national prosperity, and was unable to complete his work before his demise, thus leaving open to interpretation his policy recommendations for nations to prosper under non-capitalistic conditions.

John Maynard Keynes thoughts were concentrated on aggregate demand. Keynes (1936) stated that "the outstanding faults of the economic society in which we live are its failure to provide for full employment and its arbitrary and inequitable distribution of wealth and incomes." (p. 148). Keynes raised two important considerations relevant to development economics, namely employment and income inequality; these factors continue to remain relevant to industrial migration and development economics.

Kuznets (1955) questioned whether unequal income distribution had an impact on economic growth. Kuznets (1955) further highlighted the importance of industrial migration in the form of a shift from agricultural to non-agricultural sectors, however was unable to explore the implications hereof upon income distribution due to the lack of a quantum of relevant data. (pp. 12). Kuznets (1955) positioned income per capita as "a focal point at which the functioning of the economic system impinges upon the human beings who are the living members of society and for whom and through whom the society operates." (p. 27)

Akamatsu (1962) focused on the mutual interactions between developed and developing nations, specifically looking at how developing nations commenced a process of industrial migration which was dependant on the aggregate demand of the developed nations.

Kuznets (1971) defined economic growth as a "long-term rise in capacity to supply increasingly diverse economic goods to its population, this growing capacity based on advancing technology and the institutional and ideological adjustments that it

demands. All three components of the definition are important. The sustained rise in the supply of goods is the result of economic growth, by which it is identified."

Porter (1990) stated that the concept of national competitiveness is driven through productivity levels; specifically suggesting that organisations, through increased productivity, can influence the affluence of a nation.

Sen (1997) raised differences between income inequality and economic inequality, most notably indicating that structural capabilities within a nation can lead to a decrease in economic inequality. This thinking contrasts with normative economic thought, which focuses largely on per capita income as a measure of economic inequality. Social welfare indices, related to human development, social wellbeing and national capabilities such as education and health, offer alternative measures of national prosperity.

Hausmann and Klinger (2006) have addressed industrial migration as a necessary input for national prosperity in the context of developing nations:

> Rich countries by definition produce more output per worker than poor countries. But they also produce different, presumably more challenging products. Therefore, the process of development involves moving from simple poor-country goods to more complex rich-country goods. This process is often called structural transformation. Part of this transformation is related to changing factor endowments as physical, human and institutional capital is accumulated (p. 1).

Lin (2012) placed emphasis on the migration of income, stating that economies which have low-wage manufacturers and high-wage innovators lack the ability to continue with industrial migration, which will result in the stagnation of income per capita.

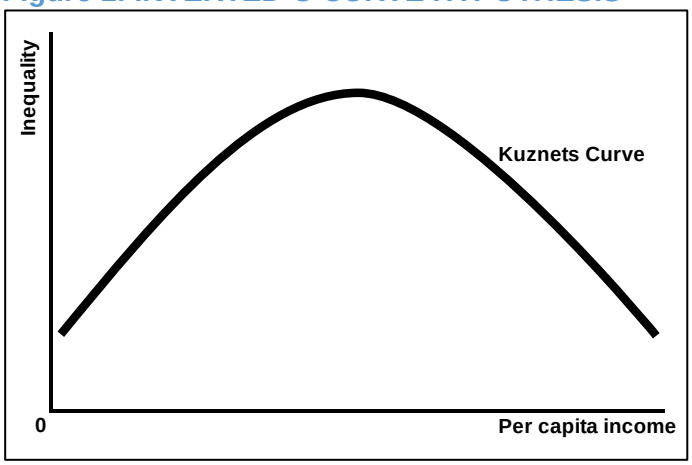
Stiglitz (2015), a challenger of inequality, stated that "We used to think there was a trade-off between equality and growth. Now we see the two as complementary. You

will have stronger growth if you reduce the extremes of inequality". The impact hereof is that sustainable economic growth can be achieved when national prosperity is shared amongst all tiers of the population.

1.3. INDICATORS OF NATIONAL PROSPERITY

Kuznets (1955) introduced the inverted-U curve hypothesis, which explains that a nation will continue to experience increasing levels of income inequality and will inevitably come to a turning point, where after inequality begins to decrease whilst income per capita simultaneously increases. Figure 1 is a depiction of the normative path of the inverted-U curve hypothesis.

Figure 1: INVERTED-U CURVE HYPOTHESIS



Source: Kulkarni and Randall (2014)

Lin (2012) stated that the secret of national prosperity is "understanding a country's endowment structure and its dynamics over time and facilitating the growth of new industries consistent with the latent comparative advantage determined by dynamic change in the country's endowment structure". This concept includes indicators of national prosperity such as productivity, labour force participation rates and employment.

The Human Development Index (HDI), which has been developed by the United Nations Development Programme, provided an alternative measure of national prosperity to income per capita. The components included in this index include life

expectancy at birth, mean years of schooling, expected years of schooling and gross national income per capita.

William and Anoruo (2006) conducted an empirical study to determine whether the best indicator of national prosperity is income per capita or the Human Development Index. This study collected cross-country data for income per capita, the Human Development Index and an independent survey measure of happiness.

William and Anoruo (2006) described the findings of this study, stating that

> GDP per capita clearly comes out on top. When HDI is used as a sole explanatory variable it does not even account for as much as half a percent of the variation in the survey measure of happiness across countries. GDP per capita, in contrast, when it is used as the sole explanatory variable, accounts for almost about 27.5 percent of the variation in happiness. When the two variables are used simultaneously as explanatory variables, something unusual occurs. While both variables are statistically significant, HDI, from the perspective of being a measure of social welfare, has the wrong sign. Instead of a positive sign, it has a negative sign.

This study by William and Anoruo (2006) found that income per capita explained variations in national prosperity better than variations in the Human Development Index. The authors have noted that this study was based on a sample of 43 countries and recommend future studies which include a larger sample to test whether these findings will change.

Kulkarni and Randall (2014) found similar results from a study conducted to determine whether a relationship exists between income inequality and the Human Development Index for Brazil. In this study, Kulkarni and Randall (2014) found that despite the increasing income per capita levels over time, a conclusive relationship between income inequality and the Human Development Index could not be found.

1.3.1. PRODUCTIVITY

Porter (1990) defined productivity based on the employment of labour and capital, specifically the output produced per unit of labour or capital employed. Porter (1990) stated that nations should plan to increase productivity as it a contributing factor to national prosperity.

Reinhardt and Prewitt (2005) produced a case study of Singapore, which implemented wage reforms to boost economic activity and attract foreign investors. Since the introduction of wage reforms, Reinhardt and Prewitt (2005) found that relative to productivity the real wage rate began to rise rapidly. Although their study did not stipulate whether wages or productivity were the dependant variable, it does offer evidence that the approach implemented by Singapore has contributed to the national prosperity of the population, and simultaneously improved productivity.

Abizadeh and Tosun (2007) studied the impact of trade openness on labour productivity over the period 1988 to 1999 and concluded that “trade openness has a positive and significant impact on the productivity of skilled and unskilled labor over time" (p.392).

1.3.2. LABOUR FORCE PARTICIPATION RATES

Lin (2012) emphasised that countries can reach a point of stagnation in their industrial migration due to the complacency of policymakers (pp. 233). Lin (2012) stated that successful transition from a low-income level to a middle-income level should be sustainable and “focus on exploiting countries’ current and latent comparative advantages” (p.233). Failure to do so will consequently erode capability to compete against global income per capita levels. To address this income trap, productivity levels need to increase. The labour force, through education, should pursue skills development which increases their ability to be active labour force participants.

Sankaran (2015) studied the determinants of foreign direct investment inflows into the Dominican Republic and observed that “labour force participation rates are statistically significant positive determinants of FDI inflows” (p.60). Foreign direct

investment is necessary to develop competitive industries, thereby contributing to the economic welfare of society.

1.3.3. EMPLOYMENT

Charles and Lehner (1998) have described the challenge presented with industrial migration towards more sophisticated industries, stating that

> If lean and cost-driven strategies dominate in an economy, one likely outcome is rapid development in productivity. For a number of companies and even for whole industries, this may help to gain sufficient comparative advantage in the short to medium-term. In this case, the outcome for jobs and incomes could be positive. For other companies and industries, a rapid development in productivity may create on the one hand, job losses, on the other hand it may allow for comparatively high wages. Alternatively strong efforts to cut labour costs may occur and relax the pressure for productivity. In this case, the likely outcome may be that employment can be stabilised at the expense of real income. (pp.)

Pianta (2001) supported this notion that industrial migration could have either a positive or negative influence on employment; the determinant of the outcome of such industrialisation is driven by the nature of the industrial migration. The framework presented in Figure 2 is a representation of the possible effects on employment.

Figure 2: A FRAMEWORK FOR INVESTIGATING THE IMPACT OF INNOVATION ON GROWTH AND EMPLOYMENT

	Technological Change Industry specific opportunities for innovation in firms					
Behaviour of firms	Non-innovating firms		Firms innovating mainly in processes		Firms innovating mainly in products	
Innovative strategy of firms	No R&D and innovation Stable productivity Cost savings Low quality		Some R&D and innovation Growing productivity Defence of market shares		High R&D and innovation Growing productivity through Search for new markets and	
Competitive strategy	Passive price competitiveness		Active price competitiveness		Technological competitiveness	
External conditions of markets and demand	Stagnant	Growing	Stagnant	Growing	Stagnant	Growing
Outcomes for the firm	Losing out to competitors	Falling or stable market shares		Stable or growing market shares (at the expense of competitors)		Fast growing market shares Development of new markets
Outcomes for the industry	Strong fall of value added and employment	Stable value added Falling employment with growth of productivity		Slow growth of value added Stable employment with growth of productivity		Strong growth of value added Some employment growth

Source: Pianta (2001)

1.4. INDICATORS OF INDUSTRIAL MIGRATION

The World Economic Forum's Global Competitiveness Index (2014) measures the relative competitive performance of countries ranking countries into three categories, namely factor-driven economies, efficiency-driven economies and innovation-driven economies. The Global Competitiveness Index measure of competitiveness provides a development framework for progression through the industrial forest based on the advantageous utilisation and development of available factors of endowment in a particular nation. Each of the three categories has a defined set of requirements to ensure that standardised qualifying criteria are applied to nations included in each of the competitiveness ranking categories. For a country to move to the next competitive level using this measure, it is mandatory for factors of

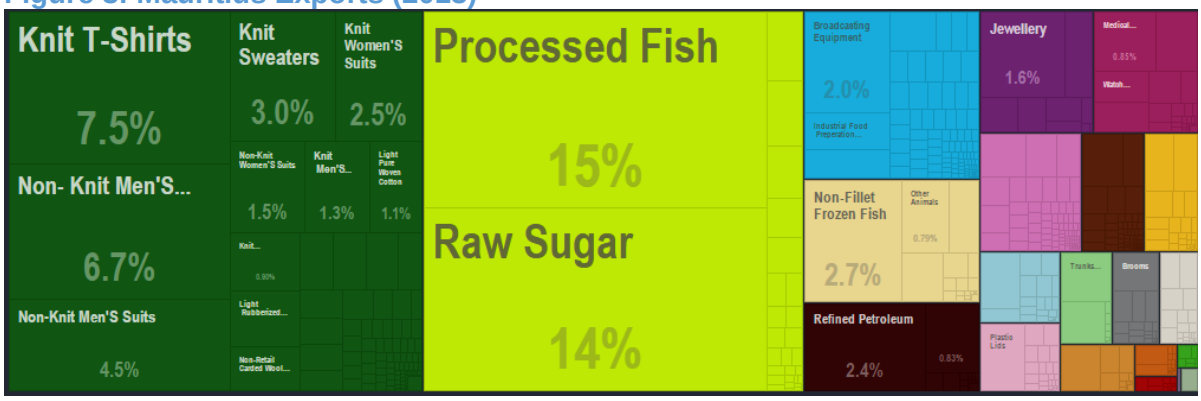
endowment to be developed in the context of the category specific requirements. Accordingly it can be surmised that migration through the industrial forest should occur through a planned and phased approach, rather than through coincidence.

1.4.1. PRODUCT SOPHISTICATION

Lin (2012) observed that countries which have achieved successful industrial migration have defied traditional economic policy prescriptions, as these countries adopted export-promotion strategies rather than import-substitution strategies. Lin (2012) highlighted that export-promotion strategies are supported through an increase in the level of product sophistication. Lin (2012) provided empirical evidence of this concept by using Mauritius as an example, describing that productivity levels in Mauritius increased upon adopting export-promotion strategies and surpassed the productivity levels of its contemporaries in the Sub-Saharan Africa region.

The foundation of the Mauritian economy was historically built in the agrarian economy, with its largest export being a natural resource. Sugar, natural factor of endowment in Mauritius, remained the largest export until the independence of Mauritius. After achieving independence, the level of product sophistication has been developed and the trade strategy shifted towards an export-promotion strategy. Mauritius was able to capitalise on its cost-effective labour and cultivate a textile production industry. A liberal regulatory environment which promoted foreign trade was implemented. As a result of these decisive policy actions, Mauritius effectively migrated through the industrial forest. Figure 3 illustrates Mauritian export categories, with the largest export category from Mauritius in 2013 being textiles, which exceeded the export value of combined natural resources, such as sugar and processed fish.

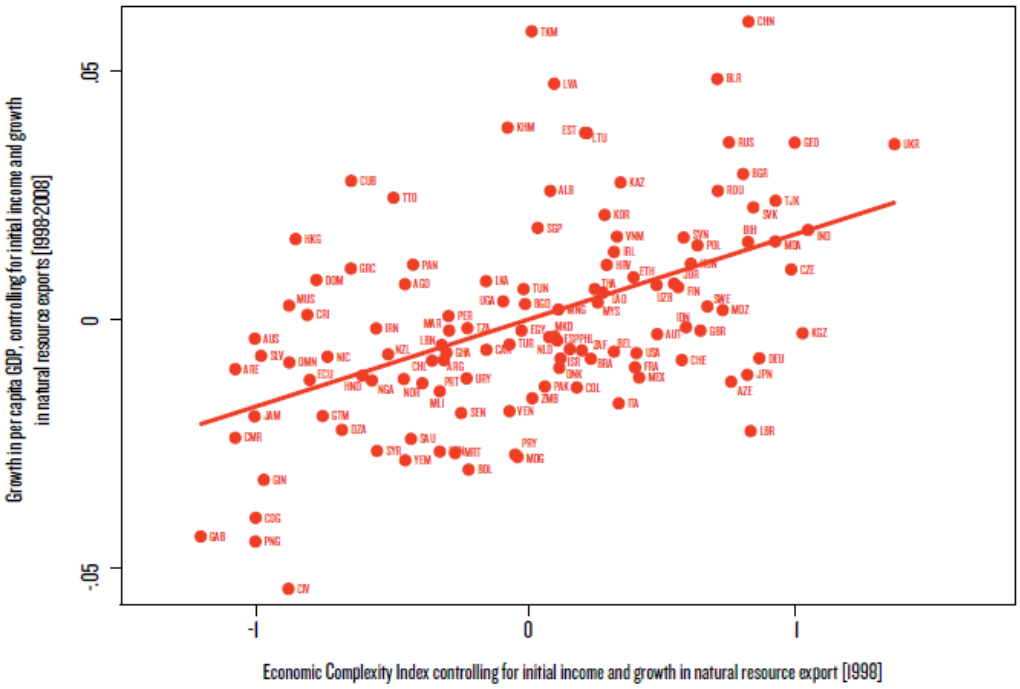
Figure 3: Mauritius Exports (2013)



Source: Observatory of Economic Complexity (2013)

Hausmann and Hidalgo (2007) found that the economic performance and competitiveness of countries can be determined by the nature of products that countries export. Hausmann and Hidalgo (2009) studied economic growth based on a country's economic complexity and found a positive linear relationship between growth in GDP per capita for the period between 1998 and 2008 and the Economic Complexity Index (ECI) for 1998. Figure 4 demonstrates the outcome of their findings.

Figure 4: GROWTH IN GDP PER CAPITA AND ECONOMIC COMPLEXITY INDEX



1.4.2. ECONOMIC COMPLEXITY

Hausmann, Hidalgo, et al (2009) has defined economic complexity as "the composition of a country's productive output and reflects the structures that emerge to hold and combine knowledge." (p. 18). In their work relating to economic complexity, Hausmann and Hidalgo (2009) have also provided a measure of economic complexity, which is the Economic Complexity Index. Hausmann and Hidalgo (2009) have described the application and interpretation of the Economic Complexity Index using analogies which firstly assess nation's factors of endowment and secondly assess nations with similar levels of income per capita.

> Think of a particular country and consider a random product. Now, ask yourself the following question: If this country cannot make this product, in how many other countries can this product be made? If the answer is many countries, then this country probably does not have a complex economy. On the other hand, if few other countries are able to make a product that this country cannot make, this would suggest that this is a complex economy.

Hausmann and Hidalgo (2009) have explained that it is possible for nations with high income per capita to have low economic complexity and conversely nations with low income per capita can have high economic complexity. One of the findings of this study by Hausmann and Hidalgo (2009, p.23) stated that "In fact, as we show in this Atlas, the gap between a country's complexity and its level of per capita income is an important determinant of future growth: countries tend to converge to the level of income that can be supported by the knowhow that is embedded in their economy."

Lin (2012) suggested that countries should align development policies and growth targets to the factors of endowment and knowledge available locally so as to develop country competitiveness. Hausmann and Hidalgo (2014) further developed upon this and specified that "In a modern reinterpretation of this idea, the division of labour is what allows us to access a quantity of knowledge that none of us would be able to hold individually." (p.15).

1.4.3. POLICY IMPLICATIONS OF INDUSTRIAL MIGRATION

Porter (1990) stated that government is to act as the catalyst which drives private sector productivity and thereby create competitive industries. Lin (2012) specified that a proactive government can collaborate with private firms to migrate towards latent competitive industries. Lin (2012) developed a six-step framework which facilitates industrial migration, which is detailed below.

Step 1: Policymakers should select dynamic growing countries with similar endowment structures and with about 100 percent higher per capita incomes. They must then identify tradable industries that have grown well in those countries for the past 20 years.

Step 2: If some private domestic firms are already present in those industries, they should identify constraints to technological upgrading or further firm entry and take action to remove those constraints.

Step 3: In the cases of industries in which no domestic firms are present, policymakers may try to attract FDI from the countries listed in Step 1 or organize new firm incubation programs.

Step 4: In addition to the industries identified in Step 1, the government should also pay attention to spontaneous self-discovery by private enterprises and support the scaling up of successful private innovations in new industries.

Step 5: In countries with poor infrastructure and bad business environments, special economic zones or industrial parks may be used to overcome barriers to firm entry and FDI and encourage the formation of industrial clusters.

Step 6: The government should be willing to compensate pioneer firms in the industries identified earlier with tax incentives for a limited period, cofinancing [*sic*] for investments, or access to foreign exchange.

These authors have conceded the role of central government in establishing national prosperity. The role of government planning is critical to support the progression of economic complexity at a national level, which would inevitably encourage countries to compete against each other for a share of productive capabilities.

1.5. RESEARCH GAPS

Although industrial migration has been probed and described by economists, a conclusive relationship has not been established between industrial migration and national prosperity. The concept of industrial migration, through increasing product complexity and sophistication, as drivers of national prosperity has not been established to date. Lin (2012), notwithstanding his research and professional experience, conceded that

> The big questions addressed by Adam Smith and others remain (largely unanswered) on the agenda today: How can a country accelerate its growth and wealth creation to move from a low-income agrarian economy to an industrializing middle-income economy and proceed to a postindustrializing [*sic*] high-income economy? (p.46).

1.6. RESEARCH PURPOSE

The purpose of this research study sought to understand the relationship between industrial migration and national prosperity. Research questions were derived from the literature and were studied to determine the benefits of industrial migration, the optimal conditions required for industrial migration and the path of industrial migration.

2. LITERATURE REVIEW

The literature review has been structured to comprise of five sections, namely Industrial Migration, National Prosperity, Product Sophistication, Product Complexity and Economic Complexity. Literature has been reviewed to firstly understand these concepts, and secondly to determine whether there is evidence of a relationship between industrial migration and national prosperity.

2.1. INDUSTRIAL MIGRATION

Kuznets (1955) study of the causes of long-term changes in the distribution of income found that “An invariable accompaniment of growth in developed countries is the shift away from agriculture, a process usually referred to as industrialization and urbanization” (p. 7). Although this study was limited by the availability of data and knowledge which is presently easily accessible to support further research, this study presented a key insight regarding the variance in income per capita levels between rural agricultural regions and urban industrialised regions. Kuznets (1955) stated that “the average per capita income of the rural population is usually lower than that of the urban” (p. 7). This suggested that a relationship exists between industrial migration and national prosperity, measure using income per capita.

Akamatsu (1962) studied the interaction between the developed Western European region with the developing Asian region to understand the patterns of economic growth in developing economies, and described seven stages of trade interaction, each with pertinent attributes. These seven stages provided a narrative for the process of industrial migration as experienced by developing nations, migrating from basic industries to advanced industries.

> The first stage is the period when native Asian industry developed as a result of the exchange of native Asian products for Western European industrial products.
>
> The second stage is the period when the native handicraft industry crumbled because manufactured consumer goods flowed into the Asian area after the Industrial Revolution in Western Europe.

The third stage is the period when Western European capital and techniques infiltrated the Asian area for the large-scale production of primary goods, such as raw materials and provisions necessary for the Western European economy, as well as for the construction of railroads and highways. During this period of exchange of Western European consumer goods for native primary products came to be established.

The fourth stage is the period when Western European capital came into the developing countries to develop modern industries, including the industries processing raw materials produced in those areas.

The fifth stage is the period when native capital began to run the industries processing native raw materials. In this period a conflicting relationship was generated between consumer goods imported from the advanced countries and those of the native processing industries. However in this period, capital goods came to be imported from the advanced countries for the consumer-goods industries in the developing countries and, in consequence there was a conspicuous change from consumer goods to capital goods in the import structure.

The sixth stage is the period when manufactured goods in general began to be produced by native industries, whether the raw materials were domestically available or not. The capital goods required by these industries were imported at the expense of the induction of foreign capital and of the export of primary products.

The seventh stage is the period when the industrialisation of the developing countries became so advanced as to make possible the export of manufactured consumer goods, and when the domestic production of some capital goods came to the fore.

Akamatsu (1962) introduced the concept of “wild geese flying pattern” (p. 11) to describe these patterns of industrial migration. The foundation of this framework was that a natural process of industrial migration occurred as the level of product sophistication and complexity evolved across developed and developing nations at dissimilar rates. The seven stages of industrial migration evolved based on the interactions between developed and developing nations. Akamatsu (1962) defined this process through the concepts of hetrogeneization and homogeneization. The hetrogeneization process is characterised by the availability of different factors of endowment in developing and developed nations. As industrial migration ensues there will be a consequent homogeneization process, which is driven through the increased economic complexity in developing nations. Not only do factors of production become similar in developing nations relative to developed nations, but more importantly these developed factors of production become more accessible to developing nations.

Lin (2012) presented a similar perspective, noting that a common feature of industrial migrators was that “They all started from resource-intensive industries or labor-intensive [*sic*] industries such as mining, agriculture, garments, textiles, toys, and electronics in the early stage of development and moved up the industrial ladder step by step to more capital-intensive industries.” (p. 94).

Lin (2012) studied factors which contribute to national prosperity and one finding of this study raised the importance of industrial migration; a contrast amongst nations which have adopted a path of industrial migration to those who have not provides empirical evidence to suggest that the prosperity of industrial migrators exceeds those of their lagging counterparts. Lin (2012) postulated that “Chile, Japan, and Singapore successfully adopted technologies available from more advanced countries to launch their industrial upgrading, while the Democratic Republic of Congo, Jamaica, and Nepal have had difficulties doing the same.” (p. 25).

Lin (2012) advocated that to achieve national prosperity, it is necessary for nations to be able to “change their human as well as physical capital endowments, increase the pace of adoption of new ideas, speed the process of industrial upgrading, and

improve soft infrastructure (such as institutions) and hard infrastructure (such as transportation and telecommunications networks)" (p.33).

Evidence has been presented which supports industrial migration and Lin (2012) provided a six-step framework which is a recommendation for planned and structured industrial migration. It has been found that planning for industrial migration is important; Lin (2012, p.93) states that

> If industrial upgrading and diversification are left to random spontaneity, firms may enter too many different industries. As a result, only a few sufficiently large clusters may emerge, and evolution via "survival of the fittest" will typically be a very long and costly process. It is therefore better for the government to encourage the entry of firms into some industries aligned with the country's comparative advantage. That can reduce the time and cost of cluster formation.

Lin (2012) has indicated that industrial migration should not exceed an optimum pace of progression and that national policy development should be wary of targeting over ambitious development goals (p. 112). Low income countries can take a few generations of migration through the industrial forest before reaching an improved level of per capita income, which emphasises the long term consequences of macroeconomic policy decisions.

The role of government in industrial migration has been found to be a critical precondition for successful industrial migration, as government policy decisions can determine the level of success in migrating through the industrial forest. Government policy decisions either encourage or discourage foreign direct investment, which has significantly more importance to low-income developing nations than to high-income developed nations. Lin (2012) has stated that successful industrial migration can be achieved in as soon as one or two generations, but only if government deploys the correct strategy (p. 112).

To illustrate that nations are able to achieve high and sustainable economic growth in a relatively short period, Lin (2012) made reference to the Growth Commission Report which reported the success stories of 13 such nations. Figure 5 provides a view of the income per capita growth each of these nations experienced. The Growth Commission Report (2008) found five common attributes amongst the 13 nations, namely exploitation of the world economy, macroeconomic stability, high savings rate, market allocated resources and competent governments. The Growth Commission Report (2008) substantiated that a key success factor of these nations was their ability to effectively migrate through the industrial forest, stating that "In any period of fast growth, capital, and especially, labor [*sic*] moves rapidly from sector to sector, industry to industry. This mobility of resources was a feature of all the 13 high-growth cases." (p. 25).

Figure 5: INCREASE IN PER CAPITA INCOME FOR 13 SUCCESSFUL ECONOMIES

Economy	Period of high growth**	Per capita income at the beginning and 2005***	
Botswana	1960–2005	210	3,800
Brazil	1950–1980	960	4,000
China	1961–2005	105	1,400
Hong Kong, China*	1960–1997	3,100	29,900
Indonesia	1966–1997	200	900
Japan*	1950–1983	3,500	39,600
Korea, Rep. of*	1960–2001	1,100	13,200
Malaysia	1967–1997	790	4,400
Malta*	1963–1994	1,100	9,600
Oman	1960–1999	950	9,000
Singapore*	1967–2002	2,200	25,400
Taiwan, China*	1965–2002	1,500	16,400
Thailand	1960–1997	330	2,400

Source: World Bank, World Development Indicators.

*Economies that have reached industrialized countries' per capita income levels.
**Period in which GDP growth was 7 percent per year or more.
***In constant US$ of 2000.

Source: Growth Commission Report, 2008

The evidence found to this point indicates that industrial migration does come about as a result of structural changes in an economy. Two forms of structural change, namely product sophistication and product complexity, have been explored further in separate sections in this chapter.

2.2. NATIONAL PROSPERITY

One explanation of national prosperity as stated by Porter (1990) described that "The principal goal of a nation is to produce high and rising standard of living for its citizens." (p. 1) and additionally described that national prosperity can be achieved through industrial migration.

> A nation's standard of living depends on the capacity of its companies to achieve high levels of productivity – and to increase productivity over time. Sustained productivity growth requires that an economy continually *upgrade itself*. A nation's companies must relentlessly improve productivity in existing industries by raising product quality, adding desirable features, improving product technology, or boosting production efficiency. They must develop the capabilities to compete in more and more sophisticated industry segments, where productivity is generally high. They must finally develop the capability to compete in entirely new, sophisticated industries.

This suggests that national prosperity is an outcome of industrial migration. Lin (2012) has clarified that nations do not achieve the same levels of income per capita, due to the differences of each country's unique range of available factors of endowment. This highlights the significant role which factors of endowment have on industrial migration and consequently on national prosperity. National prosperity is primarily measured using income per capita, which explains the reason for the differences in income levels across nations with different factors of endowment.

2.3. PRODUCT COMPLEXITY

Akamatsu (1962) defined the "wild geese flying pattern" using a seven stage process for industrial migration. The migration between each stage came about as the product complexity evolved, migrating from basic native products in the first

stage to highly industrialised products in the seventh stage. The intermediate stages from two to six were a process of homogeneization for the developing nations.

Hausmann and Hidalgo (2010) have examined a range of product complexity measures, as reviewed below:

a. Dixit-Stiglitz Model

The Dixit-Stiglitz Model, based on new trade theory, reconsiders whether countries specialise as set out by traditional economic theorists of the Smith school of thought. This model presumes that all products are homogenous in terms of the factors of endowment used in production and further disregards the costs associated with production; for this reason this model does not facilitate a real measure of evaluating progressive product complexity. Hausmann and Hidalgo (2010) have dismissed this model as it does not provide any insight into the future product complexity capabilities of a country.

b. The Melitz Trade Model

The Melitz Trade Model analyses which firms within a country would have predisposition towards supplying the local and the export product markets, thereby remaining relevant only at the industry level and not the country level. This model has also been dismissed as it is not an appropriate complexity measure.

c. Kremer O-ring Model

The Kremer O-ring Model considers the number of process stages involved in production, and measures competitive advantage using the limited perspective that advancements in product complexity would only add to the costs of production rather than enhance national competitive advantage. It can be deduced that this model does not take into consideration the greater economic gains which may result from capital investment into redeploying factors of endowment towards a more complex array of products.

Hausmann and Hidalgo (2010) have concluded that each of the above measures do not have the ability to provide predictive projections relating to future product complexity. In view of that, they have developed the Economic Complexity Index and the Product Complexity Index, to determine the relationship between complexity and ubiquity. The output of these indexes project theoretical future growth predictions, and confirms that that complexity is a function of the quantity of factors of endowment available in a country.

Due to this salient finding that countries can only produce products for which they have the available factors of endowment, the evolution of product complexity should not be constrained by the local availability of factors of endowment, but should follow a path of homogeneization as recommended by Akamatsu (1962).

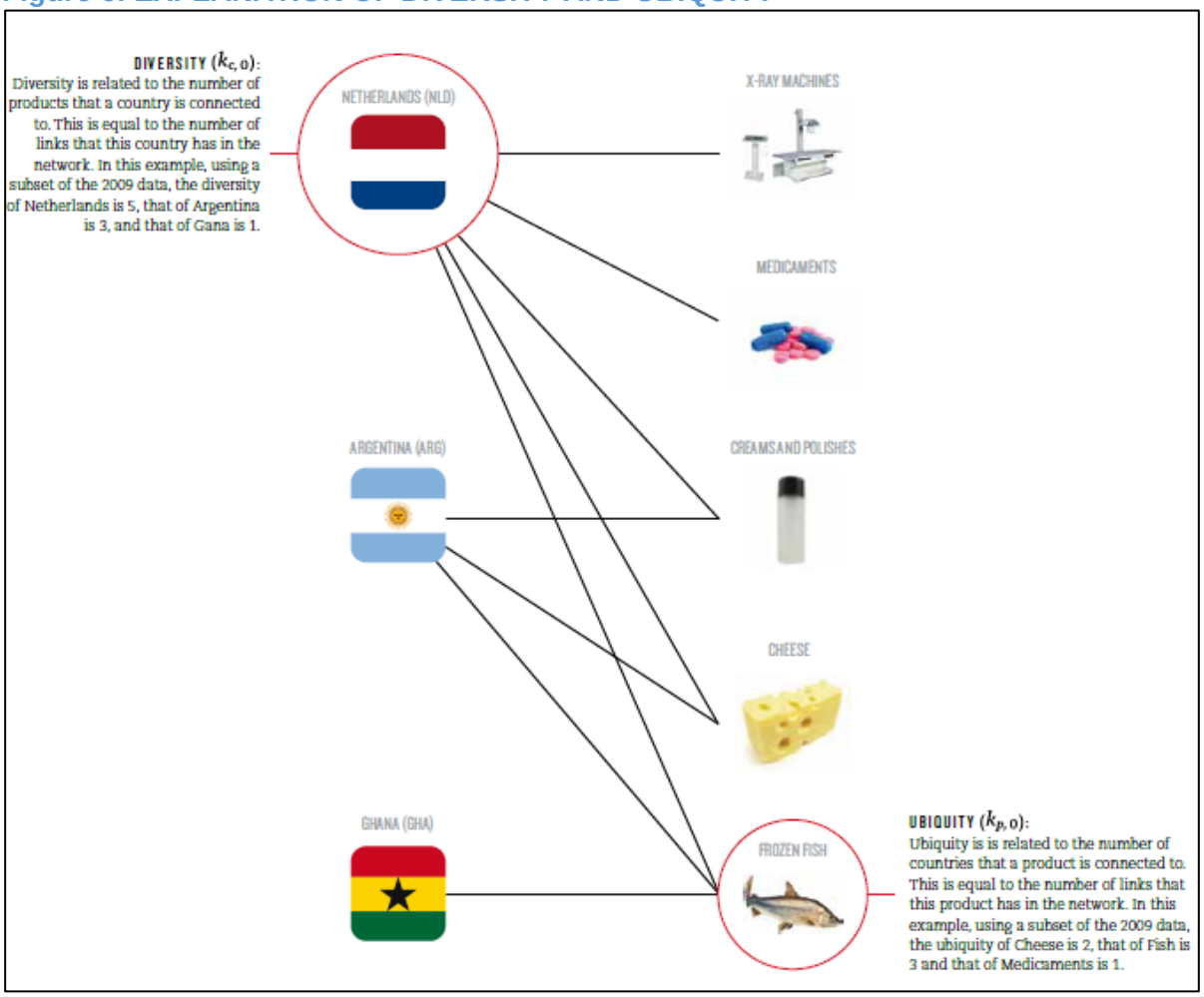
Hausmann and Hidalgo (2014) introduced two concepts, firstly diversity and secondly ubiquity, which can be used to demonstrate the nature of product complexity.

> Diversity is related to the number of products that a country is connected to. This is equal to the number of links that this country has in the network.
>
> Ubiquity is related to the number of countries that a product is connected to. This is equal to the number of links that this product has in the network.

Hausmann and Hidalgo (2014) have examined the product connectedness of three countries, namely the Netherlands, Argentina and Ghana. The findings of this examination are depicted in Figure 7, and illustrated that industrial migration occurs as the product complexity increases over time. Ghana remains in the agrarian economy producing only fish whilst Argentina has migrated towards cheese and creams and polishes. Argentina has introduced new and advanced processes to the product value chain, by transforming basic agrarian materials into manufactured consumer products. The Netherlands, a nation skilled in the agrarian economy, migrated in a similar manner as Argentina, towards manufactured consumer

products, however has continued migrating into more complex products such as medicaments and x-ray machines.

Figure 6: EXPLANATION OF DIVERSITY AND UBIQUITY

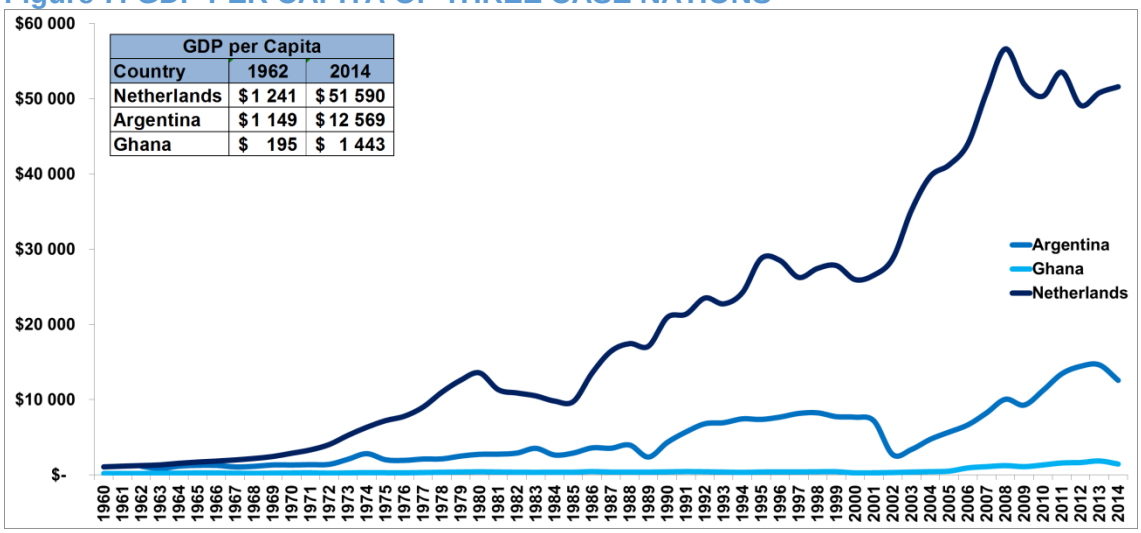


Source: Hausmann and Hidalgo (2014)

The evidence presented in Figure 6 corroborated that the product complexity of a nation is influenced by the available factors of endowment. Taking this empirical information a step further by introducing GDP per capita from 1960 to 2014, suggested that rising income per capita can be attributed to industrial migration, in the case of these three countries. Figure 7 describes the extent of change in GDP per capita over a period of time for the three nations and suggests that higher income per capita can materialise due to a significant increase in industrial

migration. In the Netherlands the income per capita increased as the product complexity increased, and contrastingly in Ghana, a country which remains in the agrarian economy, the income per capita has remained relatively lower than its migrating counterparts.

Figure 7: GDP PER CAPITA OF THREE CASE NATIONS



Source: Adapted from the World Bank using GDP per Capita

2.4. PRODUCT SOPHISTICATION

Lall, Weiss and Zhang (2006), introduced an index which could be used to measure the sophistication of exports. Table 1 presents their technology-sophistication matrix which categorised possible export sophistication and technology intensity combinations.

Table 1: EXPORT SOPHISTICATION AND TECHNOLOGY INTENSITY

Technology Level	Sophistication Level	
	LOW	**HIGH**
LOW	Technologically simple products whose export production has shifted to low wage areas	Technologically simple products whose export production remains in high wage areas because of trade distortions, resource availability, logistical needs to be near the main markets
HIGH	Technologically advanced products with fragmentable processes located in low wage areas	Technologically advanced products without fragmentable processes where high wage countries retain strong comparative advantage
Note: The sophistication level is based on the average income of the exporter of a product, the level rising with income. The technology level is based on the R&D intensity of the core industrial process.		

Source: Lall, Weiss and Zhang (2006)

In an endeavour to understand the Chinese economic growth phenomenon, Jarreau and Poncet (2011) have studied the contribution of export sophistication at a provincial level towards China's economic growth. This study has found that four of the five best performing provinces, with the highest level of export sophistication, also have some of the highest GDP per capita levels across all provinces. From this, it has been concluded that in the case of China, there is a positive relationship between product sophistication and GDP per capita.

In contrast to the research finding of Jarreau and Poncet, Xu (2010) has found that whilst China does export sophisticated products, there is no correlation between export sophistication and GDP per capita. The rationale for this finding is due to the lack of consideration to the quality of these sophisticated products. Upon the normalisation of the sophisticated product data, which standardised product quality

across comparative products, China no longer remains ahead of comparable peer countries in terms of product sophistication.

Xu (2010) has measured sophistication using the EXPY index, which was originally introduced by Hausmann, Hwang and Rodrik (2007). Hausmann et al. (2007) have denoted EXPY as per Equation 1 below.

Equation 1: SOPHISTICATION INDEX

$$EXPY_c = \sum_p S_{cp} PRODY_p$$

$EXPY_c$ Variables:

$EXPY_c$	this is measure at a country level, measuring the average PRODY of that country's exports
p	Product
S_{cp}	Share which country *c* has in the world market for product *p*
$PRODY_p$	Measures the average income per-capita associated with a product $PRODY_p = \sum_c \frac{S_{cp}}{\sigma_p} G_c$

$PRODY_p$ Variables:

S_{cp}	Share which country *c* has in the world market for product *p*
G_c	Income of country *c* measured as GDP per capita
σ_p	$\sum_c S_{cp}$

Source: Xu (2010)

2.5. ECONOMIC COMPLEXITY

Hausmann and Hidalgo (2014) described economic complexity in terms of the knowledge, which is defined as the intellectual capital capabilities available to a nation, and the multiplicity of such knowledge. This indicates that in order to achieve economic complexity, productive knowledge should be applied to available factors of endowment which will result in the enhancement of these factors of endowment. This notion corroborates with Akamatsu's concept of homogeneization.

Hausmann and Hidalgo (2007) have sought to derive a complexity measure which can predict the future income growth of an economy, proposing that future growth should be supported by the creation of market conditions which allow for complexity

to emerge. A key measure introduced by Hausmann and Hidalgo (2007) is the Revealed Comparative Advantage (RCA), which quantifies a countries share of exports of a particular product within the global market for that product. This measure is useful to determine which nations have are dominant global product markets. The country export data used in this study can be further analysed to confirm whether a relationship exists between dominant nations and their level of national prosperity.

Equation 2: REVEALED COMPARATIVE ADVANTAGE (RCA)

$$RCA_{cp} = S_{cp}/T_p$$

$$T_p = \sum_c S_{cp}$$

RCA Variables:

c	Country
S_{cp}	Share which country *c* has in the world market for product *p*
p	Product
T_p	Total share of product *p* in the world market

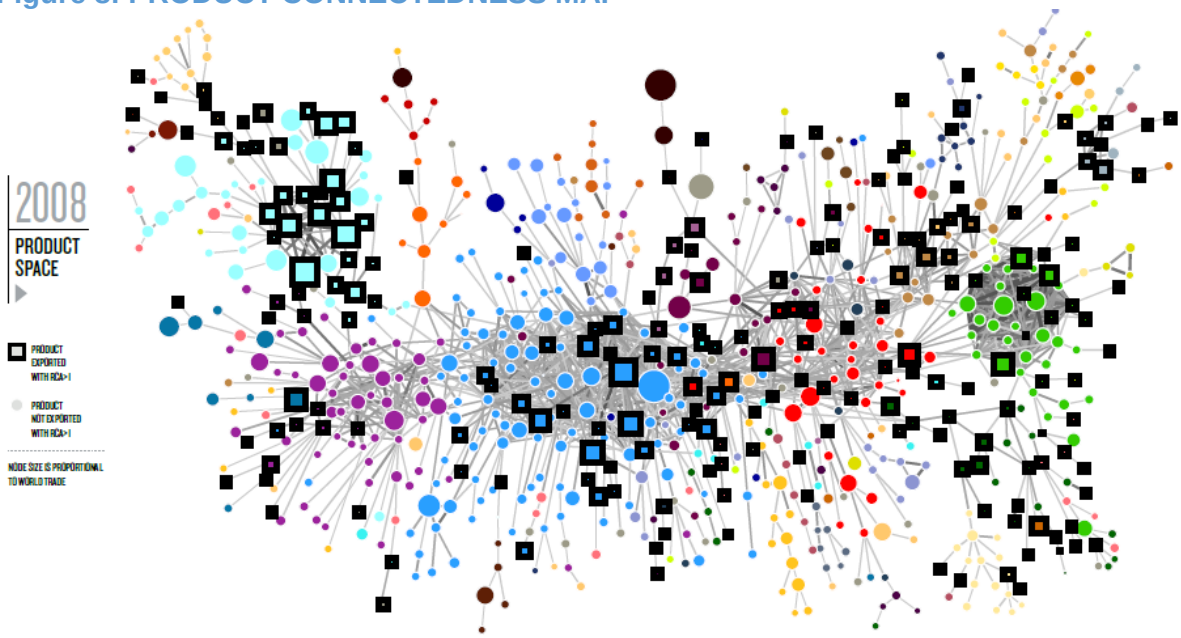
Source: Hausmann and Hidalgo (2007)

Hausmann and Hidalgo (2007) have utilised the RCA to generate a country-product network, to determine product ubiquity within global product markets. Product ubiquity is concerned with the omnipresence of a product in the global market, and does not directly influence national prosperity. Hausmann and Hidalgo (2011) defined connectedness as

> Connectedness is a measure of how centrally located a community is in the product space. It is the average proximity of a community's products to all other products, where proximity is the measure of distance between two products used to construct the product space. (p. 47).

An example of the product connectedness map is presented in Figure 8, which is designed for individual nations based on the level of product complexity and ubiquity in the nation's product space.

Figure 8: PRODUCT CONNECTEDNESS MAP



2.6. CONCLUSION OF THE LITERATURE REVIEW

The literature reviewed for this study presented significant evidence to support that a relationship exists between industrial migration and national prosperity.

Lin (2012) surmised that countries will migrate, but will not achieve the same levels of GDP per capita, attributed to the uniqueness of the factors of endowment available in each nation. Due to these unique factor conditions, nations would migrate at different rates.

Akamatsu (1962) described the wild geese flying pattern, which specifically stated that income and complexity will grow at dissimilar rates due to the homogeneization and hetrogeneization processes. Although natural factors of endowment are unique, Akamatsu (1962) proposed that new factors of endowment can be developed as technological advancements are made.

Hausmann and Hidalgo (2012) presented an example of industrial migration through increasing economic complexity as illustrated in Figure 6 and the change in income per capita over a period of time as depicted in Figure 7. This example provided

evidence in support of the concept that as industrial migration occurred through an improvement in economic complexity, the income per capita increased over time.

These authors have mentioned that structural change is responsible for shifting the factors of endowment available within a nation. This structural change, when supported by the introduction of advancing technologies resulted in improved economic complexity over the long-run for nations which have achieved successful industrial migration.

3. RESEARCH QUESTIONS

Chapter 1 and Chapter 2 have demonstrated that the concept of industrial migration has been probed and described by economists; however a definitive relationship has not been established between industrial migration and national prosperity. To determine whether a conclusive relationship exists, three research questions have been identified and described in this section.

Research Question One:

Why does industrial migration matter?

Research Question One sought to establish whether there were any material benefits associated with industrial migration, particularly the impact of industrial migration on national prosperity. To assess this, a series of relationships between indicators of national prosperity and industrial migration have been examined.

The indicators which have been examined in relation to industrial migration were GDP per capita, the Human Development Index, unemployment, GINI Index, mean years of schooling, high-technology exports (% of manufactured exports).

Research Question Two:

What is the extent of industrial migration?

Research Question Two sought to determine the extent of industrial migration in terms of the speed at which migration occurs and also to determine whether specific characteristics were associated with industrial migration. The characteristics which analysed included three categories, first, demographic profile (population size and neighbourhood), second, nature of economic activity (key economic activity, resource dependence and income group) and third, trade orientation (key products traded and export orientation).

Research Question Three:

Do nations which migrate follow a path or framework?

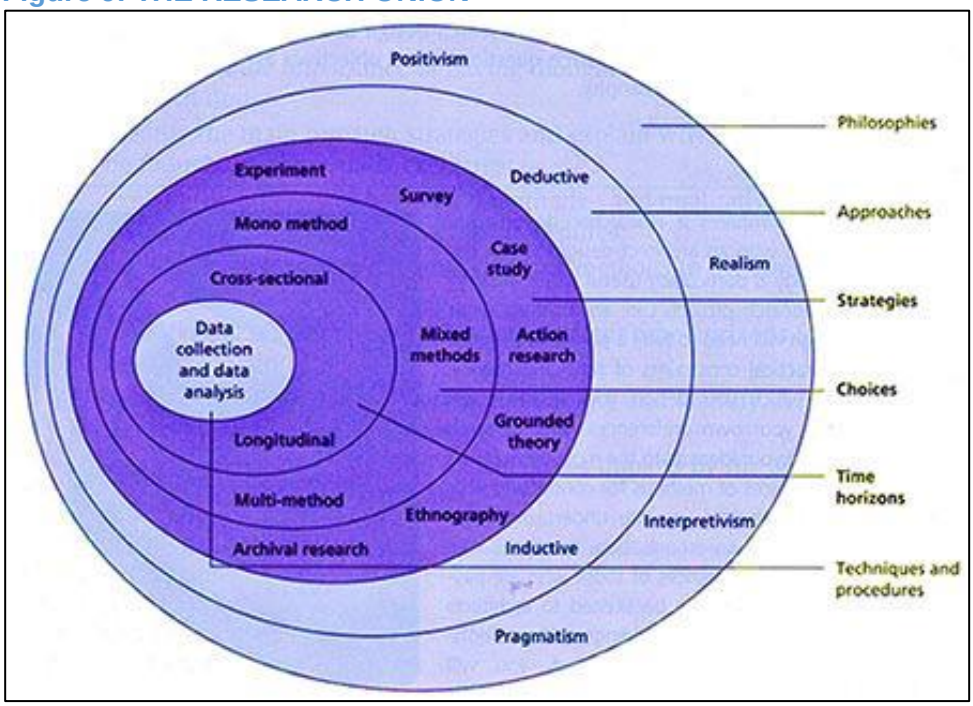
Research Question Three sought to determine the nature of industrial migration, by studying the industrial migration patterns. Akamatsu (1962) and Lin (2012) presented frameworks for industrial migration. Akamatsu's (1962) seven stage framework was selected as the framework to answer Research Question Three.

4. RESEARCH METHODOLOGY

4.1. RESEARCH DESIGN

Saunders and Lewis (2012) have described that the research design should be appropriately selected based on the research questions and objectives. Saunders, Lewis and Thornhill (2009) introduced the research onion, a framework for designing the research process. This research design was designed using the principles of the research onion.

Figure 9: THE RESEARCH ONION



Source: Saunders, Lewis and Thornhill (2009)

The principle which was used in the research design was the pragmatism philosophy. Saunders and Lewis (2012) have defined pragmatism as “a research philosophy which argues that the most important determinant of the research philosophy adopted are the research question(s) and objectives.” (p.107). This approach has been selected as it would be necessary to use a mixed-methods design to answer the research questions. Saunders and Lewis (2012) have also stated that “mixing methods, both qualitative and quantitative, are possible, and may be highly appropriate in one study.” (p. 107).

The research approach which was selected for this research study was the induction approach. Saunders and Lewis (2012) have provided a description of the induction approach.

> With inductive reasoning, we begin with specific observations and measures, begin to observe patterns and repeated patterns and repeated occurrences of phenomena and formulate some speculative hypotheses which can be investigated. All this is with a view to developing some general conclusions or theories. (p. 109)

A mixed-methods research strategy was used in this research study. The two strategies which were selected are descriptive studies and explanatory studies. Saunders and Lewis (2012) have indicated that "different strategies may work at different stages in the study, depending, of course, on their suitability to answer your research questions and objectives." (p.121).

The first research strategy, namely descriptive studies, was selected as quantitative secondary data was required for this research study. Secondary data was collected and analysed to answer Research Question Two in this study. Saunders and Lewis (2012) stated that "describing a phenomenon is much easier than explaining why it occurred", and further stated that a descriptive study precedes explanatory studies.

The second research strategy, namely explanatory studies, was used after the descriptive study was completed. The choice to use explanatory studies was made as the objective of this research study sought to determine whether a relationship existed between two variables, specifically industrial migration and national prosperity. Saunders and Lewis (2012) have stated that "Explanatory studies take descriptive studies an stage further by looking for causal relationships between key variables." (p.113). The method used in the second research strategy was qualitative, and included using historical analysis, case studies and observation.

The final aspect of the research design used in this research study was the longitudinal time horizon. To determine whether a relationship existed between the

two variables, and to understand the nature of the relationship, a long-term data set was required. This eliminated the influence of once-off economic events and subject error. Subject error has been described by Saunders and Lewis (2012) as an error resulting from the timing of the data capturing.

4.2. UNIVERSE

The universe comprised of all nations which are officially recognised as a country. The World Bank list of countries has been used as the point of reference, to ensure that countries included in this study were officially recognised. The World Bank country list was used for two dominant reasons; first the World Bank collects, maintains and reports on data from all nations and second, the World Bank was one of the data sources used in this study. The universe comprised of 249 nations.

4.3. POPULATION

The population has been defined by Saunders and Lewis (2012) as the entire set of group members. The population for this study was defined as the group of nations, which had data available for the Economic Complexity Index. The population comprised of 138 nations.

4.4. UNIT OF ANALYSIS

The data collected for this study was quantitative in nature and obtained from two sources. The first source was the Atlas of Economic Complexity, and the data obtained was secondary data in the form of a calculated index. The second source was the World Bank, and the data obtained was secondary data in the form of GDP per capita. The unit of analysis for GDP per capita data was currency stated in US Dollars.

4.5. SAMPLING METHOD

The sample was selected for the explanatory study, after the descriptive study was completed, using quota sampling, which is a non-probability sampling technique. Saunders and Lewis (2012) defined quota sampling as “a type of non-probability sampling that ensures the sample selected represents certain characteristics in the population that the researcher has chosen.” (p.137).

The requisite characteristics for the sample were defined as the countries which experienced the highest level of migration, based on the change in the Economic Complexity Index. The change in Economic Complexity Index was calculated as the difference between the final and initial year of data availability, which was 2013 and 1964 respectively.

4.6. SAMPLE SIZE

The sample was selected using the quota sampling method, after the data transformation was complete. The data transformation has been descried in Chapter 5. The characteristic required in the sample was specified as the nations who experienced the highest level of industrial migration. For this reason the sample was extracted only from Decile 10, which is a group of seven countries who experienced the highest level of industrial migration.

4.7. DATA COLLECTION

The data collected was quantitative and secondary in nature. The data was obtained from online research resources.

The Observatory of Economic Complexity produces an Economic Complexity Index for each nation in the population on an annual basis since 1964 to the current year. The Observatory of Economic Complexity is an academic research resource, led by Ricardo Hausmann, Professor of the Practice of Economic Development at the Harvard Kennedy School and CID Director, and Cesar A. Hidalgo, Career Development Professor at MIT. The data is available for public download to use in academic research.

The GDP per capita data is calculated and published by the World Bank. The World Bank is an institution which assists nations in achieving economic and social goals, and promotes knowledge sharing. An open data website allows public downloads of data, so that it can be used to develop solutions to address the development challenges facing nations.

5. RESULTS

5.1. DESCRIPTION OF THE DATA OBTAINED

The data used in this study was quantitative in nature and obtained from two sources, first the Economic Complexity Index was obtained from the Observatory of Economic Complexity and the second, GDP per capita was obtained from The World Bank. A complete set of available data for all available nations and years were obtained from both sources and have been described in detail in their respective sub-sections.

It was necessary that the data from both sources were aligned and converged into one set of data for the nations included in this study. A process of data transformation was completed to produce a single set of meaningful data as required to answer the research questions presented in Chapter 3. The data transformation process has been explained under a separate topic in this section.

Supporting data used in this research study, namely total population size, GINI index, exports of goods and services (current US$), imports of goods and services (current US$), High-technology exports (% of manufactured exports), unemployment, total (% of total labor force), were obtained from the World Bank. Human Development Index data was obtained from the United Nations Development Programme.

5.1.1. ECONOMIC COMPLEXITY INDEX

The Economic Complexity Index was available for 138 nations for a 50 year period commencing from 1964 to 2013. This secondary data was calculated by the Observatory of Economic Complexity based on the principles of product diversity and product ubiquity, as described by Hausmann and Hidalgo (2011).

> Some products, like medical imaging devices or jet engines, embed large amounts of knowledge and are the results of very large networks of people and organizations. These products cannot be made in simpler economies that are missing parts of this network's capability set. Economic complexity,

> therefore, is expressed in the composition of a country's productive output and reflects the structures that emerge to hold and combine knowledge.
> (p. 18)

The primary data used in the calculation of the Economic Complexity Index is based on actual trade data, at the product level. The unavailability of primary data resulted in missing secondary data for specific nations and years.

5.1.2. GDP PER CAPITA

GDP per capita data was obtained from the World Bank database, for 249 nations for the period commencing from 1960 to 2014. GDP per capita data is secondary data, calculated by the World Bank using two sets of primary data. The primary data used in the calculation is national GDP for a nation and the midyear population of that nation. GDP is divided by midyear population to produce an average income per person. As a result of the unavailability of primary data for specific years and nations, some secondary data was not available.

5.2. DATA TRANSFORMATIONS

The data collected for this study was obtained from two separate and independent data sources, which resulted in partial availability of data for specific nations and years. This study sought to determine whether a relationship exists between industrial migration and national prosperity, which would be investigated using research questions. To answer these research questions, a series of data transformations were required to generate a single converged set of meaningful data.

5.2.1. ECONOMIC COMPLEXITY INDEX

The first stage of the data transformation focused on the Economic Complexity Index data, obtained annually for 138 countries for the period 1964 to 2013. To calculate industrial migration, data points were required for two specific years, which were 1964 and 2013. The availability of data for 1964 was limited to 99 nations and 122 nations for 2013. Consequently only nations which had a data point available for

both 1964 and 2013 were included in the observations for the Economic Complexity Index, which resulted in 96 observations.

The second stage of the data transformation was performed for the 96 nations obtained in the first stage of data transformation. Industrial migration has been calculated as the difference between the start and end Economic Complexity Index data points, for the years 1964 and 2013 respectively. The calculation for the difference required a minuend and subtrahend. A minuend is the value from which another value is subtracted and a subtrahend is a value which is subtracted from another value. For that reason the difference was calculated using the 2013 Economic Complexity Index as the minuend and the 1964 value as the subtrahend, as represented in Equation 3.

Equation 3: EQUATION FOR INDUSTRIAL MIGRATION

$$\text{Industrial Migration} = \text{Economic Complexity Index}_{(C,YR50)} - \text{Economic Complexity Index}_{(C,YR1)}$$

Where C = Country
YR50 = 2013
YR1 = 1964

In the third stage of data transformation, the industrial migration values obtained in stage two were ranked and ordered from largest to smallest value. This stage concluded the data transformation required for the Economic Complexity Index.

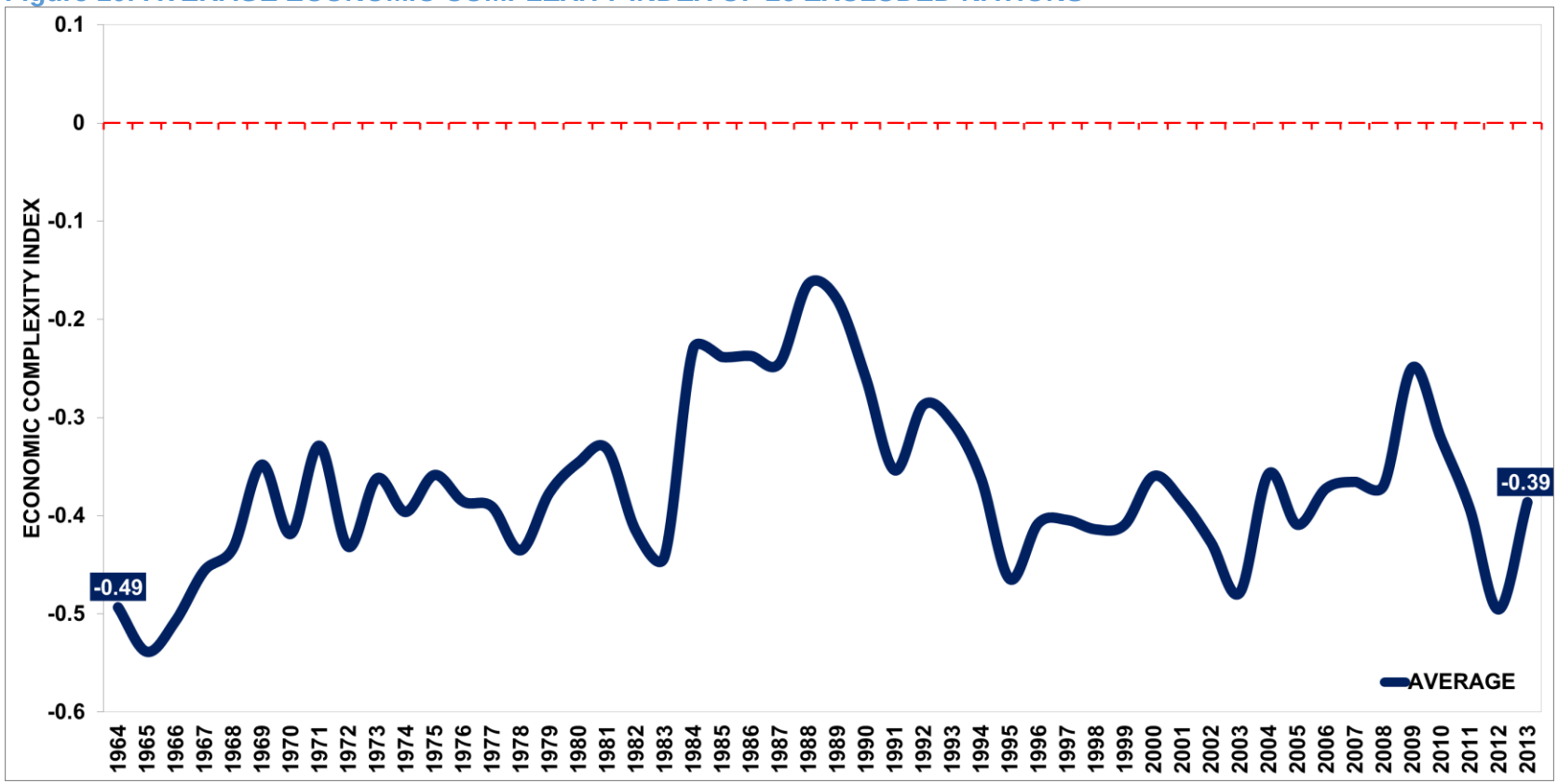
5.2.2. GDP PER CAPITA

The fourth stage of data transformation was performed on the GDP per capita data to align the data obtained from both data sets for the 96 observations obtained in the first stage of data transformation. GDP per capita data was required for each of these nations for 1964 and 2013. It was found that GDP per capita data was only available for 70 of the 96 nations. Consequently the size of the included observations was reduced from 96 nations to 70 nations in this stage.

The average Economic Complexity Index for the 26 disqualified nations is presented in Figure 10. These findings revealed that these nations were slow industrial migrators with an average difference in Economic Complexity Index of 0.11. As a result of these findings, there are no significant known implications of excluding these nations from this study.

This stage concluded the data transformation required for the GDP per capita data.

Figure 10: AVERAGE ECONOMIC COMPLEXITY INDEX OF 26 EXCLUDED NATIONS



5.2.3. CONVERGENCE OF THE DATA

In the fifth stage of data transformation the 70 nations which qualified to be included in the observations for this study were merged into a single data set, which included Economic Complexity Index data and GDP per capita data.

5.2.4. ANALYSIS OF THE CONVERGED DATA

In the sixth, final, stage of data transformation, a statistical distribution of the data was required so that a quota sample could be extracted. A decile, which is a distribution of nine values which distribute the data into 10 equal parts, was applied and resulted in ten deciles which comprised of seven nations each.

Decile 10 represented the top 10% of migrators and Decile 1 represented the lowest 10% of migrators. The quota sample method was selected as the appropriate sampling method, as a common attribute amongst migrating nations was a necessary condition for isolating the sample data, as described in Chapter 4. For that reason Decile 10 was selected as the sample for this study.

The seven nations included in Decile 10 were Thailand, Malaysia, Uganda, Brazil, Singapore, Turkey and the Philippines.

5.3. RESULTS PER RESEARCH QUESTION

5.3.1. RESEARCH QUESTION ONE:

Why does industrial migration matter?

Research Question One sought to establish whether there were any material benefits associated with industrial migration, particularly the impact of industrial migration on national prosperity. To assess this, a series of relationships between indicators of national prosperity and industrial migration have been examined.

The indicators which have been examined in relation to industrial migration were GDP per capita, Human Development Index, Unemployment, GINI Index, Mean years of schooling, High-technology exports (% of manufactured exports). These results are presented from Figure 11 to Figure 16.

For each of the results presented from Figure 11 to Figure 16, a coefficient of determination has been calculated, and the implication of this has been discussed in Chapter 6.

Figure 11: RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND GDP PER CAPITA (2013)

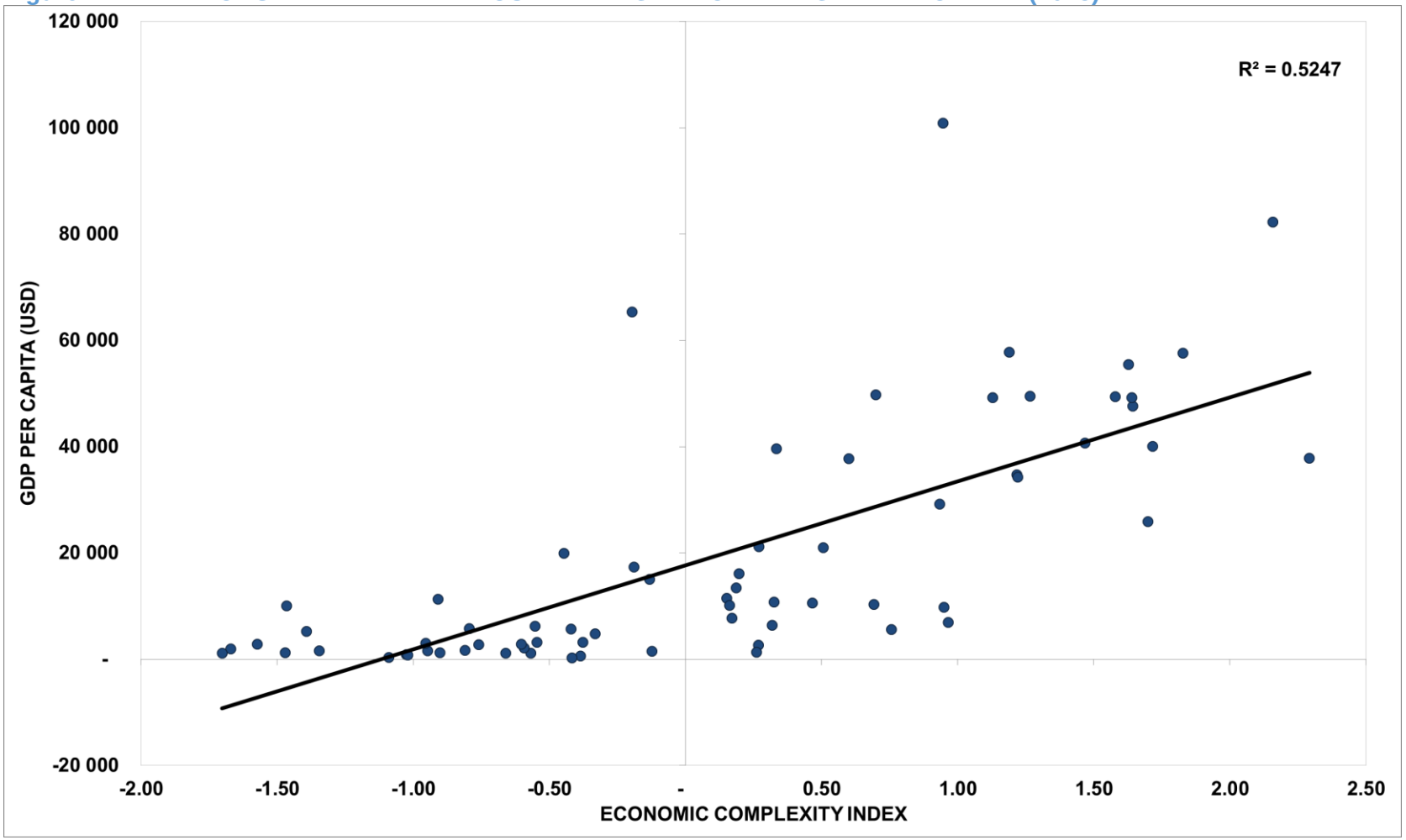


Figure 12: RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND HDI (2013)

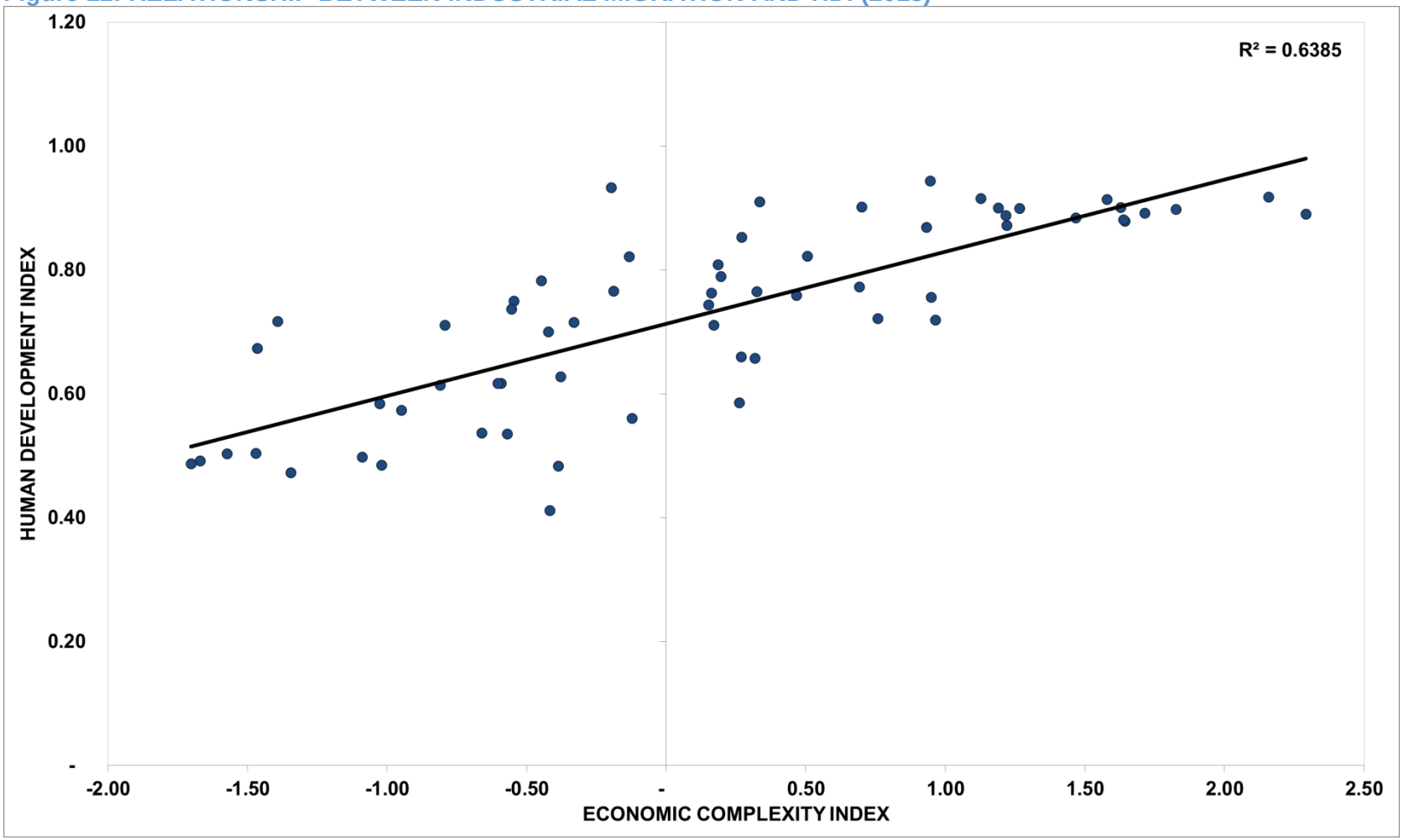


Figure 13: RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND UNEMPLOYMENT (2013)

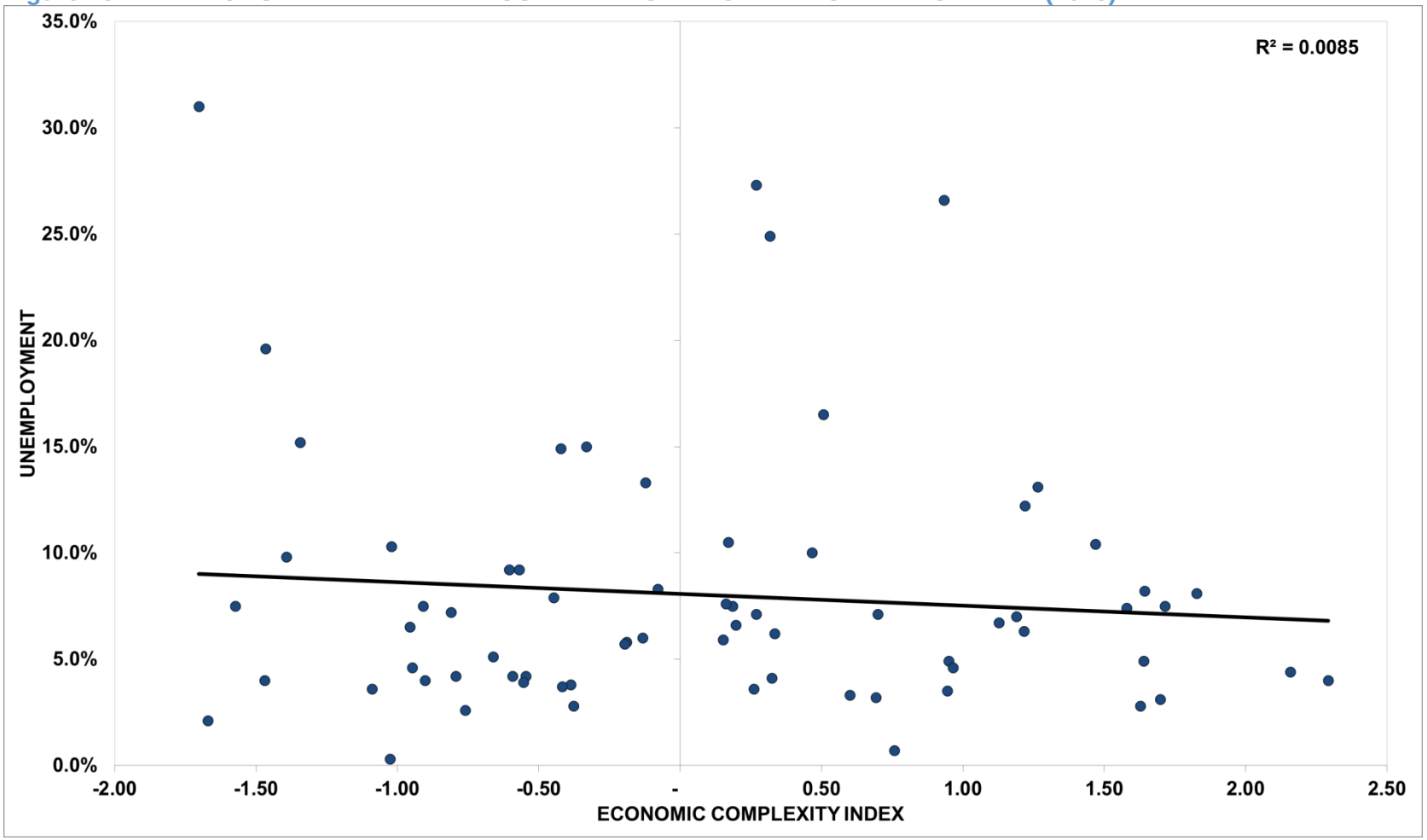


Figure 14: RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND GINI INDEX (2013)

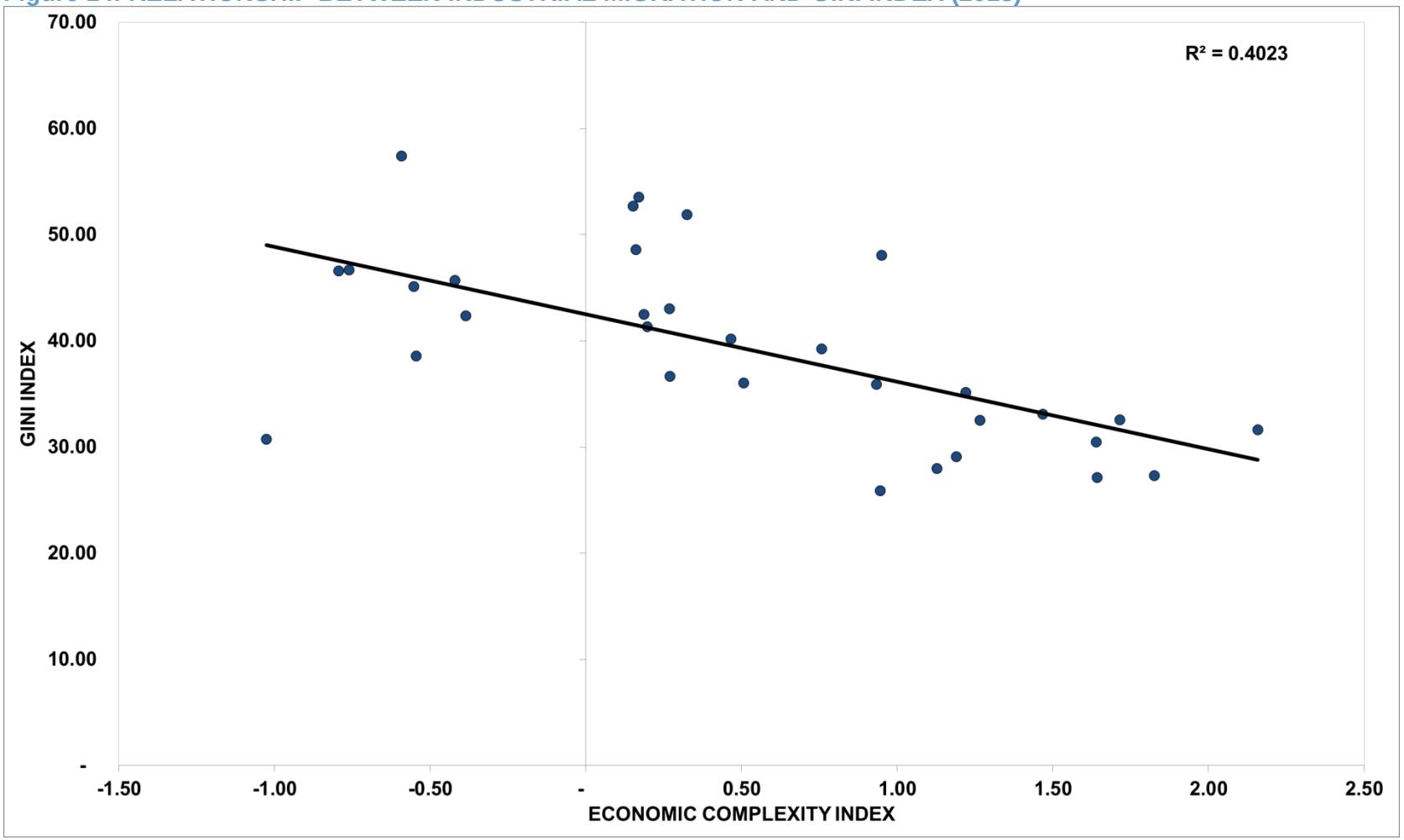


Figure 15: RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND MEAN YEARS OF SCHOOLING (2013)

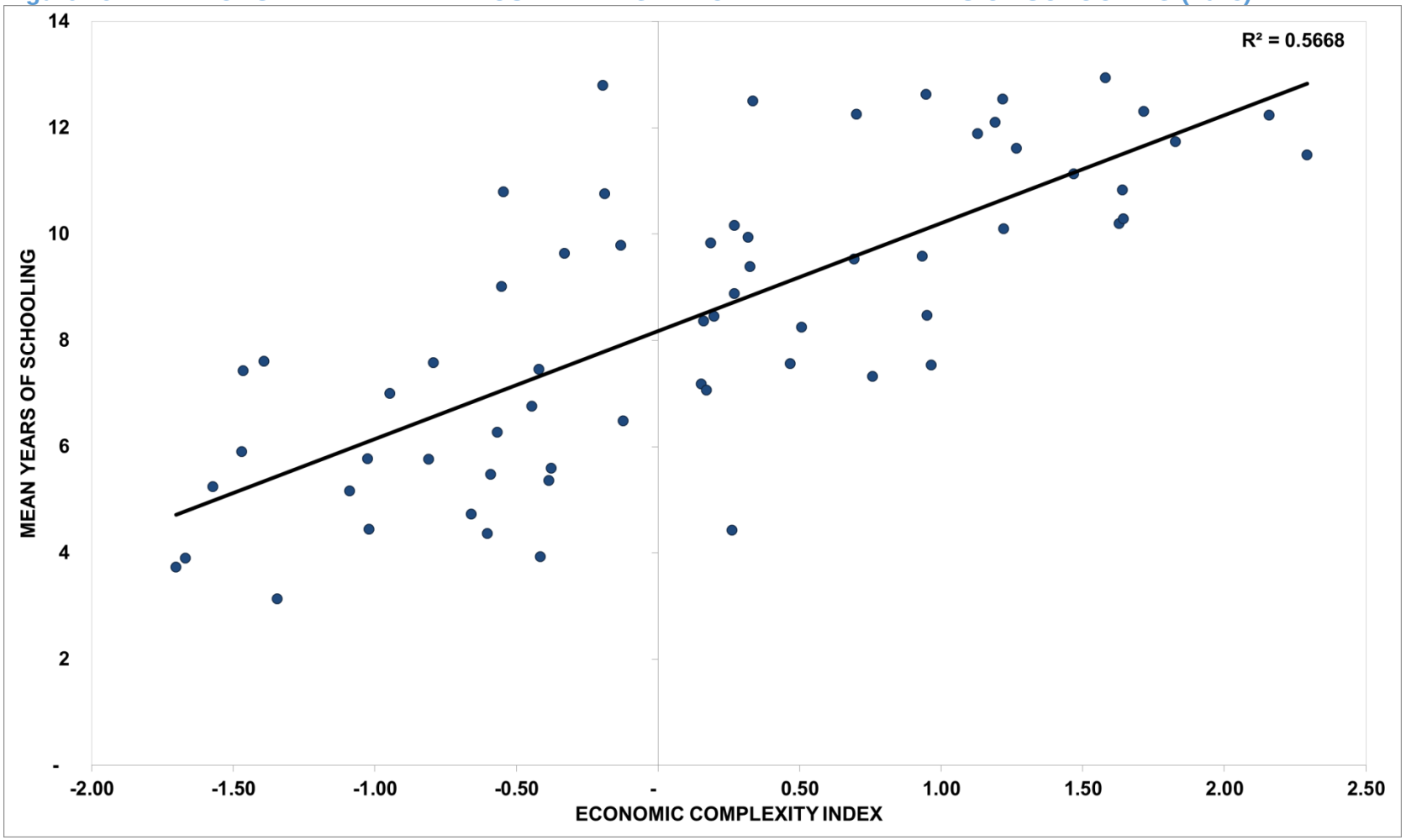
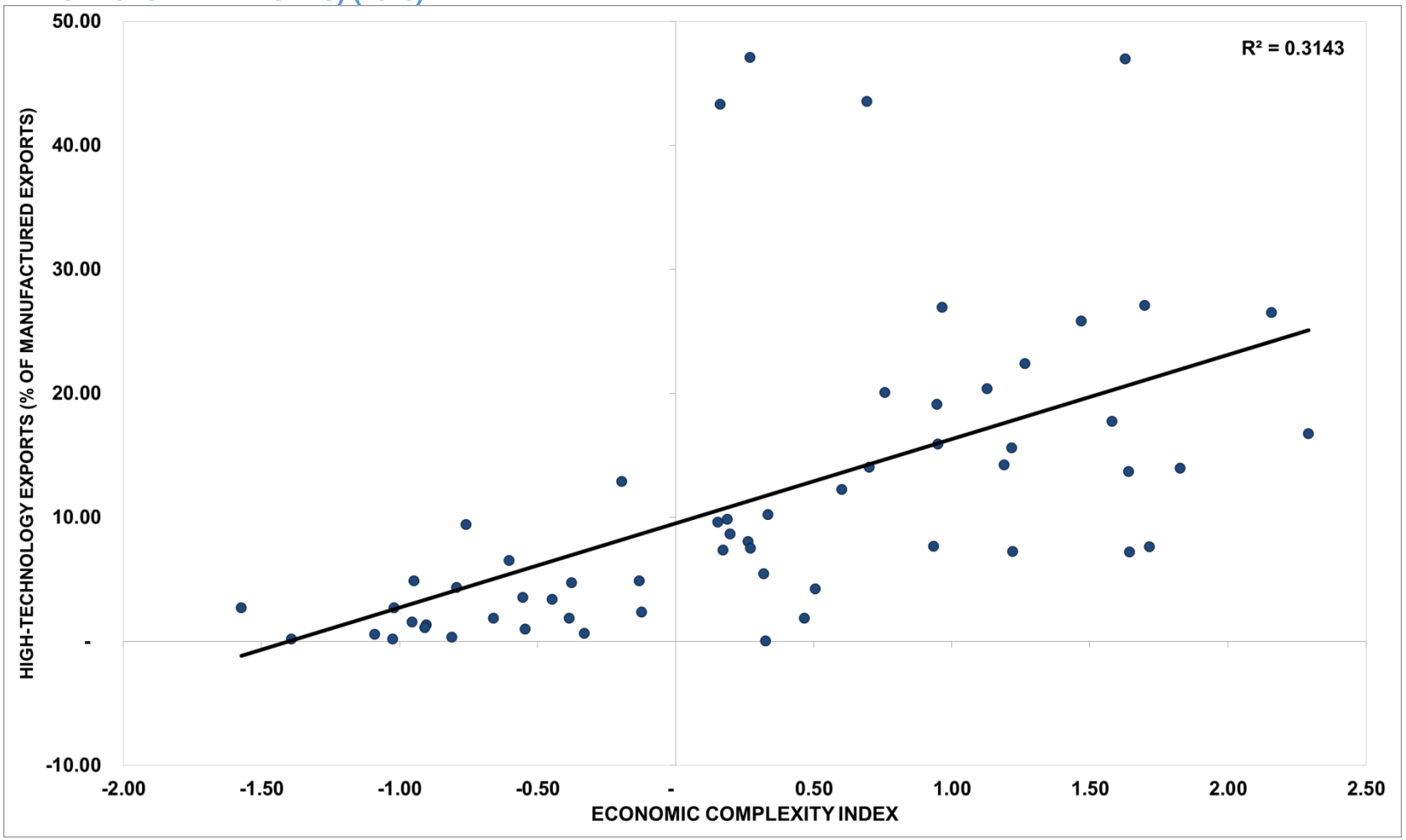


Figure 16: RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND HIGH-TECHNOLOGY EXPORTS (% OF MANUFACTURED EXPORTS) (2013)

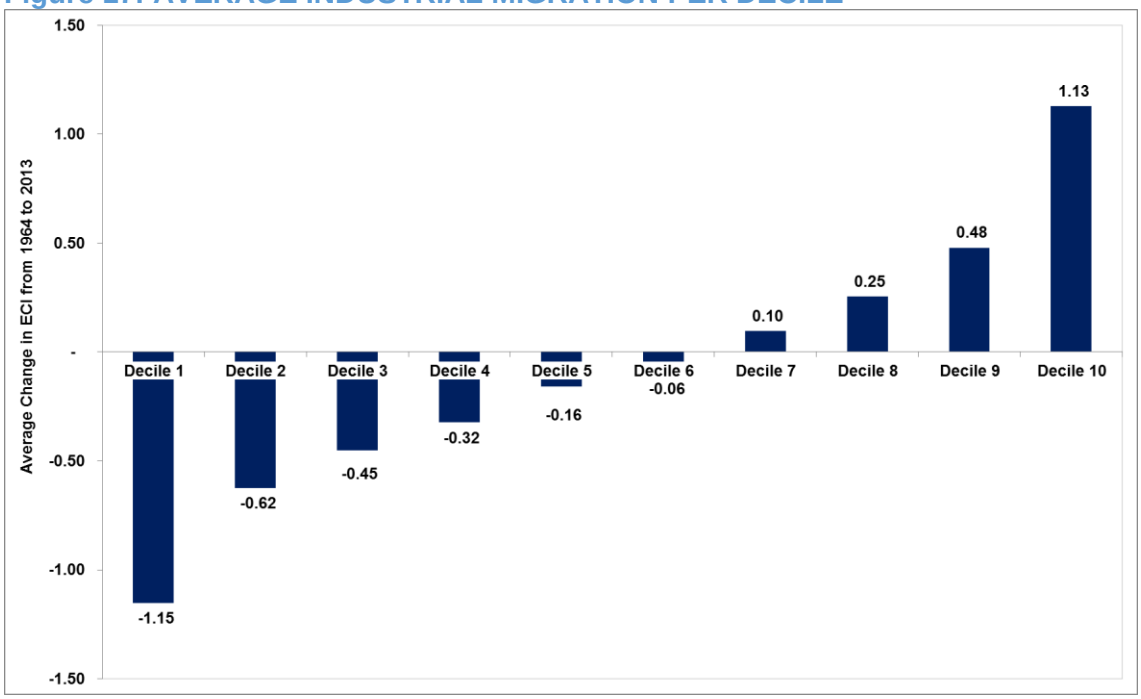


5.3.2. RESEARCH QUESTION TWO

What is the extent of industrial migration?

Research Question Two was selected to determine the extent of industrial migration in terms of the speed at which migration occurs and also to determine whether specific characteristics were associated with industrial migration. The extent of migration per decile is presented in Figure 17, and is an indication that nations have migrated at different speeds and in different directions over the 50 year period. Positive values signify an improvement in industrial migration has progressed whilst negative values signify that industrial migration has deteriorated.

Figure 17: AVERAGE INDUSTRIAL MIGRATION PER DECILE



To answer Research Question Two, a quota sample was selected, based on the extent of migration. The sample selected only included nations from the tenth decile as these nations represented the nations who achieved the highest level of industrial migration.

The migratory patterns of nations included in Decile 10 were analysed in terms of the speed of industrial migration and common attributes of nations in this decile. The attributes analysed included three categories, first, demographic profile (population size and neighbourhood), second, nature of economic activity (key economic activity, resource dependence and income group), and third, trade orientation (key products traded and export orientation). These results are summarised from Table 2 to Table 4.

Table 2: DEMOGRAPHIC PROFILE OF DECILE 10

Demographic Profile				
Nation	**Year**	**Population**	**Location**	**Region**
Thailand	1964	30 881 332	Asia	East Asia & Pacific
	2013	67 451 422		
Malaysia	1964	9 287 442	Asia	East Asia & Pacific
	2013	29 465 372		
Uganda	1964	7 746 181	Africa	Sub-Saharan Africa
	2013	36 573 387		
Brazil	1964	81 751 802	South America	Latin America & Caribbean
	2013	204 259 377		
Singapore	1964	1 841 600	Asia	East Asia & Pacific
	2013	5 399 200		
Turkey	1964	30 292 969	Eurasia	Europe & Central Asia
	2013	75 010 202		
Philippines	1964	29 962 877	Asia	East Asia & Pacific
	2013	97 571 676		

The demographic profile of Decile 10, as detailed in Table 2, is varied by population, ranging from small to large populations. The location is concentrated in developing neighbourhoods, with Asian nations dominating the highest migrating decile.

Table 3: NATURE OF ECONOMIC ACTIVITY OF DECILE 10

Nature of Economic Activity					
Nation	**Year**	**Economic Activity**	**GDP per Capita**	**Income Group**	**Resource Dependence**
Thailand	1964	Agrarian	$ 126	Low income	High
	2013	Manufacturing	$ 5 741	Upper middle income	Low
Malaysia	1964	Agrarian	$ 312	Low income	High
	2013	Manufacturing	$ 10 628	Upper middle income	Low
Uganda	1964	Agrarian	$ 76	Low income	High
	2013	Agrarian	$ 675	Low income	Low
Brazil	1964	Agrarian	$ 259	Low income	High
	2013	Agrarian	$ 11 711	Upper middle income	High
Singapore	1964	Agrarian	$ 485	Low income	High
	2013	Manufacturing	$ 55 980	High income: nonOECD	High
Turkey	1964	Agrarian	$ 369	Low income	High
	2013	Manufacturing	$ 10 975	Upper middle income	Low
Philippines	1964	Agrarian	$ 176	Low income	High
	2013	Manufacturing	$ 2 788	Lower middle income	Low

Table 3 revealed that there has been a shift in economic activity as presented in five of the seven nations. GDP per capita and income group categorisation changed, these changes have been addressed in Chapter 6.

The trade orientation of Decile 10 nations have been summarised in Table 4 and show the change in the largest export and import products, along with the total value of all exports and imports, including goods and services. To determine whether the nation has adopted an export-promotion or import-substitution strategy, the trade balance and trade orientation results have also been summarised in Table 4.

Table 4: TRADE ORIENTATION OF DECILE 10

Trade Orientation							
Nation	**Year**	**Export Value (Goods & Services)**	**Primary Export Product**	**Import Value (Goods & Services)**	**Primary Import Product**	**Trade Balance**	**Trade Orientation**
Thailand	1964	$ 656 471 224	Rice	$ 712 538 529	Machinery	**$ -56 067 305**	**Import**
	2013	$ 284 889 718 654	Machinery	$ 272 165 725 161	Machinery	$ 12 723 993 494	Export
Malaysia	1964	$ 1 184 282 920	Natural Rubber	$ 1 136 468 537	Machinery	$ 47 814 383	Export
	2013	$ 255 787 176 051	Machinery	$ 226 736 190 106	Machinery	$ 29 050 985 945	Export
Uganda	1964	$ 176 115 304	Coffee	$ 136 049 266	Machinery	$ 40 066 038	Export
	2013	$ 4 999 077 325	Vegetable Products	$ 7 533 623 818	Mineral Products	**$ -2 534 546 493**	**Import**
Brazil	1964	$ 1 354 466 101	Coffee	$ 1 204 326 313	Machinery	$ 150 139 788	Export
	2013	$ 287 520 114 834	Mineral Products	$ 343 413 907 537	Machinery	**$ -55 893 792 703**	**Import**
Singapore	1964	$ 1 091 623 601	Natural Rubber	$ 1 188 741 743	Natural Rubber	**$ -97 118 142**	**Import**
	2013	$ 578 961 400 144	Machinery	$ 508 781 587 149	Machinery	$ 70 179 812 994	Export
Turkey	1964	$ 500 000 000	Raw Cotton and Nuts	$ 611 111 111	Machinery	**$ -111 111 111**	**Import**
	2013	$ 211 044 675 386	Textiles	$ 264 910 643 082	Machinery	**$ -53 865 967 696**	**Import**
Philippines	1964	$ 958 592 555	Fruit	$ 974 734 257	Machinery	**$ -16 141 702**	**Import**
	2013	$ 75 933 976 771	Machinery	$ 86 999 276 147	Machinery	**$ -11 065 299 376**	**Import**

5.3.3. RESEARCH QUESTION 3:

Do nations which migrate follow a path or framework?

Research Question Three sought to determine the nature of industrial migration, by studying the industrial migration patterns. Akamatsu (1962) and Lin (2012) presented frameworks for industrial migration. Akamatsu's (1962) seven stage framework was selected as the framework to answer Research Question Three.

The long-run industrial migration paths are presented in Figure 18 for all deciles and Figure 19 for Decile 10 nations. The long-run industrial migration patterns were found to be different across the ten deciles, as demonstrated in Figure 18. The long-run industrial migration for the quota sample, namely Decile 10, was studied to answer Research Question Three.

The nature of the relationship between industrial migration and national prosperity has been explored with Research Question Three. To explore this relationship for each of the seven nations individually, the interaction between these two variables analysed over the 50 year period. The results are presented from Figure 20 to Figure 27.

Figure 18: LONG-RUN INDUSTRIAL MIGRATION PATTERNS FOR EACH DECILE (1964-2013)

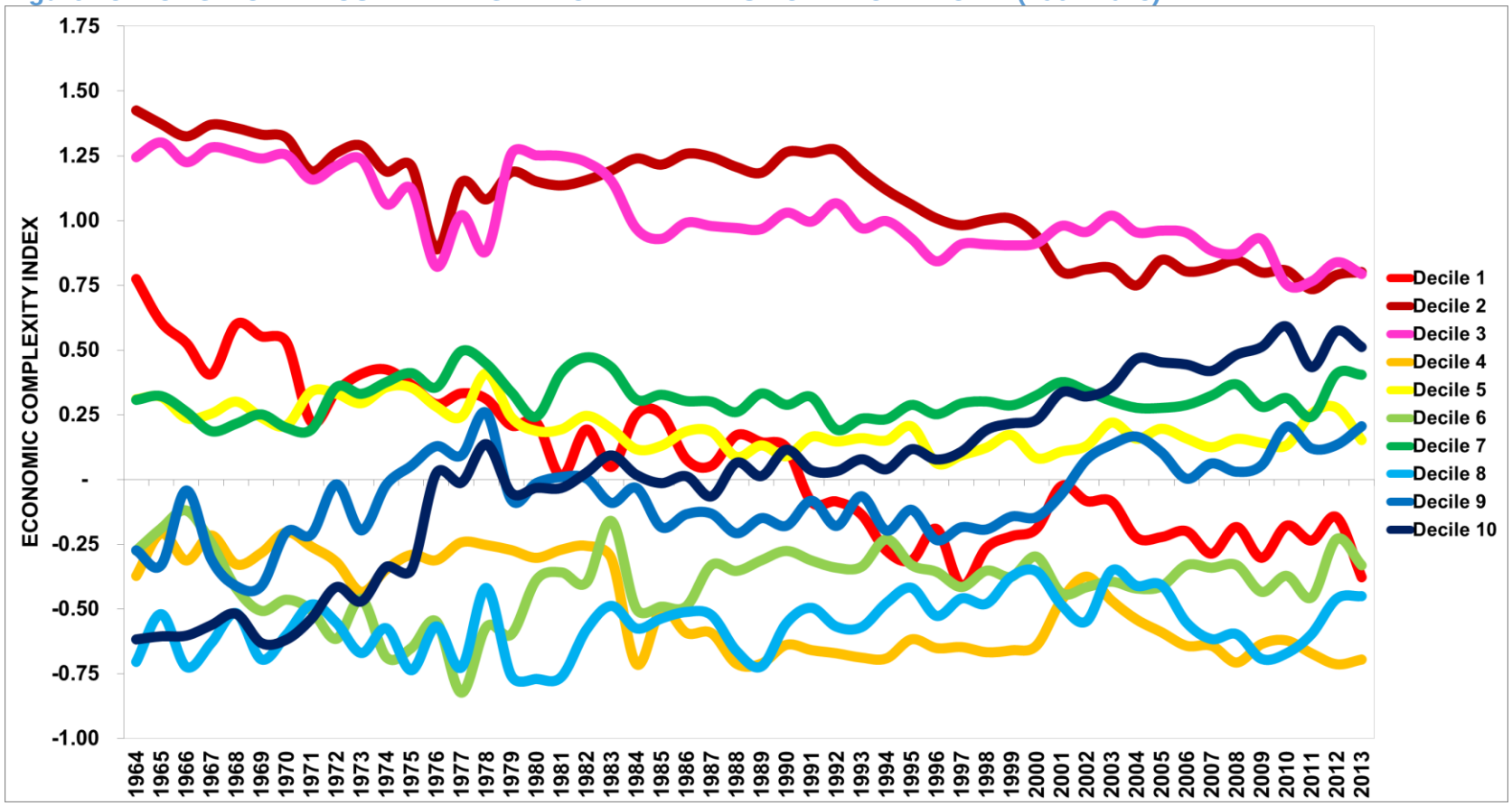


Figure 19: LONG-RUN INDUSTRIAL MIGRATION PATTERNS FOR DECILE 10 (1964-2013)

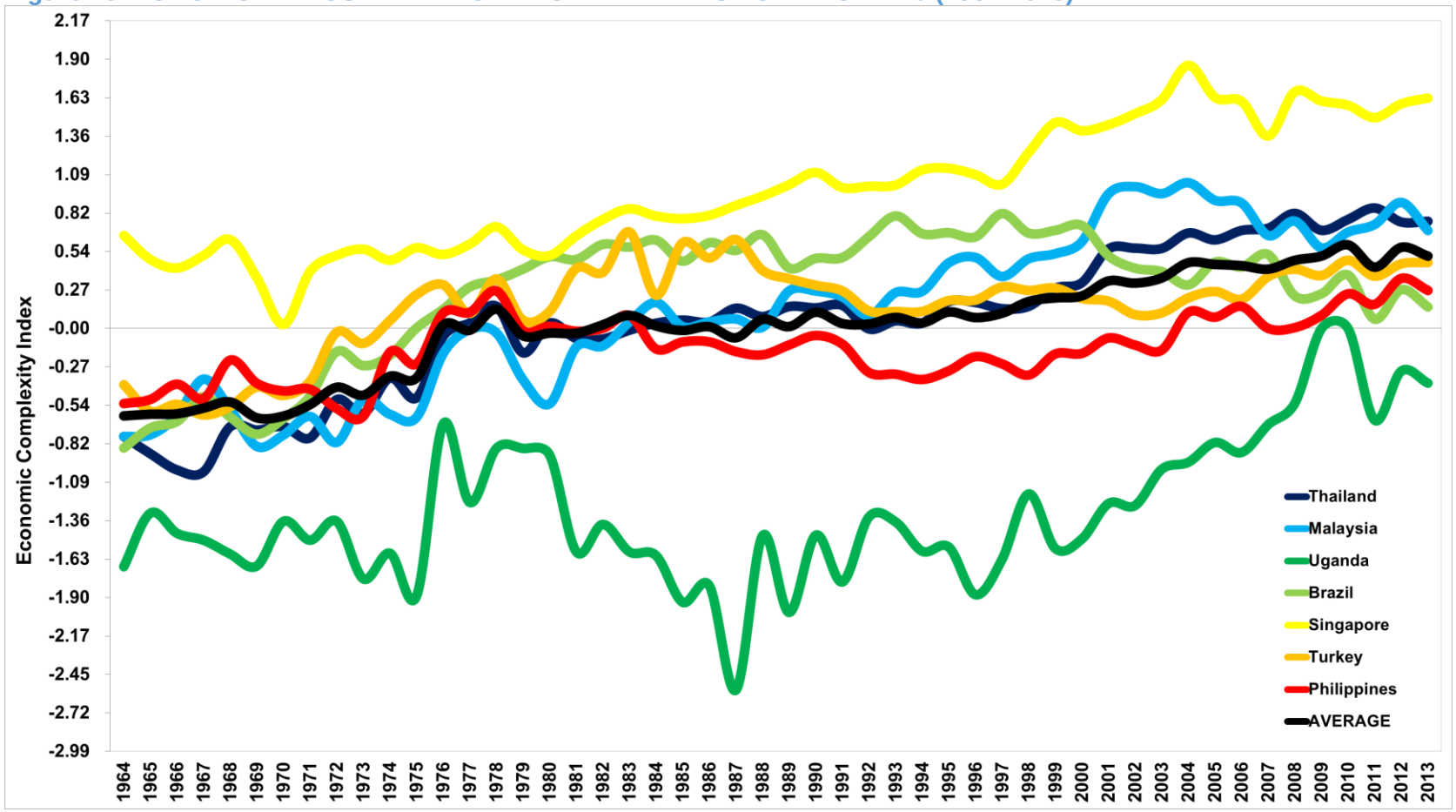


Figure 20: LONG-RUN RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND NATIONAL PROSPERITY FOR DECILE 10 (1964-2013)

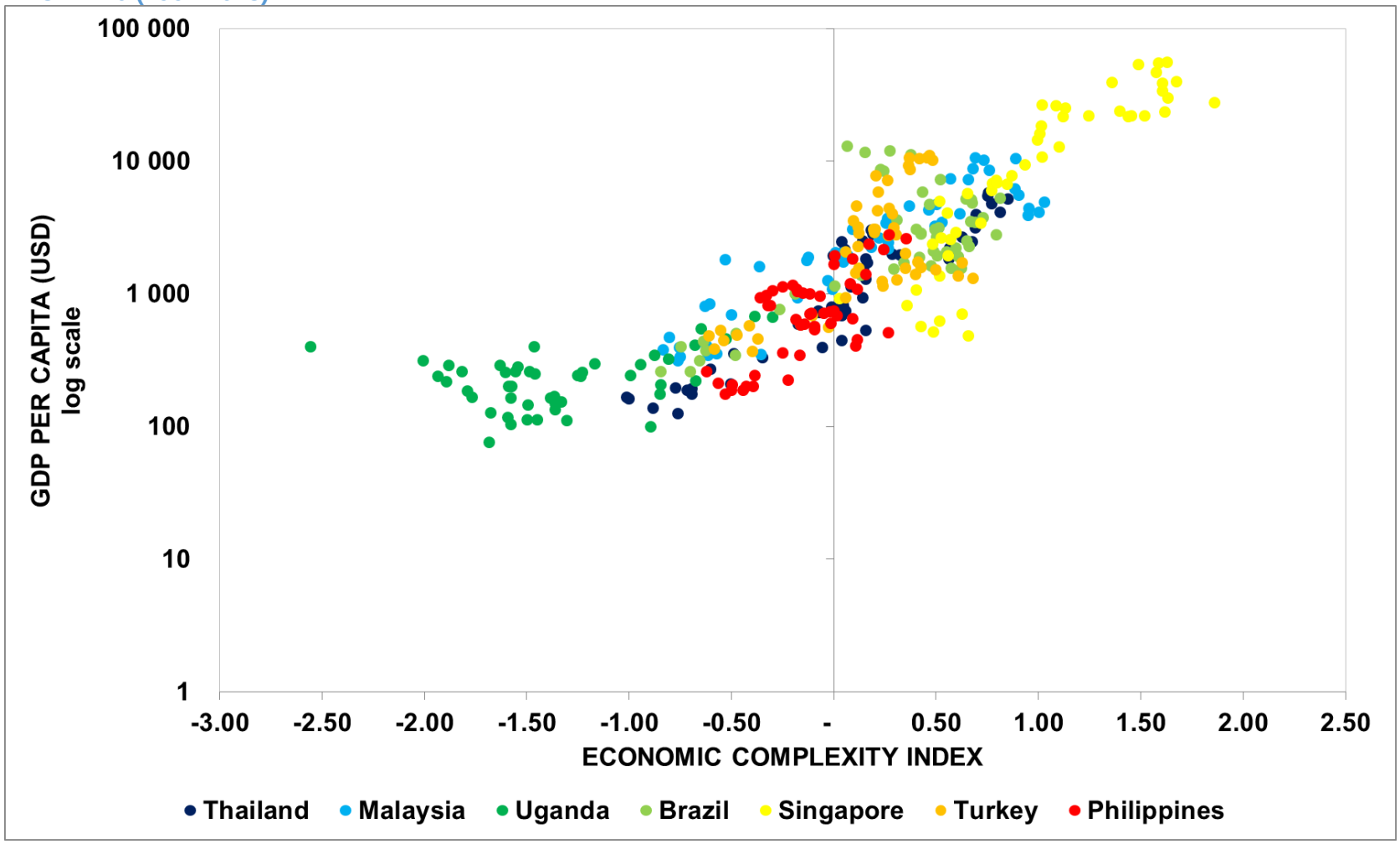


Figure 21: LONG-RUN RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND NATIONAL PROSPERITY FOR THAILAND (1964-2013)

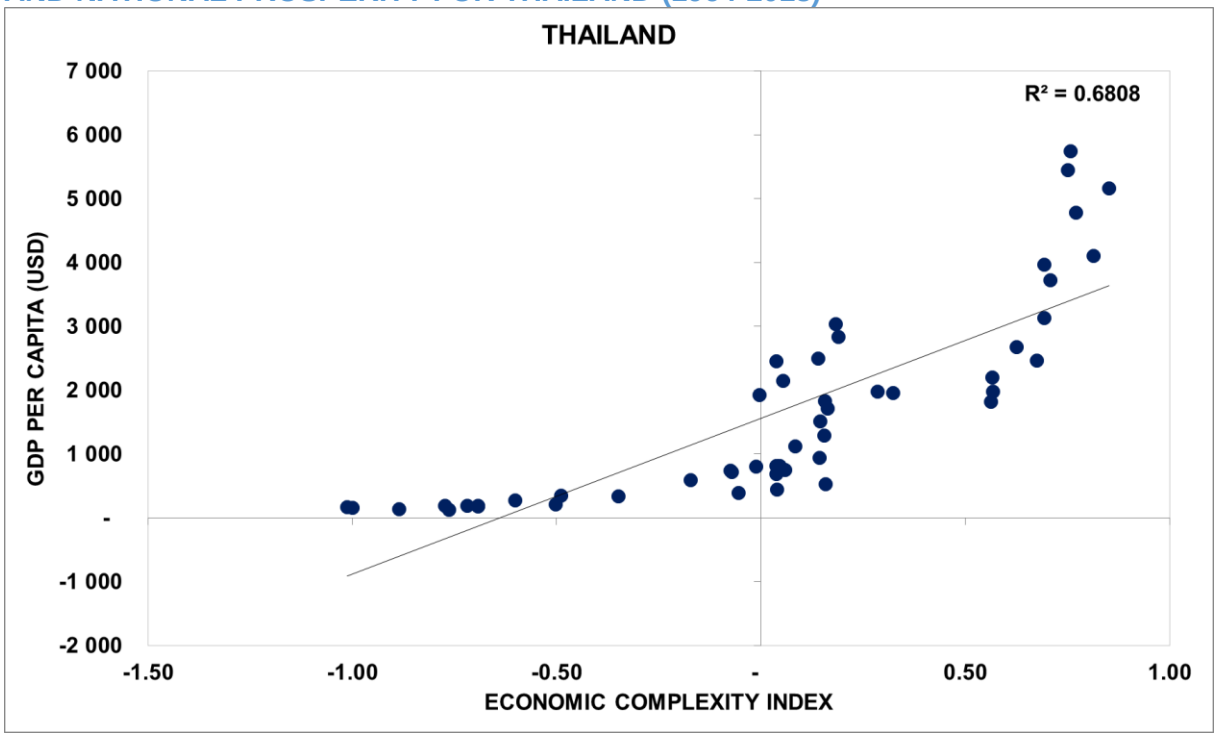


Figure 22: LONG-RUN RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND NATIONAL PROSPERITY FOR MALAYSIA (1964-2013)

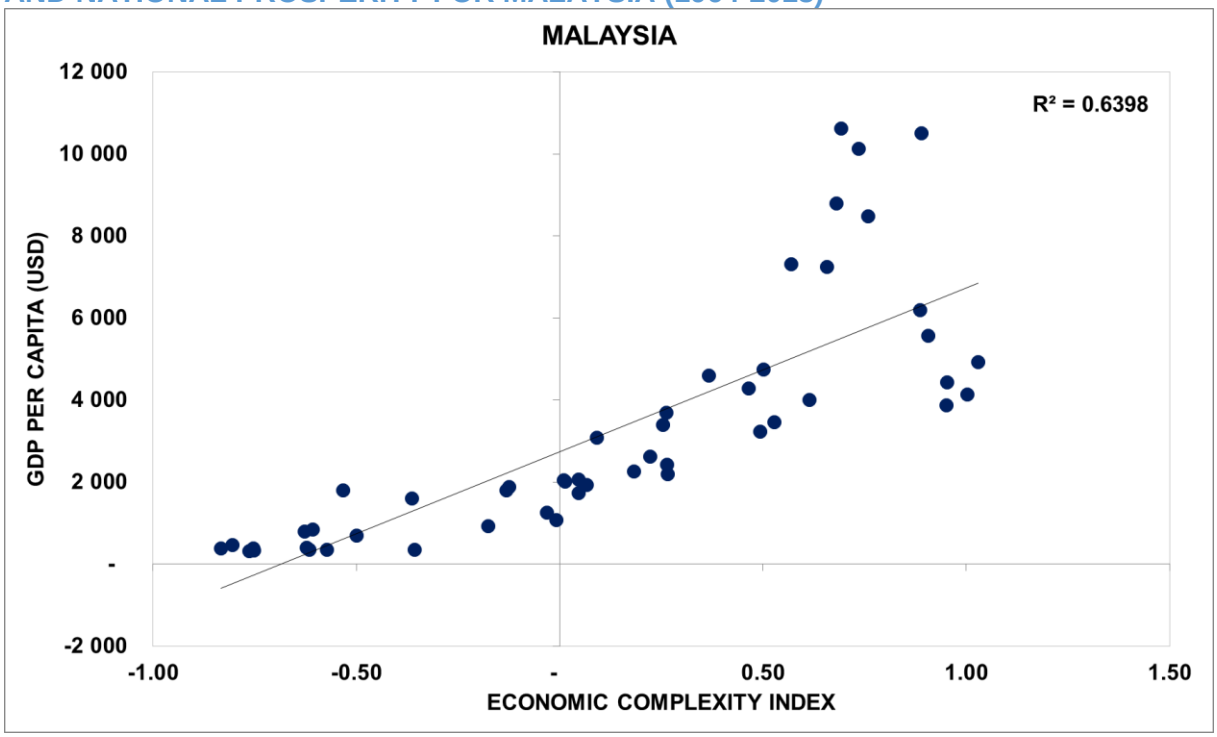


Figure 23: LONG-RUN RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND NATIONAL PROSPERITY FOR UGANDA (1964-2013)

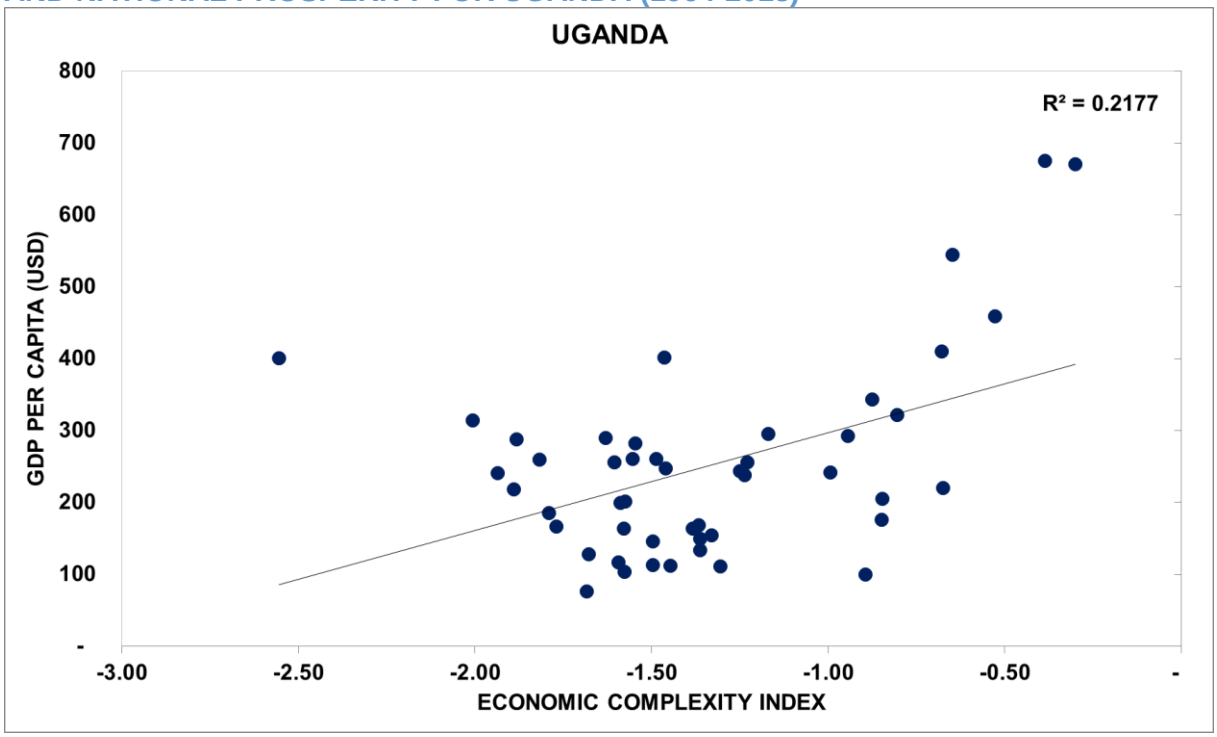


Figure 24: LONG-RUN RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND NATIONAL PROSPERITY FOR BRAZIL (1964-2013)

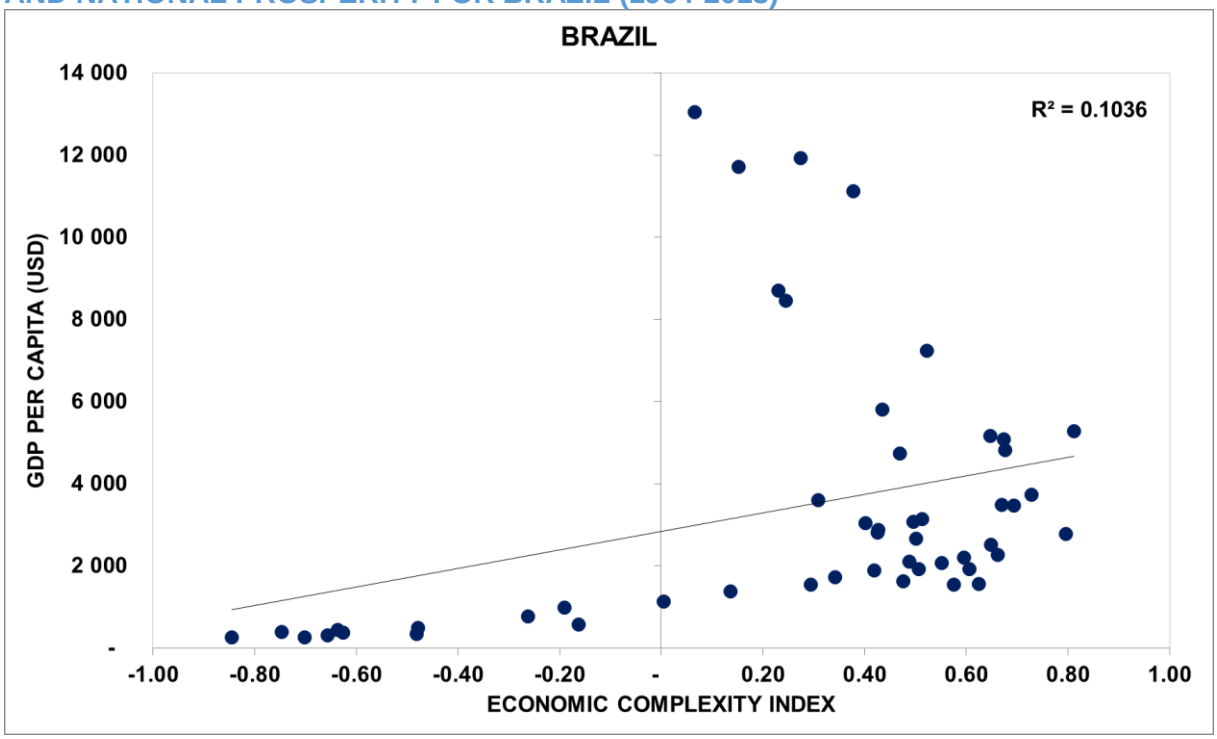


Figure 25: LONG-RUN RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND NATIONAL PROSPERITY FOR SINGAPORE (1964-2013)

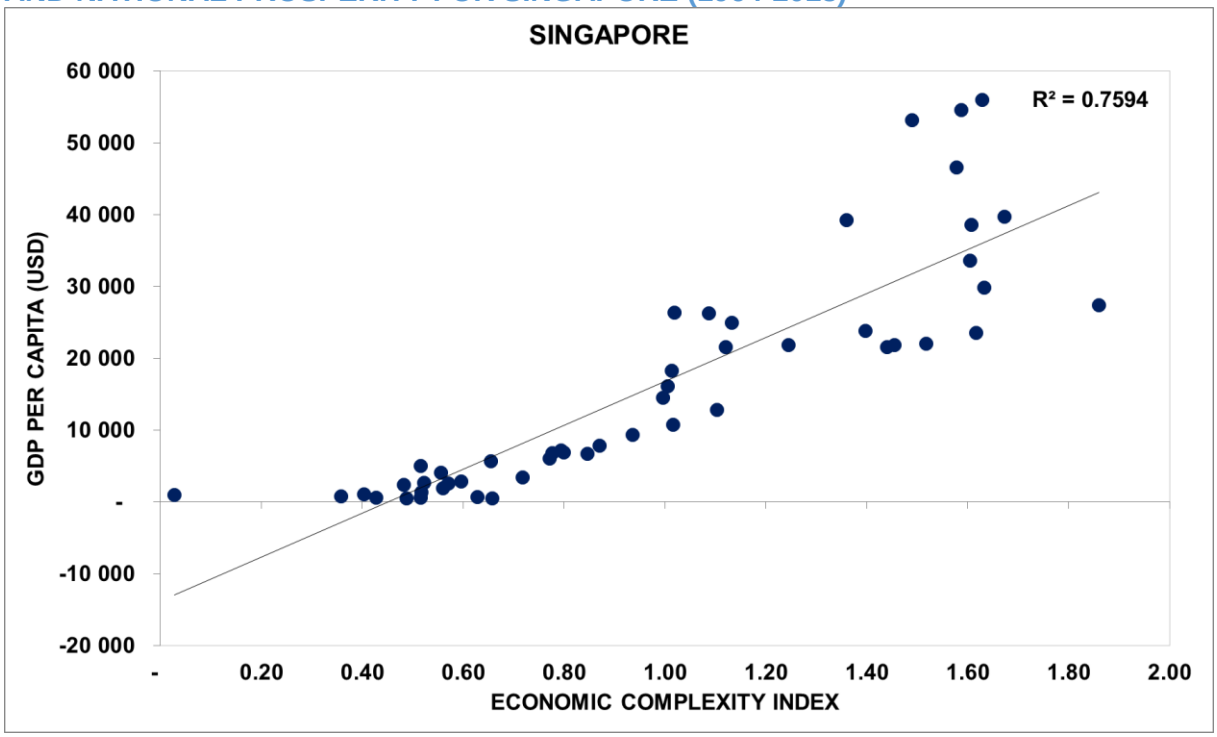


Figure 26: LONG-RUN RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND NATIONAL PROSPERITY FOR TURKEY (1964-2013)

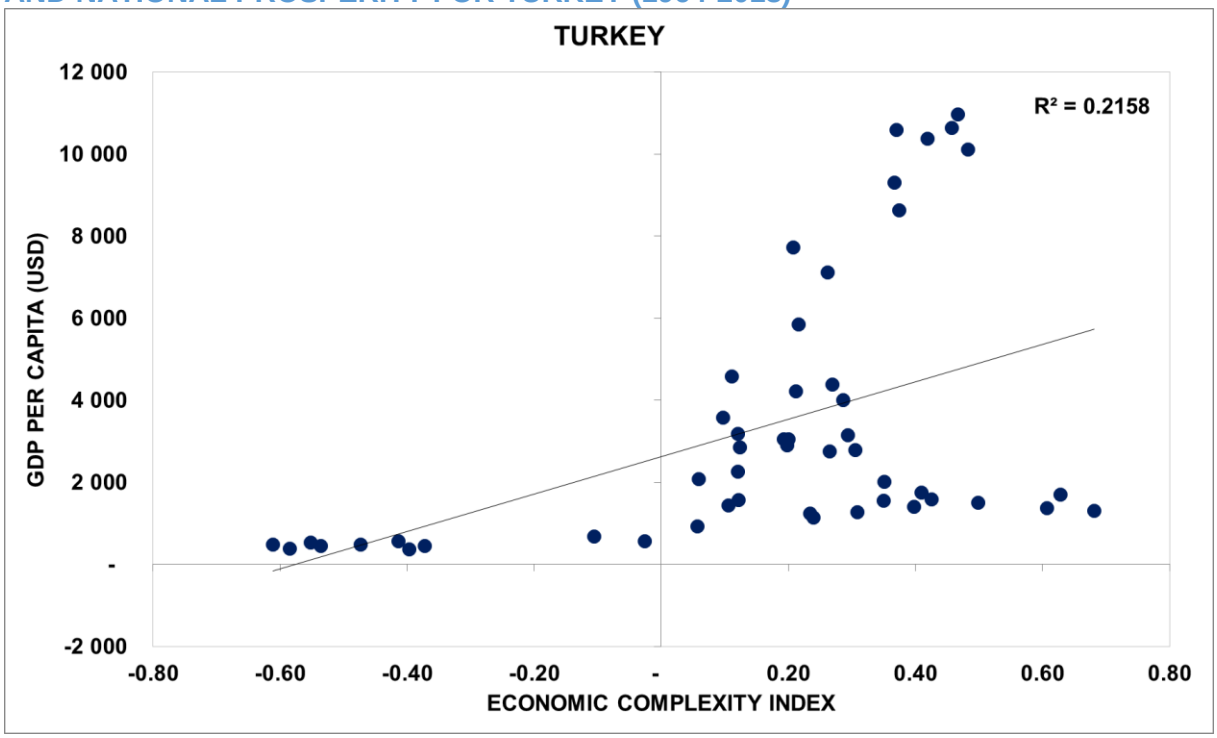
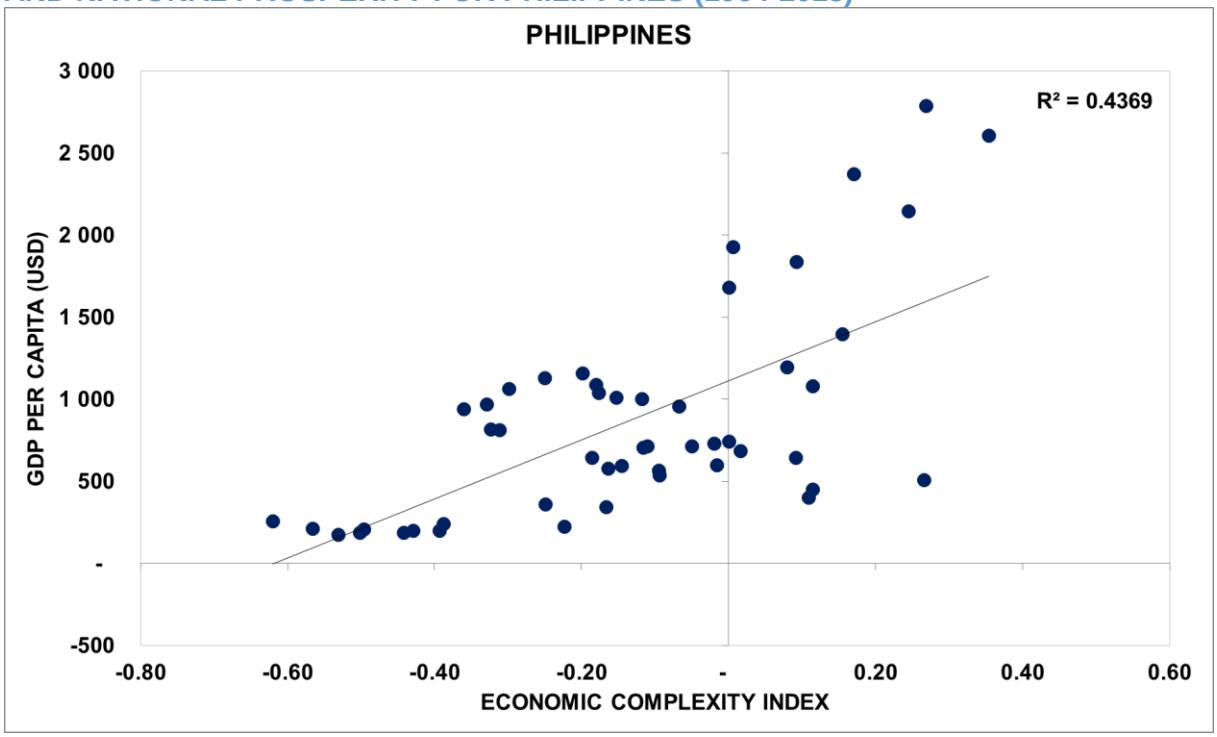


Figure 27: LONG-RUN RELATIONSHIP BETWEEN INDUSTRIAL MIGRATION AND NATIONAL PROSPERITY FOR PHILIPPINES (1964-2013)



6. DISCUSSION OF RESULTS

The results presented in Chapter 5 have been discussed in this chapter, with consideration to the literature review presented in Chapter 2. The research questions presented in Chapter 3 were derived from existing literature as reviewed in Chapter 2. The results were presented in Chapter 5 under the relevant research question, and have been discussed in this chapter using the same approach.

6.1. RESEARCH QUESTION ONE:

Why does industrial migration matter?

Research Question One sought to establish whether there were any material benefits associated with industrial migration, particularly the impact of industrial migration on national prosperity. To assess this, a series of relationships between indicators of national prosperity and industrial migration have been examined. The indicators which have been examined in relation to industrial migration were GDP per capita, Human Development Index, Unemployment, GINI Index, Mean years of schooling, High-technology exports (% of manufactured exports).

6.1.1. GDP PER CAPITA

The relationship between industrial migration and GDP per capita was presented in Figure 11. Industrial migration accounted for a 52.47% variance in GDP per capita across nations. Nations who have migrated further along the industrial forest have benefited from higher levels of GDP per capita.

Kuznets (1955) stated that “an invariable accompaniment of growth in developed countries is the shift away from agriculture, a process usually referred to as industrialization and urbanization.” (p. 7). Kuznets (1955) further explained the implication of this migratory process in terms of income distribution, stating that “the average per capita income of the rural population is usually lower than that of the urban.” (p. 7).

Hausmann and Hidalgo (2011) have stated that one attribute of the Economic Complexity Index is its ability to predict future economic growth, which “suggests that countries tend to move towards an income level that is compatible with their

overall level of embedded knowhow. On average, their income tends to reflect their embedded knowledge." (p.27).

6.1.2. HUMAN DEVELOPMENT INDEX

The components which are included in the Human Development Index are life expectancy at birth, mean years of schooling, expected years of schooling and gross national income per capita. These components contribute to national prosperity as they determine the living standards of human beings.

The Human Development Report (2014) stated that "People with limited core capabilities, such as in education and health, are less able to easily live lives they value. And their choices may be restricted or held back by social barriers and other exclusionary practices." (p. 2). This means that in nations where the human development is low, the levels of national prosperity will also be low.

Figure 12 presented the relationship between industrial migration and the Human Development Index, where industrial migration explained a 63.85% variance in the Human Development Index across nations. These results were a significant indicator of the relationship between the two variables, and provide a key insight that as industrial migration occurred, the nations with higher Economic Complexity Index values achieved higher levels of human development.

6.1.3. UNEMPLOYMENT

Figure 13 presented the results of the relationship between industrial migration and unemployment, which had a low R-squared value. The interpretation of this regression model is that less than 1% of the variance in unemployment is explained by industrial migration.

Charles and Lehner (1998) described that nations which are industrialising will experience an increase in the productivity level, and the impact of this on some industries is that unemployment may increase as the income level is adjusted for the increase in productivity.

Pianta (2001) developed a framework to show the relationship between industrialisation and employment, which has been presented in Figure 5. As the economic complexity of nations increase, employment with be stable and able to achieve slight growth in employment. These findings are positive for productivity levels and income, but the impact on unemployment is insignificant.

6.1.4. GINI INDEX

The relationship between industrial migration and the GINI Index were presented in Figure 14, and showed that industrial migration explained for a 40.23% variance in the GINI Index across nations. Poverty will reduce in the long-run as economic complexity increases in a nation, which is a possible outcome of increasing GDP per capita associated with higher levels of industrial migration.

The results whilst significant were indicative of inherent variability in the relationship between the two variables. Nations who have successfully migrated the industrial forest have also realised growth in GDP per capita, but these higher income levels may not cause a subsequent reduction in poverty. Sen (1997) argued that economic equality would be better for national prosperity than income equality. This would ensure that a population would have fair access to resources and opportunities to improve their living standards. Thus the implications of these results should be considered in conjunction with capabilities such as education and health indices.

6.1.5. MEAN YEARS OF SCHOOLING

This variable is a component of the Human Development index, and Hausmann and Hidalgo (2011) have cited that “The standard variables used as a proxy for human capital are the number of years of formal schooling attained by those currently of working age, or the school enrolment of the young (Barro and Lee, 2010).”

The results for the relationship between industrial migration and mean years of schooling were presented in Figure 15. These results showed that industrial migration explained for a 56.68% variance in the mean years of schooling across nations, which is a significant finding. The implication of the significant relationship with industrial migration is that as industrial migration transpires, advanced

knowledge will be required to produce more complex products. Mean years of schooling will increase to support the shift from less complex products to more complex products.

Hausmann and Hidalgo (2011) have stated “our approach emphasizes the tacit productive knowledge that is embedded in a country’s economic activities.” (p. 34). For developing nations this positive relationship is a step towards building capabilities and skills required to advance industrial migration. Schooling is one of the pillars of building knowledge in a nation, and should be built upon to enhance the economic complexity which in turn will enhance national prosperity.

6.1.6. HIGH-TECHNOLOGY EXPORTS

The relationship between industrial migration and high-technology exports were presented in Figure 16, and showed that industrial migration explained a 31.43% variance in the high-technology exports across nations. These results support the concept that as industrial migration occurs, the nature of the products being manufactured and export become more complex in nature.

Hausmann and Hidlago (2011) have developed a Product Complexity Index (PCI), which is a fundamental driver of industrial migration.

> The economic complexity of a country is connected intimately to the complexity of the products that it exports. Ultimately, countries can only increase their score in the Economic Complexity Index by becoming competitive in an increasing number of complex industries. (p. 25).

Akamatsu (1962) introduced the “wild geese flying pattern” and described the seven stages of industrial migration, which surmises that the introduction of increasing levels of product complexity is critical to industrial migration. Figure 28 is a summary of the most and least complex products with the corresponding Product Complexity Index.

Figure 28: PRODUCT COMPLEXITY INDEX

TABLE 2.2.1: TOP 5 PRODUCTS BY COMPLEXITY

Product Code (SITC4)	Product Name	Product Community	Product Complexity Index
7284	Machines & appliances for specialized particular industries	Machinery	2.27
8744	Instrument & appliances for physical or chemical analysis	Chemicals & Health	2.21
7742	Appliances based on the use of X-rays or radiation	Chemicals & Health	2.16
3345	Lubricating petrol oils & other heavy petrol oils	Chemicals & Health	2.10
7367	Other machine tools for working metal or metal carbide	Machinery	2.05

TABLE 2.2.2: BOTTOM 5 PRODUCTS BY COMPLEXITY

Product Code (SITC4)	Product Name	Product Community	Product Complexity Index
3330	Crude oil	Oil	-3.00
2876	Tin ores & concentrates	Mining	-2.63
2631	Cotton, not carded or combed	Cotton, Rice, Soy & Others	-2.63
3345	Cocoa beans	Tropical Agriculture	-2.61
7367	Sesame seeds	Cotton, Rice, Soy & Others	-2.58

6.1.7. ANSWER TO RESEARCH QUESTION ONE

The answer to Research Question One is that industrial migration does matter.

The findings on the relationship between industrial migration and select variables, namely GDP per capita, Human Development Index, Unemployment, GINI Index, Mean years of schooling and High-technology exports, have provided key insights on the importance of industrial migration. Table 5 provides a summary of the key findings which explain the importance of industrial migration.

Table 5: RESEARCH QUESTION 1 - KEY FINDINGS

Variable	R-squared	Key Findings
GDP per capita	0.5247	The implication of the significant relationship with industrial migration is that as industrial migration progresses, an increase in GDP per capita is expected.
Human Development Index	0.6385	The implication of the significant relationship with industrial migration is that as industrial migration progresses, social condition will

		improve and result in an increased Human Development Index.
Unemployment	0.0085	The implication of the weak relationship with industrial migration is an expected characteristic. As tacit knowledge increases in the form of economic and product complexity increase, employment will remain stable with marginal growth.
GINI Index	0.4023	The implication of the positive relationship with industrial migration is that as industrial migration transpires, the wage level (represented by GDP per capita) will increase and poverty reduction will occur in the long-run.
Mean years of schooling	0.5668	The implication of the significant relationship with industrial migration is that as industrial migration transpires, advanced knowledge will be required to produce complex products. Mean years of schooling will increase to support the shift from less complex products to more complex products.
High-technology exports	0.3143	The implication of the significant relationship with industrial migration is that as industrial migration progresses, more complex and sophisticated products are manufactured by a nation. This will change the product space and product complexity, creating demand for advanced skills and higher wages, which increases national prosperity.

6.2. RESEARCH QUESTION TWO

What is the extent of industrial migration?

Research Question Two was selected to determine the extent of industrial migration in terms of the speed at which migration occurs and also to determine whether specific characteristics were associated with industrial migration. The extent of migration per decile is presented in Figure 17, and is an indication that nations have migrated at different speeds and in different directions over the 50 year period.

The migratory patterns of nations included in Decile 10 were analysed in terms of the speed of industrial migration and common attributes of nations in this decile. The attributes analysed included three categories, first, demographic profile (population size and neighbourhood), second, nature of economic activity (key economic activity, resource dependence and income group), and third, trade orientation (key products traded and export orientation).

6.2.1. DEMOGRAPHICS

6.2.1.1. POPULATION SIZE

The population size of for Decile 10 nations were presented in Table 2, for 1964 and 2013 respectively. The population size across these nations varied from small to large, and from 1964 each nation experienced substantial population growth. Population size has not been found to be a common characteristic across the highest migrating nations.

For this reason it has been concluded that this factor does not have a meaningful impact on the extent of industrial migration. The implication of this finding is that all nations have an equal opportunity to achieve industrial migration irrespective of the population size.

6.2.1.2. NEIGHBOURHOOD

Porter (2000) emphasised the importance of location and stated that “Location affects competitive advantage through its influence on productivity and especially on productivity growth.” (pp.19). Porter (2000) qualified this statement

by explaining the competition and productivity are “strongly influenced by the quality of the microeconomic business environment” (pp. 19).

> Some aspects of the business environment (e.g., the road system, corporate tax rates, the legal system) cut across all industries. These economy-wide (or “horizontal”) areas are important and often represent the binding constraints to competitiveness in developing economies. In more advanced economies and increasingly elsewhere, however, the more decisive aspects of the business environment for competitiveness often are cluster specific (e.g., the presence of particular types of suppliers, skills, or university departments). (p. 19)

The results indicated that five of the seven highest migrating nations are located in Asia. For purposes of reporting the results, this study has categorised Turkey as an Asian nation; its unique location distributes Turkey across two continents, which are Asia and Europe. The reason for selecting Asia is based on the economic characteristics. The World Bank has ranked Turkey as an upper-middle income nation which is consistent with other Asian nations, whilst European nations are classified as high-income nations.

The dominant representation of Asian nations in Decile 10 is evidence of changing economic paradigms in the region. When Lin (2011) presented a paper titled “From Flying Geese to Leading Dragons: New Opportunities and Strategies for Structural Transformation in developing countries”, he stated that

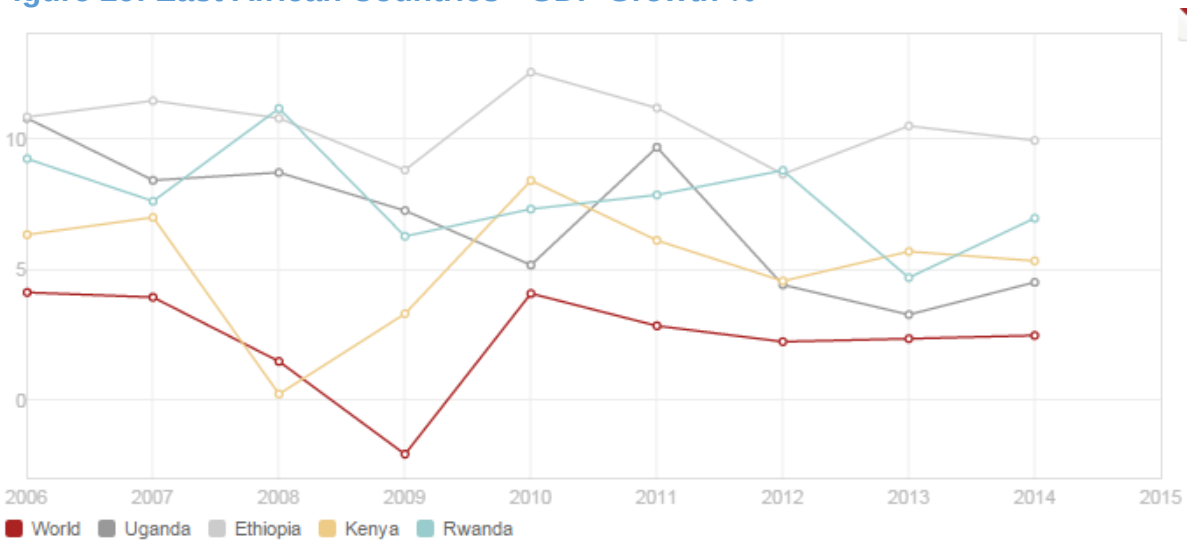
> “Having been itself a “follower goose”, China is on the verge of graduating from low-skilled, manufacturing jobs and becoming a “leading dragon”, which will free up nearly 100 million labor-intensive manufacturing jobs.” (p.4)

The reference to China as a follower goose can be attributed to Akamatsu’s (1962) wild geese flying pattern, where the leader goose was China’s neighbour, Japan. Japan learnt by doing and accumulated cumulative labour hours, before graduating to a more complex economy. Likewise, China went through a

process in industrialisation and is ideally positioned to graduate to the next level in the wild geese flying pattern.

The importance of the interaction between this theory and the results of this study points to a trend of industrial migration in the Asian neighbourhood.
The remaining two neighbourhoods were Africa and South America, both in developing regions of the world. Uganda is located in East Africa, in proximity to nations such as Kenya, Rwanda and Ethiopia. GDP growth performance of these nations in the past decade exceeded GDP growth rates of the world on average, as shown in Figure 29.

Figure 29: East African Countries - GDP Growth %



Finally, Brazil, who qualified as member nation of BRICS due to its fast growth rate and on-going industrial upgrading, shares its neighbourhood with countries such as Uruguay and Chile. Uruguay and Chile have consistently outpaced average growth rates of other nations in the world, as shown in Figure 30. Uruguay and Chile have been reclassified by the World Bank as high income countries, migrating out of the middle-income category.

Figure 30: South American Countries - GDP Growth %

The results discussed in this section confirm that nations in developing neighbourhoods are ideally conditioned for industrial migration, through the implementation of structural change and industrial development.

6.2.2. NATURE OF ECONOMIC ACTIVITY

6.2.2.1. KEY ECONOMIC ACTIVITY

The nature of economic activity has been presented in Table 3, which showed the economic activity of each Decile 10 nation in the years 1964 and 2013. The results found that in 1964, all seven nations where agrarian in nature. Table 4 showed the primary export product, which was aligned to the natural factors of endowment in each nation.

Industrial migration is achieved through industrial upgrading, where economic activity shifts away from high levels of natural resource dependence and towards value adding activity. There is evidence that the five Asian nations went through this process of industrial upgrading which resulted in a change in the key economic activity. Each of these nations migrated to manufacturing activities and became less dependent on natural resources.

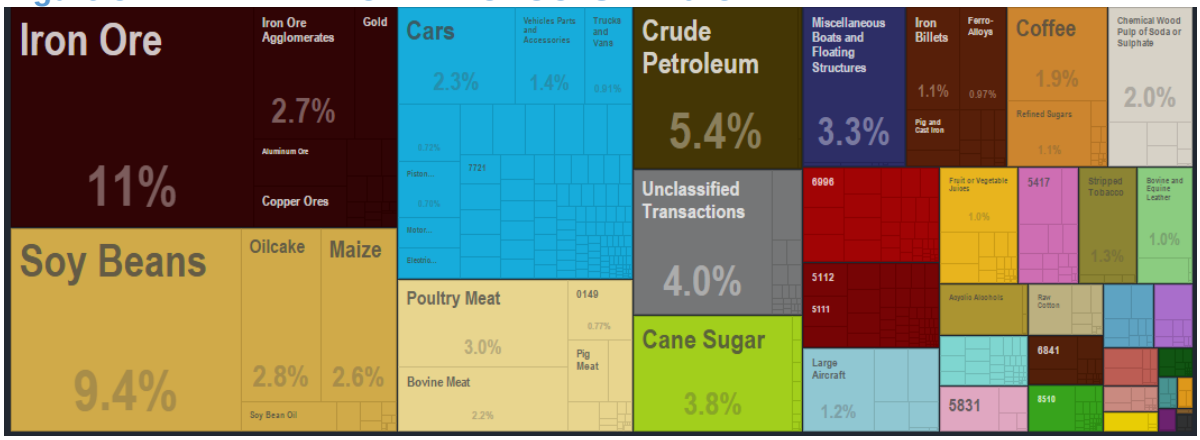
6.2.2.2. RESOURCE DEPENDENCE

As described in the previous section, the highest migrating nations reduced their dependence on natural resources. Table 4 presented the primary import product for each nation; in 1964 all nations imported different types of machinery. This machinery was used to develop manufacturing capabilities in most of the Decile 10 nations.

Uganda is an exception amongst the Decile 10 members, as it remained in the agrarian economy and did not improve product complexity from 1964 to 2013. This is a possible explanation for the miniscule GDP per capita growth relative to other Decile 10 nations.

Whilst Brazil achieved significant GDP per capita growth, it maintained a high level of resource dependence. The key product exported by Brazil in 2013 was mineral products, followed closely by natural agrarian products, as depicted in Figure 31.

Figure 31: BRAZIL EXPORT PRODUCTS IN 2013



The Atlas of Economic Complexity (2011) has calculated that the Product Complexity Index for Iron Ore and Soy Beans are -0.59 and -2.25 respectively. Larger numbers indicate higher product complexity than smaller numbers. Iron Ore ranks better than Soy Beans as it involves extractive processes, which requires mining plant and equipment in addition to labour, rather than only land and labour.

From these results, it can be concluded that a lower degree of natural resource dependence results in higher economic complexity and GDP per capita.

6.2.2.3. INCOME GROUP

Table 3 stated the income group of Decile 10 nations, as determined by the World Bank using their classification system. The World Bank income classification system uses the GNI per capita and income thresholds to calculate the income category for every nation.

Each nation the tenth decile was categorised as low-income countries in 1964. Resulting from the changes in economic activity, resource dependence and the improvement in GDP per capita over time, these nations have upgraded into new income group categories. Uganda is the only nation in the tenth decile to remain in the low-income category, and is noted as one of the poorest nations in the world. The World Bank records Uganda's GINI index as 42.37 as at 2013.

As stated by Lin (2012) nations that migrate will not achieve the same levels of GDP per capita, due to the differences in available factors of endowment in each nation. For this reason, nations achieved varying degrees of prosperity.

6.2.3. TRADE ORIENTATION

6.2.3.1. KEY PRODUCTS TRADED

Primary export and import products for each Decile 10 nation were summarised in Table 4, in the years 1964 and 2013. The product complexity of products which were exported in 1964 were very low, however as industrial migration progressed in these nations began exporting more complex products. Table 6 is a summary of the Product Complexity Index for the key products traded.

Table 6: PRODUCT COMPLEXITY INDEX OF TRADED PRODUCTS

Nation		Primary Export Product			Primary Import Product		
		1964	2013	Direction of Change	1964	2013	Direction of Change
Thailand	Product	Rice	Machinery	↑	Machinery	Machinery	—
	Product Complexity Index	-2.25	2.54		2.54	2.54	
Malaysia	Product	Natural Rubber	Machinery	↑	Machinery	Machinery	—
	Product Complexity Index	-1.95	2.54		2.54	2.54	
Uganda	Product	Coffee	Vegetable Products	—	Machinery	Mineral Products	↓
	Product Complexity Index	-2.25	-2.25		2.54	-0.59	
Brazil	Product	Coffee	Mineral Products	↑	Machinery	Machinery	—
	Product Complexity Index	-2.25	-0.59		2.54	2.54	
Singapore	Product	Natural Rubber	Machinery	↑	Natural Rubber	Machinery	↑
	Product Complexity Index	-1.95	2.54		-1.95	2.54	
Turkey	Product	Raw Cotton and Nuts	Textiles	↑	Machinery	Machinery	—
	Product Complexity Index	-2.25	0.18		2.54	2.54	
Philippines	Product	Fruit	Machinery	↑	Machinery	Machinery	—
	Product Complexity Index	-0.58	2.54		2.54	2.54	

With the exception of Uganda, all Decile 10 nations upgraded the product complexity of export goods between 1964 and 2013. This supports the argument that improvements in national prosperity can be realised by increasing the product complexity. Increased product complexity is an outcome of industrial migration.

Machinery dominated imports for most countries in both years. Akamatsu (1962) described seven stages of industrial migration, specifically stating that in the sixth and seventh stages, developing nations would commence with local production of goods, using imported capital as described in the fourth and fifth stages. The dependence on imported machinery, presumably imported from developed nations, is an indication that capital capabilities were being developed and continue to be relevant to structural upgrading based on 2013 import data.

Product complexity and economic complexity share a symbiotic relationship; first, economic complexity improves as product complexity improves and second, as economic complexity improves, there will be a need to generate increasingly more complex products.

6.2.3.2. EXPORT ORIENTATION

The trade balance was shown in Table 4, which is the difference between the export value of goods and services and the import value of goods and services. Trade orientation stood important to this study as it determined whether the Decile 10 nations adopted export-promotion or import-substitution strategies.

Lin (2012) observed that countries which have achieved successful industrial migration have defied traditional economic policy prescriptions, as these countries adopted export-promotion strategies rather than import-substitution strategies. Lin (2012) highlighted that export-promotion strategies are supported through an increase in the level of product sophistication.

The results showed that three of the seven nations from the tenth decile adopted export-promotion, namely Thailand, Malaysia and Singapore. The common attribute amongst these three nations is that the primary export product was machinery. The remaining four nations adopted import-substitution; Uganda exported vegetable products, Brazil exported mineral products, Turkey exported textiles and the Philippines exported machinery but also imported machinery.

Whilst the nature of trade orientation is important, the results have indicated that the nature of products exported is also important. In the cases where export-promotion has been adopted, it has been supported by the export of more complex products. This supports the literature presented in Chapter 2.

6.2.4. ANSWER TO RESEARCH QUESTION 2

To deduce an answer to Research Question Two, the extent of industrial migration was determined by ranking and ordering the nations into 10 deciles. The extent of migration was found to be varied across the deciles as demonstrated in Figure 17. Nations progress at different speeds, as knowledge and capabilities are developed over the long-run at different rates amongst nations.

The factors which influenced the extent of industrial migration where explored for the seven nations included in Decile 10. These factors were classified into three

categories, first, demographic profile (population size and neighbourhood), second, nature of economic activity (key economic activity, resource dependence and income group), and third, trade orientation (key products traded and export orientation).

First, the results for demographic profiling found that the population size was irrelevant to industrial migration and national prosperity. In contrast, the neighbourhood did play an influential role in determining which nations achieved the highest extent of industrial migration.

Second, the results for the nature of economic activity, indicated, with exception, that a shift away from agrarian activities to more advanced activities promoted industrial migration. Resource dependence was not a determinant of the extent of industrial migration, but rather on the corresponding increase in national prosperity. Nations which had lower levels of resource dependence achieved higher levels of GDP per capita. Income group is associated with GDP per capita, and the literature supports the results, which showed different levels of prosperity due to differences in factors of endowment across nations.

Third, the results for trade orientation demonstrated that nations with better economic complexity achieved greater levels of national prosperity. Results related to export orientation, showed that whilst export-promotion strategies are important, they need to be supported by product complexity.

Uganda is an outlier in the results, as its initial Economic Complexity was one of the lowest amongst the population. Due to a volatile political, social and economic environment, Uganda has not demonstrated characteristics associated with industrial migration. It is concluded that for this reason, national prosperity has not improved, as indicated by the low GDP per capita in 2013.

6.3. RESEARCH QUESTION THREE

Do nations which migrate follow a path or framework?

Research Question Three sought to determine the nature of industrial migration, by studying the industrial migration patterns. Akamatsu (1962) and Lin (2012) presented frameworks for industrial migration. Akamatsu's (1962) seven-stage framework has been selected as the appropriate evaluation framework. The motivation for selecting this framework in favour of Lin's six-step model is due to its emphasis on industrial upgrading and evidence presented in this study which supports the wild flying geese pattern. Lin (2012) presents a rigorous six-step framework; however it would be more appropriate to apply this framework to policy design, which has been discussed in Chapter 7.

Figure 18 presented the long-run industrial migration for each decile, which showed that each decile experienced industrial migration at different stages across the Economic Complexity Index spectrum. These results corroborated with Akamatsu's (1962) description of the wild geese flying pattern, which stated nations will experience advancements at dissimilar rates due to homogeneization and hetrogeneization.

The long-run industrial migration of Decile 10 nations, as presented in Figure 19, was found to be experience similar migratory patterns, with the exception of Uganda. Inconsistencies between Uganda and other Decile 10 nations have been discussed earlier in this chapter under Section 6.2.

6.3.1. AKAMATSU'S SEVEN-STAGE FRAMEWORK OF INDUSTRIAL MIGRATION

6.3.1.1. FIRST STAGE

Evidence of the first stage of industrial migration has been found in all of the Decile 10 nations. Table 3 presented results on the nature of economic activity in 1964 and Table 4 presented the primary export products in 1964, all Decile 10 nations were agrarian in nature at this stage.

Lin (2012) stated that a common feature of industrial migrators was that "They all started from resource-intensive industries or labor-intensive [*sic*] industries such

as mining, agriculture, garments, textiles, toys, and electronics in the early stage of development and moved up the industrial ladder step by step to more capital-intensive industries." (p. 94).

6.3.1.2. SECOND STAGE

In the second stage, Akamatsu (1962) raised the industrial revolution in Western Europe, which introduced dissimilar rates of industrial migration between the developed Western European nations and other developing nations. The industrial revolution gave rise to industries and production of consumer goods. A demand for these goods gave rise to import-substitution strategies in the developing world.

Hausmann and Hidalgo (2009) stated

> Think of a particular country and consider a random product. Now, ask yourself the following question: If this country cannot make this product, in how many other countries can this product be made? If the answer is many countries, then this country probably does not have a complex economy. On the other hand, if few other countries are able to make a product that this country cannot make, this would suggest that this is a complex economy.

The literature explains why developed nations were able to migrate so quickly, they were able to apply knowledge and value to the available factors of endowment, which drives economic complexity.

6.3.1.3. THIRD STAGE

Akamatsu (1962) explained that the interaction between the developed and developing nations is the foundation of homogeneization and hetrogeneization. The third stage is characterised by developing nations increasing exports of goods and services into developing nations. The interaction between developed and developing nations increased, and created significant dependence on import-substitution strategies for developing nations, which resulted in trade deficits as presented in Table 4.

In 196, Turkey, had accumulated a substantial trade deficit; the primary export product was agrarian goods an import goods were advanced machinery. The trade between Turkey and developed nations encouraged capital inflows into Turkey. This interaction was critical to the path of industrial migration which Turkey would in later years pursue. In 2013, Turkey's dominant export was textiles, which are produced using imported machinery.

6.3.1.4. FOURTH STAGE

In the fourth stage, Akamatsu (1962) discussed the inflow of foreign capital from the developed world. Decile 10 traded their locally produced natural resources, interchangeably for capital from the developed nations. The interaction in this stage established industrial upgrading and the development of economic complexity in Decile 10 nations. Kuznets (1955) stated that nations would experience a shift from agricultural to non-agricultural sectors, as demonstrated in this stage.

6.3.1.5. FIFTH STAGE

Akamatsu (1962) stated that in the fifth stage "capital goods came to be imported from the advanced countries for the consumer-goods industries in the developing countries and, in consequence there was a conspicuous change from consumer goods to capital goods in the import structure." (p.5). The primary import product for Decile 10 nations were capital intensive, as all of these nations were importing machinery.

In 1964, Singapore was an entrepôt, exporting and importing natural rubber. Over time Singapore's imports migrated towards more advanced products, such as machinery. Reinhardt and Prewitt (1993) studied Singapore and found that upon independence, deliberate policy changes were implemented, which change the trade orientation from import-substitution to export-promotion. This decision was made because national leadership "felt that Singaporeans lacked the skills and capital to develop enterprises of the necessary size and sophistication on their own" (p.4). This decision reflected the continued interaction between the

developed and developing world, where mutual dependence was essential for both nations to prosper.

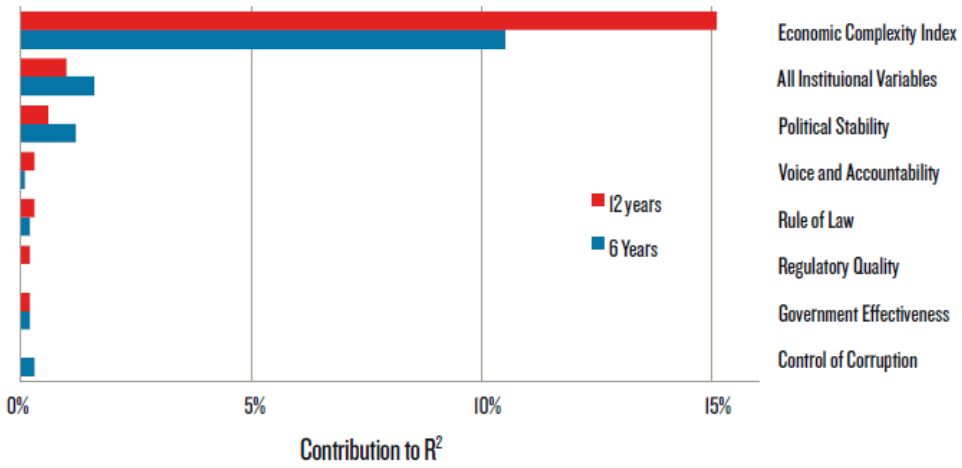
6.3.1.6. SIXTH STAGE

In the sixth stage, Akamatsu (1962) described that goods required for local demand, began to be produced domestically. In this stage nations began to import raw materials, and were no longer constrained by the natural factors of endowment available locally.

Akamatsu (1962) suggested that as industrial migration ensues there will be a consequent homogeneization process, which is driven through the increased economic complexity in developing nations. Not only do factors of production become similar in developing nations relative to developed nations, but more importantly these developed nation factors of production become more accessible to developing nations.

Hausmann and Hidalgo (2010) developed two indexes, namely Economic Complexity Index and Product Complexity Index, which confirmed that complexity is a function of the quantity of factors of endowment available in a country. Hausmann and Hidalgo (2010) have additionally proved that greater economic complexity influence future growth, as shown in Figure 32.

Figure 32: CONTRIBUTION TO THE VARIANCE OF ECONOMIC GROWTH FROM THE ECONOMIC COMPLEXITY INDEX



6.3.1.7. SEVENTH STAGE

The seventh stage is when industrial migration in developing nations has progressed to an advanced level. The results presented in Figure 20 show the long-run relationship between industrial migration and national prosperity for Decile 10 nations. These results are significant to this study, as it provides evidence which has proved the existence of a relationship between industrial migration and national prosperity.

Decile 10 nations have successfully migrated through the industrial forest, at varying rates of progress as supported by authors in Chapter 2. Resulting from this industrial migration, the product complexity has also advanced. Figure 16 demonstrated the relationship between industrial migration and high-technology exports as a percentage of manufactured exports. These results prove that as economic complexity increases nations produce and export more advanced products.

6.3.2. ANSWER TO RESEARCH QUESTION 3

The answer to Research Question Three, based on the application of Akamatsu's seven-stage framework, is that there is evidence that nations which migrate do follow a path or framework. Capabilities, knowledge and capital have been established in the long-run. Lin (2012) has stated that successful industrial migration can be achieved in as soon as one or two generations, but only if government implement strategic policies which encourage industrial migration. (p. 112).

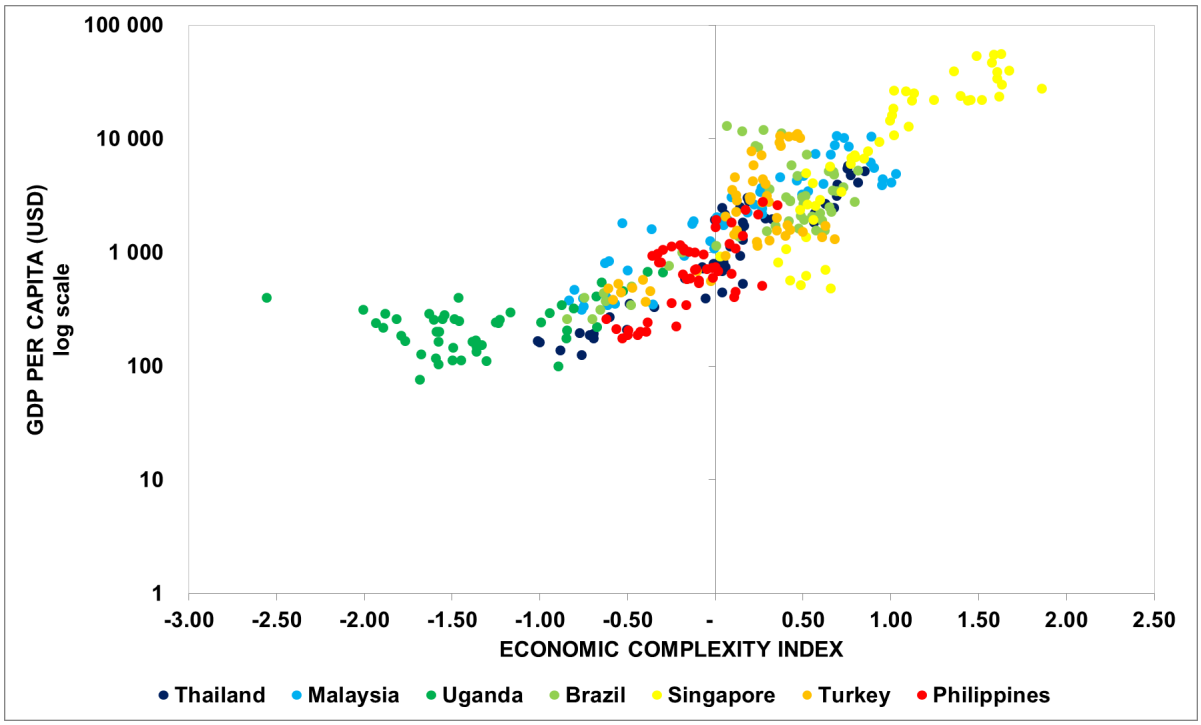
The results presented from Figure 21 to Figure 27 supports the literature, which stated that industrial migration is a long-term outcome, resulting from industrial.

7. CONCLUSION

7.1. KEY FINDINGS

First, it has been conclusively proved that industrial migration does matter. Although it is equally important for developed and developing nations to continuously migrate, the developing nations were found to demonstrate the highest level of migration over the long-run.

Second, a salient finding in this research, evidence has been found which confirms that a relationship exists between industrial migration and national prosperity. The results were presented Chapter 5 and discussed in Chapter 6.



Third, the implication of this relationship is that factors which influence economic complexity and national prosperity can be included in development and growth strategy by policy makers, to drive economic growth.

Fourth, industrial migration is a process of on-going structural change, even for developed nations. Innovation and knowledge are critical factors required to improve product and economic complexity.

Fifth, national prosperity, which is measured by income levels, increases where industrial migration progresses. This is a salient point of departure for low-income nations.

7.2. RECOMMENDATIONS FOR STAKEHOLDERS

7.2.1. POLICY RECOMMENDATIONS

This research study has found evidence that a relationship exists between industrial migration and national prosperity. The implications of this finding for stakeholders, is principally beneficial to the developing world, which is characterised by poverty, inequality and poor human development.

Structural transformation is a necessary condition to mobilise resources and activate industrial migration. Policy makers at the national level are the decision makers who shape the economic future of a nation. For this reason, it is recommended that developing nations adopt an appropriate policy framework which is essential to achieve national prosperity. Lin (2012) detailed a six-step framework, which prescribes the actions required at a policy level to drive structural transformation and industrial migration.

The central stakeholder for this recommendation is government, and the successful implementation of each step in this framework can be influenced through government intervention, at the macro and micro level.

7.3. LIMITATIONS OF THE RESEARCH

This research was dependant on quantitative data, from different sources. A recurring limitation was the availability of data across all sources. It has been found that institutions which gather and maintain data records have dissimilar qualifying criteria, such as country membership and the range of time included in the database, for the inclusion of country specific data inclusions.

For this reason, certain nations did not have the necessary data available and consequently these nations could not be included in this research. It is possible that this may have implications for the results.

7.4. SUGGESTIONS FOR FUTURE RESEARCH

First, it is recommended that the strength of the relationship between industrial migration and national prosperity be tested.

Second, this study was longitudinal across a 50 year range. Futures reassert can examine shorter time ranges, to test whether the results would change or be consistent with the findings of this long-run study.

Third, this study can be replicated with a different sample, based on different criteria for examination, such as income group (low, middle and high), developed nations or developing nations, neighbourhood, positive difference in Economic Complexity in or a negative difference in Economic Complexity.

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