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Philippine Structural Transformation in the Context of Technological Change

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Abstract

One aspiration of the Agricultural Fisheries Modernization Act (AFMA) is the promotion of industry dispersal and rural industrialization. This involves a policy of structural transformation which attempts to transition the economy from a low productivity sector such as agriculture to a high productivity sector such as industry. This study shows that, despite the efforts of AFMA, this process has not been accomplished. Previous literature has attributed this failure to many factors, including policy failure and lack of investments. The paper however argues that the role of technological change has not been given considerable attention. Empirical analysis demonstrates that policy formulation and capital accumulation are not sufficient in achieving structural transformation. Even if the correct policies are implemented and adequate investments are available, the sustainable transition from agriculture to industrialization will require the adoption of appropriate technological which utilizes local resources, including labor. To do this, the government must set up not only an environment for research and development and extension, but also provide incentives in the form of transfers to the private sector to invest in technology.

Keywords: Structural Transformation, Technology Transfer, Urbanization, Knowledge Spillover, Employment

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Leonardo A. Lanzona Jr.[1]

"Bakit parang lahat ng inyong budget puro research? Baliw na baliw kayo sa research. Aanhin ninyo ba 'yung research? Ako, matalino akong tao, pero hindi ko maintindihan 'yang research niyo, lalo na 'yung farmer. Gusto ba ng farmer ang research? Hindi ba gusto nila tulungan niyo sila?"
--Senator Cynthia Villar, Chairman of the Senate Agriculture, Food, and Agrarian Reform Committee, in a meeting with Department of Agriculture officials, October 9, 2019

Introduction

1.1 Rationale of the study

Economic development can be generally defined as a process of transformation from an economy with limited resources and choices to one with more resources and choices. In mainstream economics, the conceptualization of development is based on the following assumptions: surplus labor in agriculture that allows workers can be moved to industry with loss in product; limited physical capital that constrains production; limited domestic markets that reduce productive capacity; weak industrialization that reduces the opportunities for engaging and competing in the world markets; and a government that has limited information and cannot act objectively. The policy implications are to focus on capital accumulation and industrialization by removing barriers to industrial imports and using quantitative direct and indirect policies as well as cost-benefit analyses and planning to direct changes (Behrman, 2001).

In this view, the Agricultural Fisheries Modernization Act (AFMA) was enacted in 1997, fundamentally as a policy instrument defining ways towards the development of a globally competitive Philippine agricultural sector (Aquino, et al., 2013). The law has identified broad-based provision involving production and support services, human resource services, research development and extension, rural non-farm employment, and trade and fiscal incentives.
Among the key provisions of AFMA is the promotion of industry dispersal and rural industrialization. These joint goals would involve the development of backward and forward linkages between agriculture and industry. To achieve this, AFMA proposed trade and fiscal incentives to develop an enabling environment for Philippine agricultural and fishery products to gain a competitive edge in both the domestic and global markets.

This study aims to assess how much of the rural industrialization and industry dispersal have been achieved in the aftermath of the AFMA. The AFMA provision on rural industrialization fundamentally centers on the issue of structural transformation. Broadly defined, structural transformation refers to increases in the gross domestic product (GDP) share and employment share of industry. However, the more meaningful way of defining structural transformation is to see it as a change from low productivity to higher productivity sectors. Thus, structural transformation is

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concerned with the main elements of development, such as greater international trade, foreign direct investments, and horizontal integration into value chains. Given the theme of this paper, the goal is to assess not just the overall structural transformation of the country but evaluate to what extent rural areas can transform into highly productive areas after the passage of the AFMA in 1997.

1.2 Statement of the problem

Long-term economic development is generally associated with a movement of workers from low-productivity agriculture in rural areas to high-productivity manufacturing in more urbanized areas. This structural transformation not only increases income due to higher wages but also attracts capital to invest in inputs and mechanization for greater agricultural productivity and economic growth in rural areas. In the same way, assuming a larger share of workers move towards off-farm labor, this frees up agricultural land for more farmers to stay in the land, thereby generating employment and productivity effects among agricultural workers (Mellon, 1995).

Nevertheless, while agglomeration and urbanization have provided benefits to the economy, and workers, in particular, the country's growing urban and industrial areas have not produced as many benefits to the rest of the country as those found in other countries in the region (Usui, 2011; World Bank, 2017). Industries have been concentrated in the three regions surrounding the country's capital where access to physical investments, schooling, and other forms of public goods and services have been readily available (Tecson, 2007; Manasan and Chaterjee, 2003).

This paper argues that the failure of the country's industrialization program stems from the absence of a common conception of the role and nature of technological investments in the context of structural transformation (Evenson and Westphal, 1995). Even as investments and necessary public goods and services for industrialization have been provided, partly through AFMA, the rural areas have not achieved the desired level of industrialization because of limited technological inputs.

While technological change is seen across various angles, such as the choice of techniques in terms of creating remunerative jobs and the upgrading of markets to complement structural adjustments, these issues are seldom considered jointly in policy discussions. Romer (1990) indicated that technological change must result from the intentional actions taken by firms and workers who respond to market incentives. As such technological change is endogenous, rather than exogenous or simply responding to government directives. Moreover, technological change needs to be accessible to everyone (or nonrival) to benefit other firms within or outside the industry.

Because the benefits from the technological change cannot be fully appropriated by the firms, markets alone cannot provide the necessary technological inputs. Hence, the requisite policies that should accompany technological adjustments should be implemented. One requirement is the adoption and utilization of technology that maximizes the use of indigenous resources, including labor. Unless a chosen technique utilizes accessible and less costly inputs, it is unlikely that such economic transformations can be sustained. The implication is that technological change and

associated agricultural development should be integrated into the industrialization and urbanization process.

The crucial assumption is that any form of capital infusion and trade expansion for structural transformation should involve a technological transfer that enhances the integration of agriculture and industry. At the same time, because investments in technology can reduce direct industry investments for accumulating inputs, the government must create the necessary environment for these technological transfers, particularly knowledge spillovers (Rivera-Batiz and Romer, 1991; Henderson, 2007). Using empirical analysis of available data, the paper will show the government's failure to recognize these technical and integrating properties caused unintended policy consequences, thereby derailing industrialization.

1.3 General objective

The paper seeks to determine the impact of trade and investment policies on the country's structural transformation within the context of technological change. The assumption is that structural transformation begins and ends with worker productivity and hence his ability to work in a more productive sector. Hence, the focus will be the impact of these factors on labor movements across economic sectors. Given the environment set in the AFMA, the importance of agricultural technological shocks for igniting long-term structural transformations are assumed to be reflected in the impact of these policies on labor transition. These technological innovation effects will in turn be reflected in the changes in labor employment across various sectors.

1.4 Specific Objectives

The project has the following specific objectives:

To review available literature and data for assessing AFMA Section 3, Objective 8: To adopt policies that will promote industry dispersal and rural industrialization by providing incentives to local and foreign investors to establish industries that have backward linkages to the country's agriculture and fisheries resource base;
To develop a Theory of Change (TOC) which will serve as a framework for evaluation of AFMA Objective 8, tracing linkages from AFMA interventions to outcomes and impacts;
To apply the TOC in evaluating the extent to which a market-driven approach has been pursued to enhance the comparative advantage of Philippine agriculture, using evidence and indicators reviewed under Study Objective 1;
To provide plausible explanations for the pace and extent to which policies towards industry dispersal and rural industrialization have been pursued;
To identify a benchmark for determining attainment of well-promoted industry dispersal and rural industrialization, and assess prospects for attaining this benchmark;
To draw out policy implications for government and other key stakeholders of agriculture and fisheries modernization.

1.5 Significance of the study

The main message of the paper is that technology is complex and needs to adopt to the settings in which it is applied. There is a need to institute an innovation system beyond the AFMA method based on a traditional research and extension system centering on public research and extension. Consistent with empirical evidence, the technical features of investments and the nature of inputs for industrialization must be considered in pursuing structural transformation. In this context, technology does not consist only of discrete techniques, each described by its "blueprint." Rather, technology is created within the country itself. Contrary to the previous studies, this paper does not attribute the country's failure to undertake structural transformation to policy direction or its lack of resources. The paper argues that the inability to achieve a sustainable economic transformation lies in its obliviousness of the role of technology and the application of innovation in specific circumstances.

Background and review of related literature

The law includes the following sections to ensure the sustainability of the sector and to promote competitiveness while addressing the needs of farmers and fisherfolk:

1. Development of Strategic Agriculture and fisheries Development Zones (SAFDZ) (Section 6);
2. Accessibility to credit and a strengthened cooperative-based marketing system (Section 20);
3. Construction of rural infrastructures such as irrigation, farm to market roads, rural energy, and communication facilities (Section 46).
4. Formation of a National Agriculture and Fisheries Education System (NAFES) to upgrade the quality of agricultural and fisheries education (Section 66);
5. Strengthening of the National Research and Development (R&D) System in Agriculture and Fisheries (Section 81);
6. Establishment of a Rural Industrialization Industry Dispersal Program (Section 100), combined with the Basic Needs Program (Section 98); and
7. Exemption of tariff payments for the imports of all types of agriculture and fisheries inputs, equipment, and machinery including fishing equipment and parts thereof (Section 109).

In terms of budgets, "AFMA has an appropriation of P20 billion on its first year of implementation (1999) and a continuing appropriation of P17 billion annually in the next six years" (Aquino et al. 2013, par. 16). The budget shall be disbursed as follows: 30% for irrigation, 10% for post- harvest facilities, 10% for agro-industry modernization credit and financing, 10% for other infrastructure,10% research and development, 8% for marketing assistance, 6% for salary supplement of extension workers/ extension services, 5% for capability building, 5% for National Agriculture and Fisheries Education System, 4% for National information Network, 1.75% for rural non-farm employment training and 0,25% for identification of SAFDZ (Republic Act 8435, Section 111).

For R &D, the budget should be at least 1 percent of the Gross Value Added (GVA). At least 20 percent will be spent on basic research and not more than 80 percent on applied research and technology development, of which 10 percent shall be for technology packing and transfer activities.

A crucial element in the AFMA is the formation of backward linkages between industry and agriculture which is a necessary part of its rural industrial and industry dispersal vision. These backward linkages can be strengthened by industrial and investment policies such as the reduction of tariffs and import controls. Regardless of the existing level of backward linkages, these can presumably be improved further as the capabilities and competitiveness of domestic firms are raised. Under this arrangement, mutual gains betweem foreign investors and domestic suppliers can be obtained.

The Philippine experience in development has long been pointed out in terms of missed opportunities. In the early 19th century, the Philippines was the only Southeast Asia country to have reached a five percent industrial growth rate (De Dios and Williamson 2015). Even until the early 1960s, through its policy of import protection, the Philippines had the most developed manufacturing sector in Southeast Asia (Bautista and Power 1979; Power and Sicat 1971). However, industrialization had stagnated from the late 1960s through the 1990s. This premature deindustrialization occurred despite AFMA which spawned a series of government expenditures in support of rural industries (Turingan, 2009).

In the process, the East Asian Miracle that occurred in the 1970s through the 1990s and that led to the rise of newly industrialized economies across Asia did not happen in the Philippines (Vos and Yap 1996). Because of the relative decline of industry, in particular manufacturing, rural workers who are moving out of agriculture went to services. Workers from rural areas often found themselves in low-skill, traditional service-oriented jobs (where productivity and wages were low) or as contract workers overseas.

Rodrik's (2006) concept of structural transformation does not denote a passive process that can be developed automatically once economic fundamentals— macroeconomic stability and well-functioning markets—are achieved. Instead, he suggested certain stylized facts that indicate a successful structural transformation. These facts indicate that: (i) economic development requires diversification, not specialization; (ii) rapidly growing countries are those with large manufacturing sectors; (iii) growth acceleration is associated with structural changes in the direction of manufacturing; (iv) countries that promote exports of more sophisticated goods grow faster; and (v) some specialization patterns are more conductive to others in promoting industrial upgrading. He emphasizes the centrality of industrial development for achieving high and sustained growth in the long term.

The literature has offered different explanations for the country's failed industrialization. First, Daway and Fabella (2015) and de Dios and Williamson (2015) attribute the country's industrialization performance to decades of protectionism, political instability, insufficient export promotion, financial crises, and real exchange rate overvaluation. These all of these factors result in limiting the size of the markets, including international trade, or raising costs of production in the industrial sector.

Related to this is the literature on the high costs of inputs, such as power (Ravago, et.al., 2020) due to a failure in policy.

Second, Usui (2011) attributed poor industrialization to poor infrastructure and weak business and investment climate. While initial success in the electronic industry has been achieved, no deepening of industrial capabilities has been observed. In effect, the diversification of industrial goods has not been felt. Impediments in the development of productive capacities towards developing more sophisticated products can be traced to limited investments and high business costs which in turn lead to low investments.

Third, Briones and Felipe (2013) argue that unlike other countries in Asia, the Philippine industrial development is not agriculture-led. Development is viewed as undergoing several phases: (1) Increase in agricultural productivity; (2) Generation of agricultural surplus; (3) Integration with other non-agricultural sectors; and (4) Rise in industrialization. In the Philippines, government policies have supplanted market forces and have been skewed by urban bias, creating distortionary price supports and subsidies in agriculture.

The poor development of industries can then be traced to one factor: government failure which in turn leads to inadequate investments. The paper proposes that even if correct government policies were in place and capital is available, industrialization cannot be sustained. Growth through capital accumulation may be hampered by diminishing returns. Lucas (1998) notes that economic growth requires a combination of capital accumulation and technological change. Capital accumulation is not enough for sustained economic growth. The adoption of technological change is crucial not only in offsetting returns but also in attracting investments as returns from technological innovation improve.

Moreover, the goal of strengthening backward linkages can be achieved through technological changes as a more intensive agricultural development compliments industrialization. For foreign investors, the local procurement of inputs can lower their production costs, complemented by greater specialization and flexibility, with a better adaptation of technologies and products to local conditions. For rural industries, interactions with technologically knowledgeable suppliers can lead to external technological and skill resources, thereby instilling innovative values. Linkages can also lead to an exchange of knowledge and skills between the connected firms. A widening chain of connections can create an atmosphere of efficiency, productivity growth, technological and managerial acumen, market diversification among the interlinked firms and ultimately employment which is presumably the main objective.

The issue is the greater role of technological change relative to trade growth and capital accumulation. Evenson and Westphal (1995) noted that no existing technology can be translated by the sum of reproducible elements in which it is partially contained. Technology is essentially tacit, neither feasibly embodied, codified nor readily transferable, making it highly sensitive to the circumstances they are applied. Disregarding the tacitness and circumstantial sensitivity of technology causes treatment of technology as being general and not specific. Nontradable inputs such as land, labor, utilities, and services vary greatly in characteristics and quality. Structural transformation is essentially a technological change. Ignoring the differences in input quality can then lead to unproductive efforts in industrialization.

Related to the issue of technology as the driving force of structural transformation are so-called product-variety endogenous growth models which explicitly assume innovation as an input for production. Most of these models are based on a structure consisting of three sequentially connected sectors: one sector that produces various 'designs' ('ideas', 'knowledge', etc.); a second sector that applies these 'designs' to produce various intermediate goods; and a third sector utilizes that the intermediate goods to produce the final good (and in most models, the final good is used-foregone-as an input in producing 'designs' and/or intermediate goods (Park 2010, p.755). This differentiation between research, intermediate, and final goods sectors extends the notion of structural change beyond the usual distinct sectoral view (Romer, 1990). In this case, one can consider a horizontal integration of sectors with agriculture possibly taking the role of the intermediate sector and industry the final goods sector.

More importantly, the framework points to the adoption of innovation as emerging not just from the government. While the research sector can be financed by the government, the utilization of its products depends on the private sector, i.e., the intermediate and final product goods sector. These sectors will have to transform the products of the research sector to their practical form, to differentiate their product from the other local and foreign firms and thereby develop their market.

Romer (1987) developed an early version of a product-variety growth model. He assumes that productivity growth comes, not from the learning-by-doing of individual firms, but the continuous increase in the variety of specialized intermediate products through technology. This prevents aggregate capital from running into decreasing returns, and in the process makes investments more attractive as labor increases its marginal product. In this model, Romer sees growth as being sustained by the increased specialization of labor across an increasing variety of activities. As the economy grows, the larger market makes it worth paying the fixed costs of producing many intermediate inputs and increasing the division of labor (specialization).

In a second model, Romer (1990) points to another source of growth: research spillovers. Apart from increasing labor specialization, a new design increases the stock of knowledge and in the process increases the productivity of human capital, thus creating knowledge spillovers. All industries should benefit from the accumulated knowledge embodied in the design. In effect, the technology is nonrival, and this feature is manifested in the form of knowledge spillovers. This type of knowledge can however be excludable if the firm in the intermediate sector pays for the exclusive use of the new designs which in turn can be monopolized by the firms which created them. Nevertheless, the nonrival feature of the design makes it feasible for the other firms to create new designs derived from the original one, resulting in a differentiated-product market structure (or monopolistic competition) that can be the basis for trade and sustainable growth.

In contrast, if knowledge is tied to physical or human capital, then the technology becomes rival, as the benefits are obtained only by the person who owns the capital or the person who possesses the knowledge. This second type of technology will not lead to knowledge spillovers and can be used to be the basis for market power since only those who are associated with this knowledge can benefit from it.

The impact of technology on the economic structures then ultimately depends on whether the technology is rival or non-rival. In this sense, structural transformation can not be left to the market since the technology that leads to more competition and efficiency should be nonrival. As such, private firms are unlikely to appropriate their full returns and may not be inclined to create them. Government interventions are then needed to encourage more knowledge spillovers and product differentiation as this allows many firms to develop their specific markets where they can obtain and maintain market shares.

Boserup (1987) hypothesizes the increased population pressure in the rural areas canresult in greater innovation as the demand for food and other necessities rise. In the same way, as workers move into the industrial sector, innovations became crucial, and farmers will have an incentive to raise production. This suggests that farmers will voluntarily adapt the new technology but the conditions for such innovations will have to be institutionalized. If appropriate technology is defined as one which utilizes accessible resources and which is adapted by individuals, then technologies that link agriculture to industry can be viewed as appropriate. This then calls for the development of agro-industrial industries, as well as the creation of contract farming that can induce technological innovation from industry to farming (Otsuka, et al., 2016).

The literature has cited the importance of cities in producing knowledge spillovers in developing appropriate technologies (Glaeser, et al., 1992). With more intensive communication, industries grow faster in cities where firms in industries are smaller than the national average size of firms in those industries. With rising urbanization, employment over more firms creates agglomeration and increases local competition between these firms and therefore the spread of knowledge. This result supports the view that local agglomeration promotes growth, and that diversity leads to growth across industries (Jacobs, 1961). The evidence further suggests smaller firms grow faster, and spillovers occur more between sectors rather than within. In effect, knowledge spillovers can create benefits across sectors, not just within a sector. Finally, city industries grow faster when the rest of the city is less specialized. Thus, knowledge spillover, geographic concentration, and firms' utilization of new technology are reinforcing one another.

Nevertheless, recent data thus suggests that while knowledge spillovers are permanent externalities in cities, their impact on innovation or investment in R&D diminishes in denser cities (Qiao, et al., 2019). There are two possible reasons for this finding. One is the cost-saving effect as the agglomeration provides opportunities for firms to save on R&D activities by free-riding on the R&D inputs of other similar local and foreign firms (Lamin and Ramos, 2016). The second is the expropriation-appropriation effect due to the fear of knowledge expropriation (Leahy and Neary, 2007). This can explain why firms would rather tie their technology improvements to either physical capital or human capital.

Henderson (2007) argues that cities can be viewed as engines of growth in an economy and the focus is on knowledge spillovers and technological change. Nevertheless, he noted the changing role of large cities, which often start as manufacturing centers with a strong infusion of foreign technology and investments, next decentralize to surrounding suburban-exurban areas, and finally, to rural areas. Based on the

experience of South Korea which began with the cities of Seoul, Pusan, and Taegu, changes were driven by a series of technological "experiments" which led to the decentralization of manufacturing into the countryside.

Research design and methodology

3.1 Conceptual framework

Structural transformation takes place when productive resources are reallocated from the agricultural sector to the nonagricultural one. This involves two key events: a decrease in the agricultural share in production, and an increase in the industry share in employment.

The important role of trade in structural transformation has been noted in the literature (Alessandra, et.al., 2021). In standard models, international trade affects sectoral shares through two mechanisms. First, openness to trade identifies the sector that have comparative advantage, thus resulting in specialization and movements in the country's sectoral composition. Second, the willingness to trade (as opposed to remaining autarkical) leads to specific types of policies that can cause changes in productivity and thus translate into patterns of industrial specialization. Quantitative models have been formulated in the literature to understand the role of these mechanisms for advanced and middle-income countries, highlighting the movements from agricultural to manufacturing employment.

Starting with a closed economy, the role of agriculture in trade is given even more importance in crafting a structural transformation (Teigner, 2018). Since the agricultural and industrial goods are complementary, changes in the relative price of these goods lead to structural transformation. Under international trade, however, world prices will the trade-off between agriculture and industry and, hence, it may result in changes in the consumption and production patterns. When the foreign relative price of the agricultural good under trade is lower than the domestic one, countries import agricultural goods and reduce their local agricultural production. A faster transformation away from agriculture and toward industry may then be realized under trade. The expansion of trade is viewed as the key element for the country's development, resulting in greater competitiveness and inclusive growth.

Hence, the trade of agricultural products is crucial for structural transformation in several ways. First, it allows the country to import food and thus diversify into industries. Second, the exportation of agricultural products can create income for the economy which can lead to more savings and investment in tradable sectors. However, to release workers from agriculture to industry, technological change is needed to maintain agricultural labor productivity. Third, like the second point, agricultural products can be used as inputs for tradable goods. Technological change in this case should support the production effort.

Aside from the Free Trade Agreement (FTA) with Japan, the ASEAN nations and China remain as this country's main trade partners. Failure to maximize these agreements can mean a significant loss of opportunity. The current performance of the

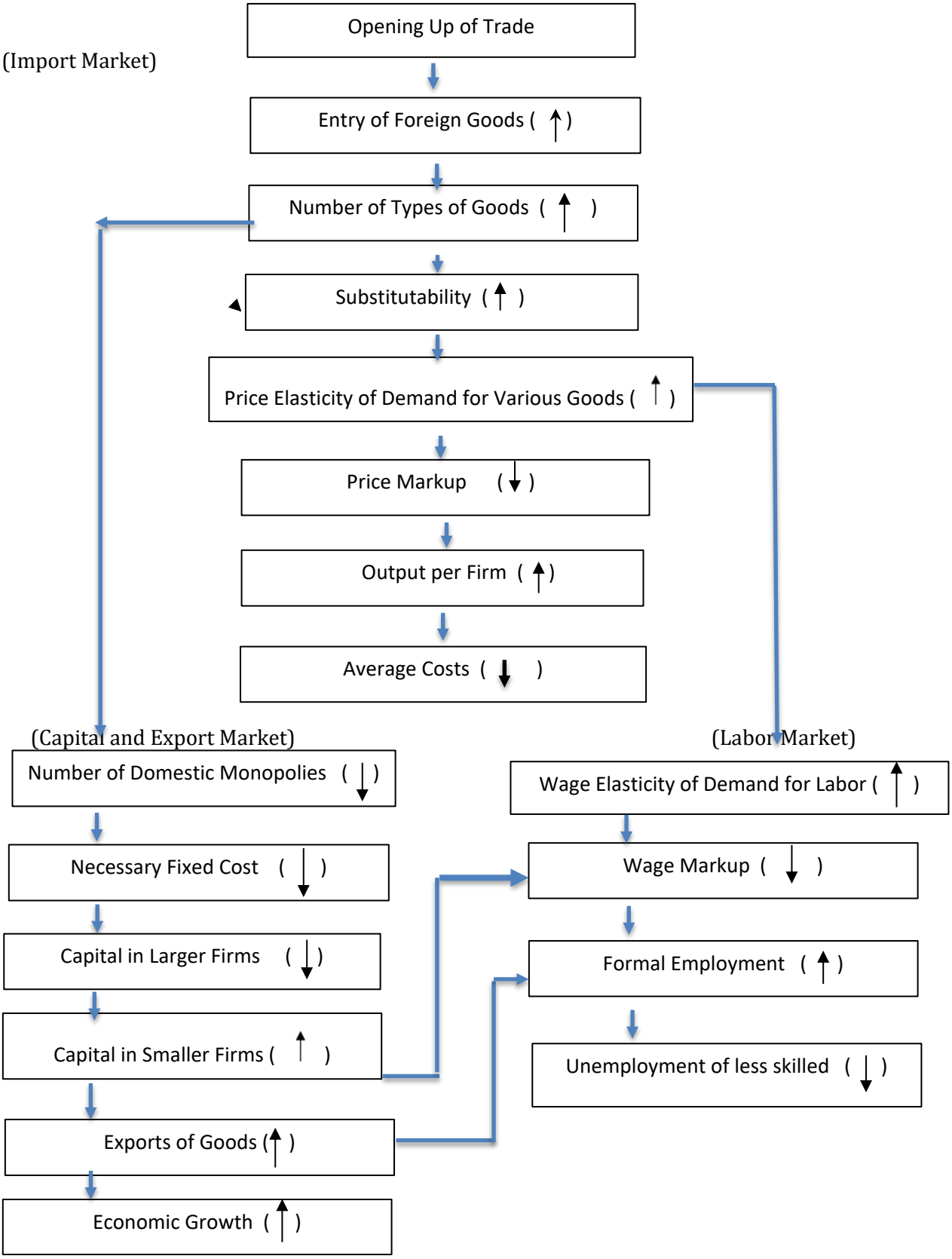
trade sector, however, indicates that the existing trade policy of the Philippines has not reached its objectives as regulations continue to limit the tradable sector.

In traditional trade theory, firms are assumed to be competitive and produce at the point where there are constant returns to scale, i.e., at full capacity. However, markets are imperfect, and that firms are operating at increasing returns to scale with excess capacity. Markets are characterized by differentiated products, imperfectly competitive, or more specifically, engaged in monopolistic competition. Based on several studies, the empirical regularities from trade under this type of market are threefold: (a) increase in the amount and types of goods consumed; (b) decrease in the monopoly powers of domestic firms; and (c) decrease in the average cost of production as the imperfections in the factors market are decreased, if not eliminated (Feenstra, 2016; Jacquemin, 1982). In addition to these factors, technological influences the type of labor used.
Trade liberalization thus remains the main element in making markets competitive. The mechanisms through which trade can achieve competitiveness and inclusive growth can be found in Figure 1. The framework shows an integration of the product, capital and labor markets.

For the product market, opening trade results in a greater variety of differentiated products that benefit consumers as well as the firms that may use these goods as inputs. These then create more variability of goods which reduces the market power of domestic monopolies. This reflects the basic assumption in conventional theory that the best way of eliminating market power is by enhancing markets, particularly international trade.

For the capital market, the increased number of foreign investments leads to lesser domestic monopolies. With more competition and greater innovation, firms become more efficient and bring down fixed costs which allow similar firms to enter the market. As larger firms lose their dominance and with greater differentiation, smaller firms will be able to gain more capital, resulting in greater economic growth. The increased inflow of resources can then spur the growth of the export sector.

Figure 1. Mechanism of Gains from Trade under New Trade Theory



Source: Goto (1990)

Finally, for the labor market, the increased elasticity of product demand translates to an increased wage elasticity of labor demand. As firms reduce their prices, wages are also likely to decrease with more employment expected from the greater output. This reduces the ability of organized labor to ask for wage increases. Along with greater output per firm, this reduction in wage markup will result in more employment and less unemployment, allowing more inclusiveness as a greater number of workers, including the unskilled labor, benefit from the trade process.

Hence, the impact of trade on labor depends on the increases in output and capital formation as integration across various economies results in a larger pool of these resources and products. The central message is that trade and investments are necessary for growth since these affect not only the performance of the products but also the factors market. Inclusive growth fundamentally depends on the distribution of gains that can be secured from both the labor and capital markets.

However, having previously decreased tariffs consistent with its WTO and other trade commitments, and had actively pursued trade liberalization since the early 1990s, the Philippines has not realized these gains. While other Asian countries with the same factor supplies undertook similar trade reforms, asymmetries in outcomes are observed between them and the Philippines, with the latter failing to maximize gains from globalization. Indeed, while other countries have been able to sustain their transformation through this process, the Philippines have not been able to do so. Furthermore, within the Philippine economy itself, disproportionate and inconsistent effects across labor and capital markets are notable.

Observed outcomes that are different (or asymmetries) can be attributed to main factors (Goto, 1990). First, the country's regulatory system can constrain the country by preventing more goods to enter the market, and in the process strengthening, instead of weakening, the monopoly power of firms and the bargaining power of large labor unions. In addition, a poor regulatory system can also limit innovation in the country, resulting in greater costs of production. The design of regulations may affect trade and competition policies, making these insufficient for achieving inclusive and sustainable growth.

In the Philippines, a compelling reason for choosing certain types of workers may be the regulatory system. Regulations are expected to address existing market failures such as negative externalities, asymmetric information, and market power. For instance, minimum wages can cause the firms to choose only the more educated and experienced workers to avoid training costs. This means that the observed phenomenon where only the highly skilled workers can find work can be explained both by the skill-based technology change or simply by the regulatory policy. Since this is an empirical issue more than a theoretical issue, then it is crucial to conduct empirical tests to test these varied hypotheses.

Second, other countries and domestic industries have invested in both physical and human capital, allowing them to establish global best practices and gain some technological advantage (Stiglitz and Greenwald, 2014). This reflects a learning environment that can allow the country to adopt and exploit the available technology and hence produce more goods. In which case, this technological system also

determines the type of industries that will prosper in the economy and the type of workers who can engage in higher productivity sectors.

To maximize the use of the country's resources, the key element is the set of investments to enhance indigenous capabilities in promoting technological change. Interpreted as another form of technology transfer, direct foreign investment can be interpreted as a substitute for the development of indigenous capabilities (Evenson and Westphal, 1995). Foreign investors however may be less aware of the sensitivity of technology to the local environment and the heterogeneous local circumstances than the domestic firms. While these investments embed specific technical assets that can initiate adaptive technological changes, the decisions made would be different if the domestic firms were the ones investing. Because they lack familiarity with the local conditions and because their judgments are conditioned by own external experiences, the returns from these investments can be sub-optimal.

3.2 Empirical method

The concept of catch-up economic growth would be relevant and can form as the basis of a theory of change. This involves the ideas of asymmetries and convergence. The main argument is that technological followers benefit from the technology created by technological leaders. The strong version of this proposition is that an inverse relationship between technological capabilities at any point in time and subsequent productivity (as well as economic) growth.

The mechanism or underlying process can be described as technology transfer. Followers, with appropriate policies and investments, are expected to learn about the leaders' technologies, choose the best for a particular purpose and then implement them. This however is easier said than done. Several factors come to play, particularly adverse institutions and deficient policy regimes which are responsible for the failure by most less developed countries (LDCs) to achieve the catch-up process. Nonetheless, the crucial elements are investments. No LDC has accomplished rapid economic growth without continued technological investment.

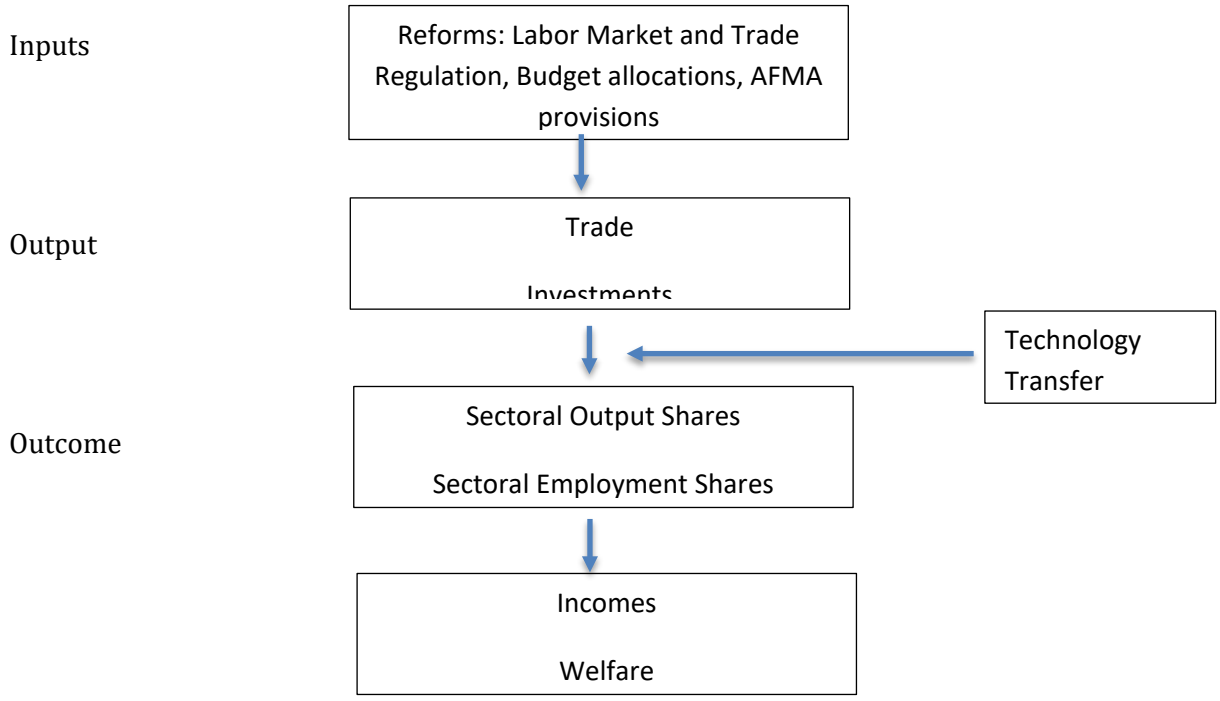
The literature has determined other mechanisms where foreign firms may contribute importantly to technological development through spillovers or positive externalities to local firms. The most common externality is through the migration of foreign-trained workers. Other forms of spillovers may occur through transfer of technology from foreign firms to their affiliated local suppliers. To examine these spillover effects, data relating to foreign investments were collected. Hence, the source of the investment may be important. Foreign investments reported in the Board of Investments (BOI) or the Philippine Economic Zone Authority (PEZA) may have different consequences from the investments in other sources. The quality of investments is assumed to differ depending upon the source of these foreign investments.

The crucial point is that investments are not all the same in terms of how they affect technology and thus industrial transformation. Some investments bring in capital that may result in a greater share of industrial output but can cause a reduction in the use of labor. On the other hand, there may investments that consider the local context and result in greater productivity of labor. Investments in agriculture that raise labor productivity and hence allow more workers to be transferred to industry can be ideal.

Through AFMA and other reforms, the government could have encouraged more of these types of investments which consider technological changes as a system that result in greater labor employment, and productivity.

Based on these considerations, Figure 2 presents the proposed theory of change. The essential point in this theory is how technology transfers, or the lack of it, can affect the outcomes related to structural transformation. Technology transfers, which are fundamentally sourced from the government but adapted by the firms will include all forms of technological innovation including knowledge spillovers. This considers the environment in which industries are located and thus incorporates the level of urbanization and the associated agglomeration. The presence of technology transfers influences the impact that trade and investments will have on the outcomes since this will affect the costs of the firms and hence their ability to adapt the appropriate technologies and undertake the transformation. It is expected that different firms categorized by ownership and source of capital can influence the outcomes depending on their technical responses to the government policies.

Figure 2. Theory of Change



Source: The author

Investments can be divided by ownership (i.e., domestic, or foreign) as well as by source of funds (i.e., public, or private). The outcomes sectoral changes in output and employment shares, the two main parts of the structural transformation. The impacts are improved incomes and welfare for the population. Like trade, investments are essential parts of the economic system and are not substitutable to technological transfers. The main point is these policies should be integrated into a comprehensive plan that will affect structural transformation.

For the empirical model, the relationship between the output and outcomes will be measured. The effects of inputs on the outputs will be used as instruments for the

outputs if feasible and if data permit. Impacts are not measured since this goes beyond the limits of the project.

A more feasible option is to use the labor data to determine which sector the workers will decide to work in. The impact of trade and investments on structural transformation can be measured through such decisions. The strategy is to use data with time or cohort dimensions to control for unobserved-but-fixed idiosyncratic variables affecting the workers.

The study will then look at the employment from the workers' perspective, emphasizing differential effects that the policy may have on different groups of workers (Lanzona, 2014). Using a multinomial probit model designed to determine the effects of regulatory policy and investment, the model will examine labor supply decisions at three levels:

A. Employment vs. Unemployment
B. Employment across Agriculture, Industry, and Services

The estimates from these can reflect the effect of policy on a broad measure of unemployment as well labor distribution into various sectors and consider its differential effects on demographic subpopulations.

Using pooled data and conditioning for regional effects, the tentative model is as follows:

$$y_{imt} = \sum_m \delta_m x_{imt} + \sum_R \delta_R R + \sum_t \theta_t t + \sum_s \gamma_s Z_t + \mu_t U_{it} + \pi_t U_{it} \cdot t + \sum_s \rho_{it}(U_{it} \cdot t \cdot Z_t) + \varepsilon_{it}$$

Where y_{imt} is the observable wage employment status of individual i who belongs to subpopulation m, indicating whether at the time t or she will be employed or not in a particular sector as opposed to another sector. This variable takes a value of one if the individual is employed and zero otherwise. The x_{imt} is a vector of variables that reflects the personal characteristics of individual i at time t such as age, gender, or education or skill level, t is variable for year fixed effect, R is for the regional fixed effects, and Z_t is a vector of variables that may vary with t. Among the variables in Z_t is an instrumental variable for labor policy and investments, including minimum wages for the industry, as well as (net) trade variables. Given the interest in investments, we categorize investments into several types: domestic and foreign which in turn will be divided by sources, such as BOI and PEZA.

The term U_{it} indicates whether the person is residing in an urban area or not. In the empirical analysis, urban centers are defined as those that are particularly industrial. This means that this will be limited to Metro Manila, CALABARZON, and Central Luzon. The key point is that urbanization is a measure of institutional and industrial innovations that result in the greater provision of public goods (Annez and Buckley, 2009). This instrument is used to identify the effects of urbanization and its associated benefits, such as agglomeration and other urban goods, on the decision to work and to engage in industries or any other sector. However, because the impact of urbanization is influenced by time-varying factors, interaction with time variables is included. Hence, π_t is the average effect of urbanization across time on labor, the measurement that is of interest. A positive π_t for industry, employment is seen as a favorable trend for structural transformation. It needs to be pointed out that in the data, because of

regional development, certain rural areas in previous periods are defined as urban in the succeeding period.

Multiplying this interaction term to all the trade and investment variables, we can then define the impact of these variables on the urban areas across time on the worker's labor decision. Hence, the coefficient of interest would be ρ_{it} which defines the effects of the Z_t on the urban or industrial areas.

In this case, we consider the variables that measure the extent to which the proportion of domestic investments to total investments can affect the use of labor and measure how the proportion of foreign investments, say from the BOI list, influence labor supply. The direct effect of investments or trade on employment will be reflected in the γ_s coefficient, while the interactive term, $U_{it} \cdot t \cdot Z_t$, will account for the impact of the investments on urban workers on average. The latter will give us a sense of which workers move to different sectors and are benefitted by the investments. Ideally, workers who are in the urban are expected to be employed in the industries, as opposed to agriculture.

Since these variables may be affected by the same unobserved factors that affect labor market participation, there is a need to estimate this model in multiple stages, such as first analyzing investments as a function of policy variables, such as AFMA or financial subsidies. The point is that observed factors can be affecting both the labor supply and investment decisions. Given the endogeneity of these variables, various regressions of these variables will first be conducted, and the predicted values of these variables will be used in the regression to weed out the error terms that can cause simultaneity biases. Furthermore, these regressions of variables should be distinct equations from one another to completely identify them.

3.3 Data

The study will use a pooled data set extracted from the Labor Force Surveys from 2010 to 2020. The data provides information on the worker's residence, their schooling and their age, and their reported work activities across different sectors.

Aggregate annual data were gathered on the following regulation, trade, and investment variables:

1) Labor Market Regulations: Minimum daily wages in the non-agricultural sector from 2010 to 2020. The minimum wage is the key indicator of labor regulation. Based on the previous discussion, higher minimum wages will cause employment in all sectors to decline. As a result, more capital accumulation is expected. However, if firms possess monopsony power, higher minimum wages flatten out the marginal costs of firms and encourage the firms to hire more workers (Robinson, 1969). There is also literature linking market power to technology through the latter's effect on scale economies and competition (see Carlton and Perloff, 2005). Firms that use capital-intensive technology are more likely to possess market power if access to capital is limited to a few firms.
2) Trade: The total value of exports and imports was collected from 2010 to 2020. Based on the conceptual framework (Figure 1), increased net trade is expected to increase economic performance and employment. However, if trade fails to utilize local resources and remains dependent on imported inputs, then the trade experience can cause reduced employment.

3) Investment: varied types of capital accumulation, both financial and physical. Based on the conceptual framework, these factors increase the capacity of the firms to produce and thus increase employment. However, if firms adopt the existing technology, the level of production falls below the maximum and the opposite effect may be observed. The following data were obtained from 2010 to 2020:
   a) Gross Capital Formation defined by the total value of the gross fixed capital formation, changes in inventories, and acquisitions (less disposals of valuables) including infrastructure.
   b) Private Inventories which are part of gross private investment of GDP that represents the difference between production and sales during the period;
   c) BOI investments both by foreign and local entities which represent equity in a Filipino corporation.
   d) PEZA investments both by foreigners and local entities in export-oriented enterprises located within identified processing zones.
   e) Power consumption of industrial firms representing part of the costs of business operation.

Empirical results

The results of the paper are categorized into two levels. At the macroeconomic level, cross-country comparisons are conducted. Assuming equally sufficient capital and labor and globally available leading-edge technology, countries should experience comparable standards of living.

The difference should be traced only to rents from intellectual property rights and possibly varying factor supplies. This, if an enormous divergence is observed, the gaps can be attributed to differences in technology transfers that lead to technology diffusion and adaptation. In this case, compared to comparable countries in Southeast Asia, the Philippines is noted to have fallen short of its structural transformation.

At the microeconomic level, regional and individual worker analyses are made. In this section, the effect of technological factors on the Philippine structural transformation is estimated. The regional concentration of the Philippine industry indicates that the firms are not achieving their full production potential.

4.1 Macroeconomic perspectives

Table 1 shows a comparison of sectoral output shares across three comparable ASEAN countries, namely Indonesia, Thailand, and Vietnam. All countries are experiencing lower output shares in agriculture. However, the Philippines has the least degree of product diversification, with services registering 60 percent of its output in 2019. While part of this can be traced to the Business Processing and Outsourcing (BPO), a substantial portion of these activities are in low productivity and small scale in nature. The highest decrease in agriculture is also found in the Philippines, but unlike other countries, the resources were not transferred to either manufacturing or other industry.

Table 1. Output Structure (% of GDP)

	Indonesia			Philippines			Thailand			Vietnam		
	2010	2019	*Change*	2010	2019	*Change*	2010	2019	*Change*	2010	2019	*Change*
Agriculture	13.9	12.7	-1.2	13.7	8.8	-4.9	10.5	8.1	-2.4	18.4	14.0	-4.4
Manufacturing	22.0	19.7	-2.3	21.9	18.5	-3.4	30.9	25.6	-5.3	12.9	16.5	3.5
Other Industry	23.4	23.4	0.0	10.4	11.8	1.4	9.0	8.0	-1.0	31.7	27.9	-3.8
Services	40.7	44.2	3.6	53.9	60.9	6.9	49.6	58.3	8.7	36.9	41.6	4.7

Source: World Bank

Table 2 shows the sectoral employment shares for the same four countries. All countries have declining employment shares in agriculture, but the Philippines has the lowest share in industry. Furthermore, the growth seems to be more directed to services.

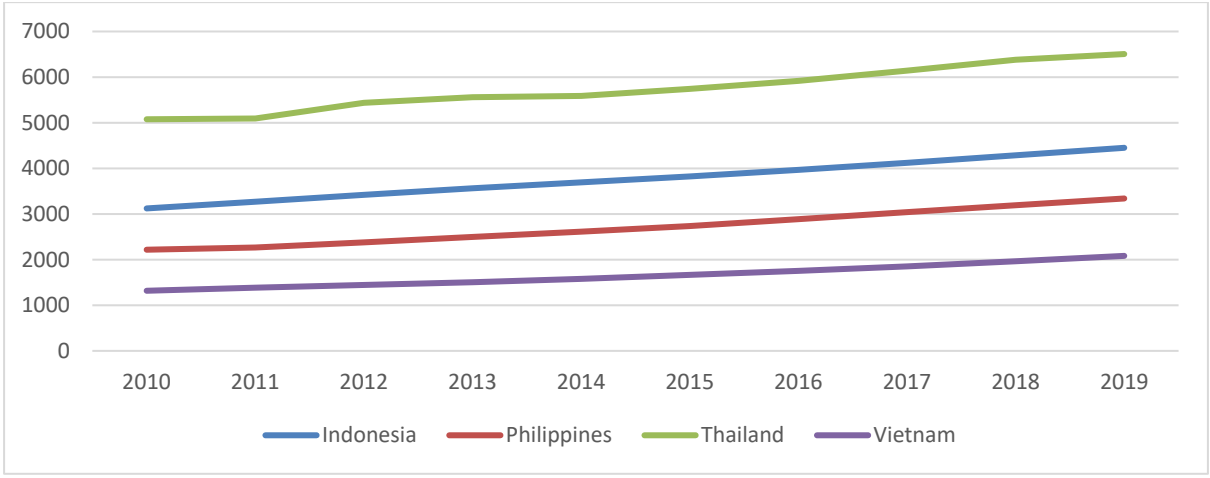
Table 2. Employment Structure (% of Total Employment)

	Indonesia			Philippines			Thailand			Vietnam		
	2010	2019	*Change*	2010	2019	*Change*	2010	2019	*Change*	2010	2019	*Change*
Agriculture	39.1	28.5	-10.6	32.9	22.9	-10.1	38.3	31.4	-6.8	48.7	37.2	-11.5
Industry	18.6	22.4	3.7	15.7	19.1	3.4	20.6	22.8	2.2	21.7	27.4	5.8
Services	42.2	49.1	6.9	51.4	58.0	6.7	41.1	45.7	4.6	29.6	35.3	5.7

Source: World Bank

The overall effect of these structural movements can be seen in Figure 3 which presents the respective GDP per capita of the countries. Thailand which has the highest manufacturing share in total output also has the highest GDP per capita. Vietnam, whose economic progress started later compared to the other countries, has the highest share of employment in industry and the highest growth rate in GDP per capita, increasing by roughly two times per year. While Indonesia has a similar sectoral composition as the Philippines, it possesses oil reserves that could have pushed its GDP higher than the Philippines. These cases indicate the importance of achieving an industry-led structural transformation not only in terms of reaching a higher GDP per capita but also as a strategy of obtaining factor supplies to achieve sustainably substantial growth rates. Furthermore, in comparison to Thailand, the difference in GDP per capita is too significant to attribute it to factor accumulation, but more to the quality of structural transformation.

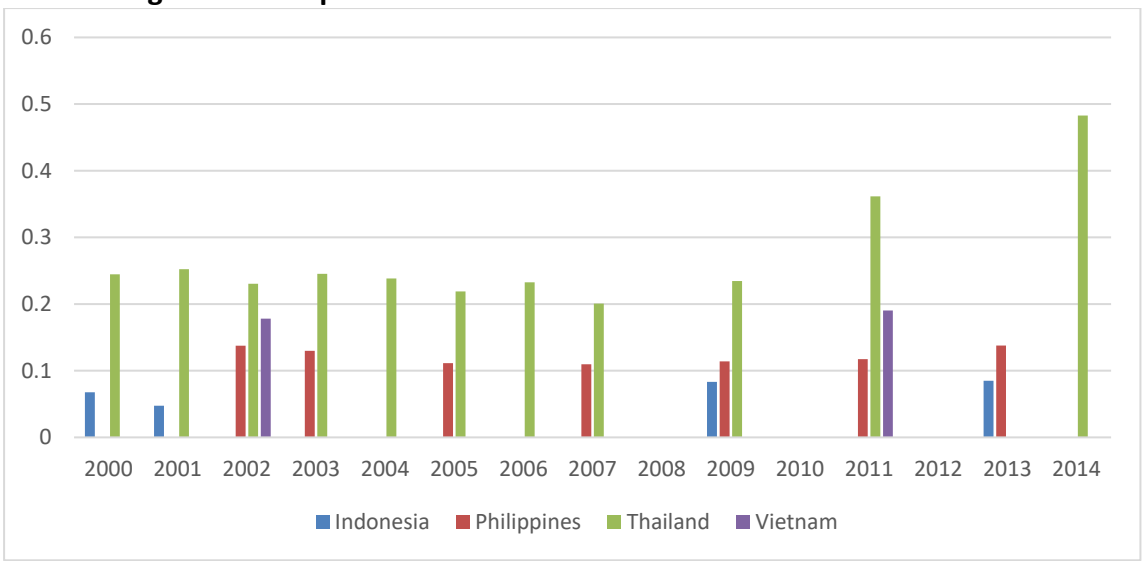
Figure 3. Gross Domestic Product per Capita (in Constant 2010 US Dollars)



Source: World Bank

The quality of the structural transformation can be noted from the differences in R&D expenditures across all countries. As noted, the AFMA mandates the government to allocate a specific portion of the GVA to R&D, but the problem is how the private firms will adopt the basic research. Figure 4 shows the available data on the total R&D expenditures to GDP. Expenditures include both capital and current expenditures in the four main sectors: Business enterprise, government, higher education, and private non-profit. R&D covers basic research, applied research, and experimental development. While Thailand has invested increasingly in R&D over the years, the share of R&D has largely remained constant and has been declining as GDP increases.

Figure 4. Percentage of R&D Expenditures to GDP



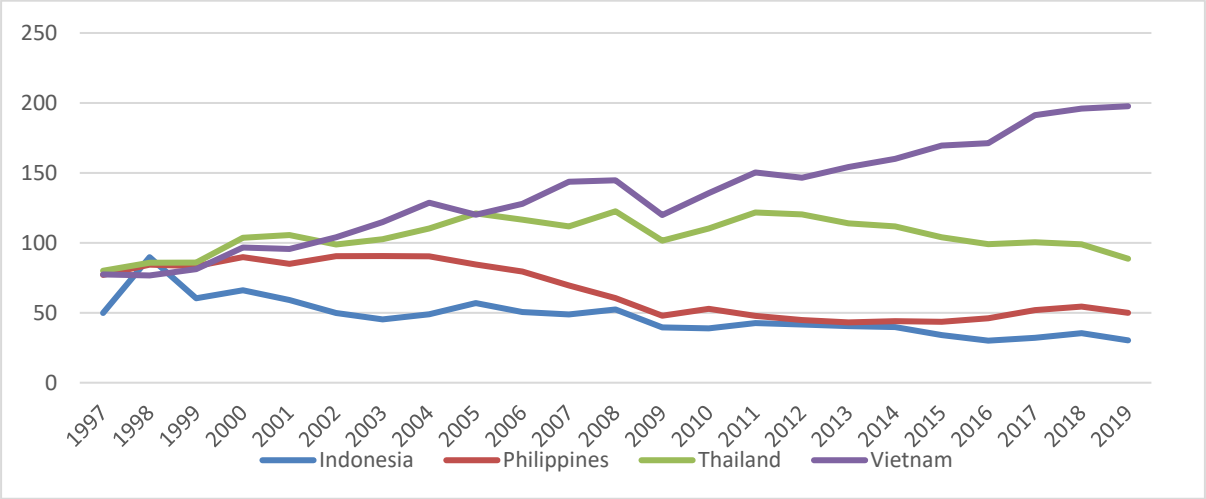
Source: World Bank

The inability to maximize the use of existing technology has consequences in three main areas. The first lies in trade. Based on an IMF study, the growth of the Philippines is caused more by domestic rather than international factors. Thus, unlike the other

emerging market economies (EMEs), it can withstand global market disruptions, such as the slowing down of the Chinese economy[2] (WTO 2018).

However, Figure 5 indicates that the economy has not reached its potential relative to the other countries, especially in trade. In 2016, the ratio of merchandise trade (exports and imports) to Gross Domestic Product (GDP) was only 48.2%, compared to 99.5% in Thailand and 171.2% in Vietnam. In the period from 2012-2015, exports of the Philippines showed a substantial improvement in 2014 at US$61.8 billion, but then slowly diminished in the succeeding years. In 2016, total merchandise exports were only valued at US$56.3 billion, slightly higher than the US$48 billion in 2011 or only 17% growth in five years. The fluctuations of merchandise exports indicated a slowly declining external demand for Filipino goods" (WTO 2018).

Figure 5. Percentage of Merchandise Trade to GDP



Source: World Bank

Imports have been increasing since 2011. In 2016, merchandise imports was valued at US$85.9 billion, registering a year-on-year growth rate of 23.4% (WTO 2018). Theoretically, an increased number of foreign goods should bring down fixed costs which allow similar firms to enter the market. In turn, the increased inflow of resources can also spur the growth of the export sector. However, the total trade performance of the Philippines continues to be underwhelming due to poor export growth that can be traced to higher costs of production.

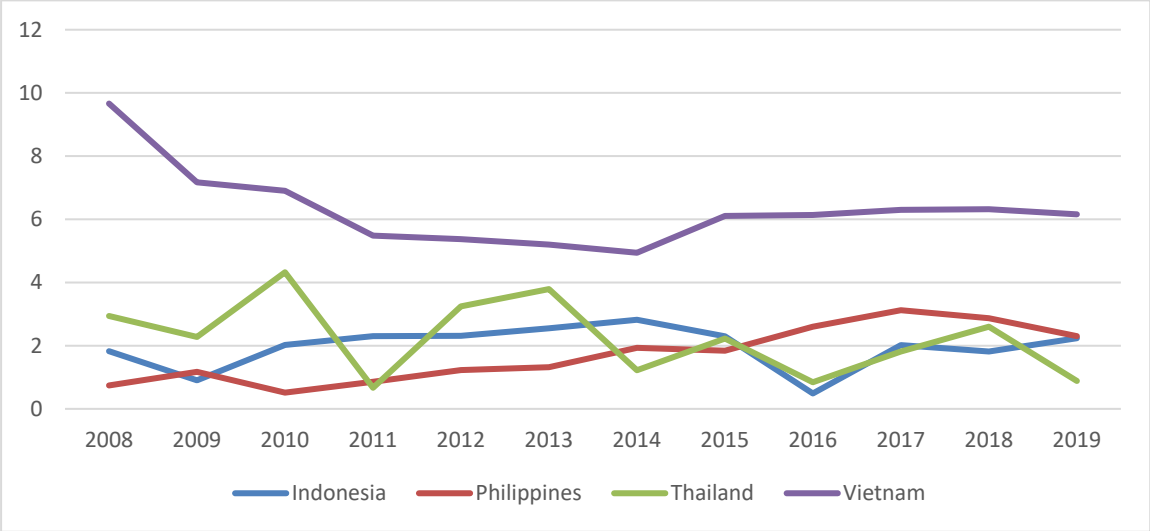
Second, a key policy in AFMA in attracting foreign investments into the country and achieving industry dispersal has been the use of fiscal incentives. As already mentioned, foreign investments are processed through the BOI or the PEZA. The BOI is attached to the Department of Trade and Industry (DTI) and promotes any type of solid investment mainly in the form of equity. Upon registration with the BOI, investors setting up their own firms can have the following incentives: income tax holidays, deduction of labor expenses, and the unrestricted use of consigned equipment. Nevertheless, these BOI-registered businesses are must export 70% of their total production, with the restriction that foreign-owned companies must be at least 40% Filipino owned after a given number of years.

[2] IMF Working Paper WP/16/214, November 2016

The PEZA provides tax incentives and other forms of investment assistance to foreign investors interested in establishing business operations in the Philippines. Registration with PEZA confers upon the companies special benefits which includes tax holidays of up to 4 years, a special 5% tax on gross income, permanent residency for foreign investors (after an initial investment of Php 150,000) and other payment exemptions, particularly labor expenses. The only requirements are to locate in special PEZA zones and to export 70% of their total production.

The incentives however have not been sufficient in attracting as many investments as the other countries. Figure 6 shows the percentage of FDI to the GDP. The Philippines recorded substantial growth beginning in 2011. The inflow of FDI amounted to US$7.9 billion in 2016, substantially higher than the US$1.9 billion in 2011. The Netherlands, Australia, the United States, Japan, and Singapore were the major source countries of FDI with more than 60% in the manufacturing sector (WTO 2018). However, this cannot be attributed to the incentives provided to the incentives, but to the significant economic growth and improved governance that reduced costs of doing business during the period (Lanzona, 2016).

Figure 6. Percentage of FDI to GDP



Source: World Bank

The issue is that these incentives are viewed as part of the marginal cost-benefit evaluation of investments intended to raise capital, and thus subject to changing conditions in the industry and the country, such as income and other input costs. Among these conditions will be access to new technology, especially by the smaller firms. If technology transfers are not available, these incentives may have limited efficacy.

The ineffectiveness of the fiscal incentives, apart from its consequent inefficiency (see Lanzona and Pacqueo, 2017), has led to a review of these incentives and the passage of a new law, Republic Act No. 11534 or the Corporate Recovery and Tax Incentives for Enterprises (CREATE), focuses on the corporate income taxes. Unlike the fiscal

incentives, corporate income taxes are neutral to the production level since these taxes do not affect marginal costs.

Finally, Table 3 features the percentage of rural employment per sector for these four countries. Unlike other countries, the Philippines has an increasing share of workers in rural areas.[3] Even in agriculture, the share of agriculture in other countries has increased, indicating that they may have progressed more in agro-industrial growth. Industrial activities in rural areas tend to be generally small-scale because if otherwise, the area would have been urbanized. This seems to suggest a difficulty on the part of the rural areas to transition towards greater agglomeration seen in urban areas as cities are not able to generate the crucial knowledge spillovers that result in technological innovation and economic growth. Hence, incentives to work in rural areas are raised.

Table 3. Rural Employment Structure (% of Employment per Sector)

	Indonesia			Philippines			Thailand			Vietnam		
	2010	2019	Change	2010	2019	Change	2010	2019	Change	2010	2019	Change
Total	58.6	45.7	-13.0	52.2	54.3	2.0	67.5	54.4	-13.2	72.4	67.2	-5.2
Agricultural	89.7	80.7	-9.0	84.7	84.2	-0.5	92.3	80.2	-12.1	92.0	89.8	-2.2
Industry	45.2	37.5	-7.7	37.7	47.7	10.1	63.6	49.4	-14.3	64.1	64.1	0.0
Services	35.8	29.1	-6.7	35.9	44.7	8.9	46.5	39.1	-7.4	46.3	45.8	-0.5

Source: ILO Modelled Estimates

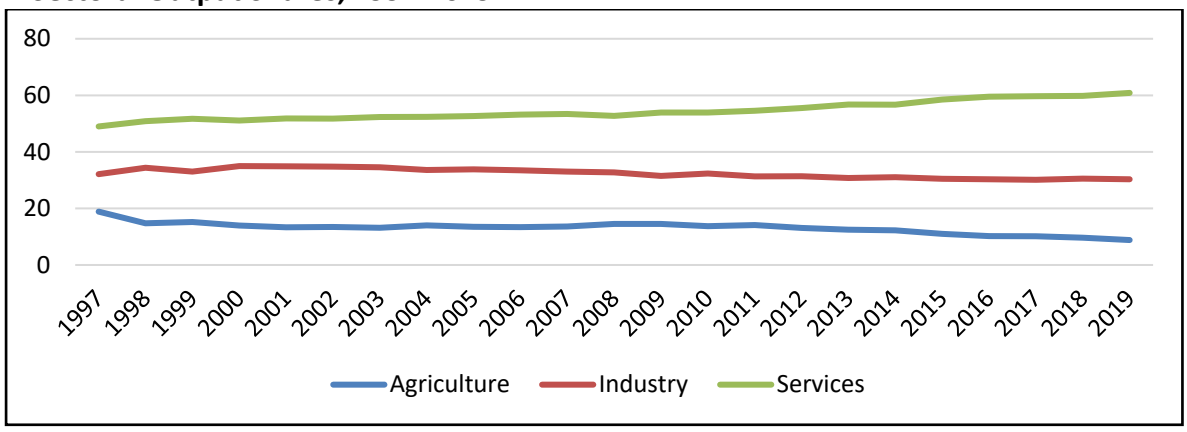
4.2 Microeconomic perspectives

Before the pandemic in 2020, the Philippine economy has improved since 2012, achieving an average annual rate of about 6%. Growth was achieved mainly through consumption and infrastructure investment. Gross Domestic Product (GDP) per capita in 2016 reached US$2,950 , 13 percent higher than the US$2,580 in 2012. The poverty rate fell from 25.2% in 2012 to 21.6% in 2015. While services remained the dominant sector in terms of contribution to GDP, the fastest-growing sector was the exports sector (WTO, 2018).

However, the figures below show why Philippine structural transformation remains unsuccessful. Figure 7 shows the movements in output shares starting in 1997 when AFMA was ratified. The output shares indicated that even at the start of AFMA, the shares of services and manufacturing were already higher than agriculture. However, industry was not able to able to overtake services which continued to grow over time. Both industrial and agricultural shares remained stagnant and even declined in the later years as services continued to increase.

[3] For this table, the ILO definition of rural areas is based on the national categories use for classifying areas in 80 member states and may not associate urban areas with industrial areas.

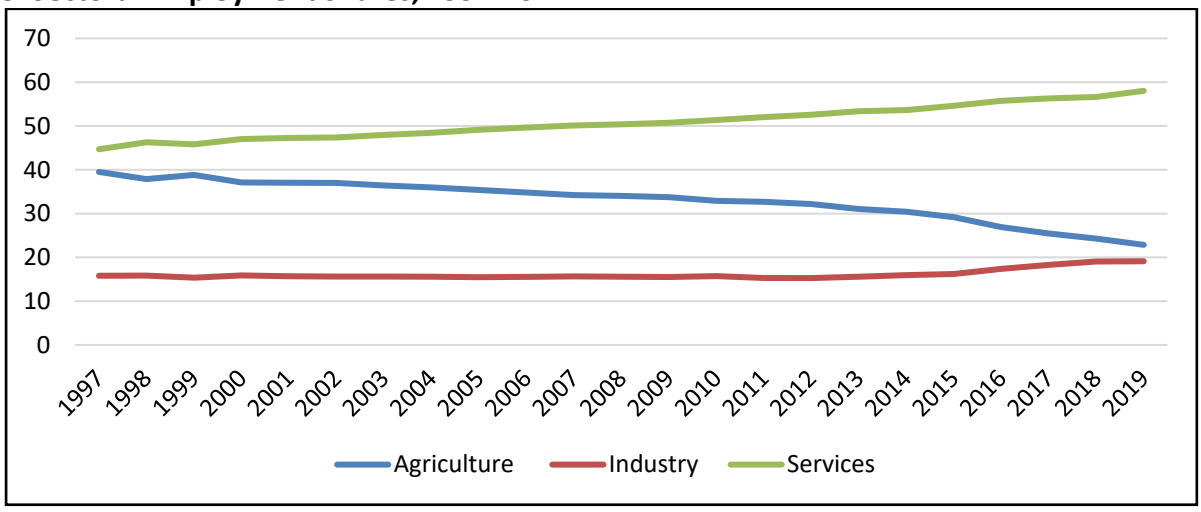
Figure 7. Sectoral Output Shares, 1997-2019



Source: Philippine Statistics Authority

The failure of the country's structural transformation can be seen more clearly in terms of employment shares. Figure 8 presents the sectoral share also beginning the ratification of AFMA up to 2019. As agriculture remained stagnant and as wages became lower, workers did not move to manufacturing but instead shifted to services. In the later years, as agriculture became more mechanized and labor improved, workers moving out of agriculture continued to move to services.

Figure 8. Sectoral Employment Shares, 1997-2021

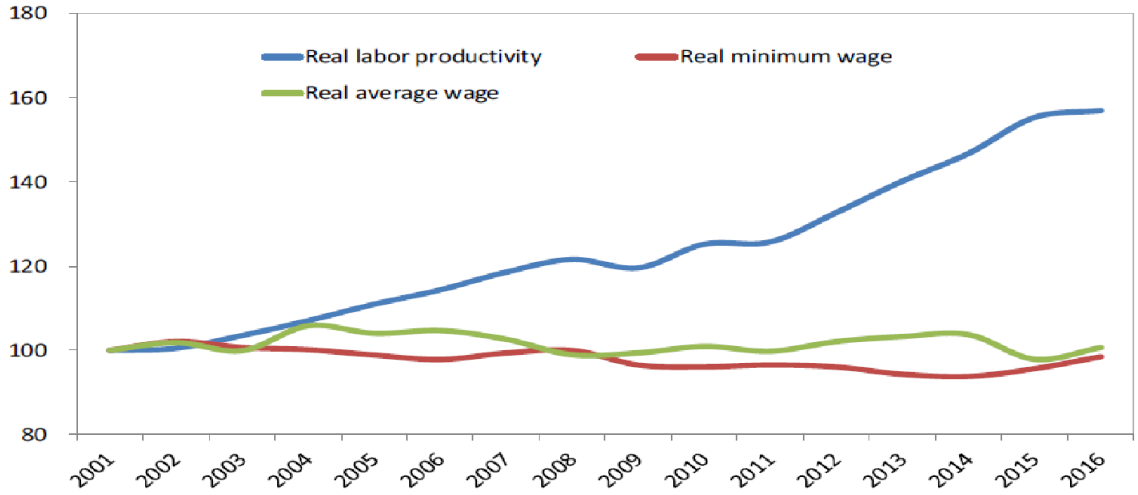


Source: Philippine Statistics Authority

At the level of the industries, two main challenges prevail. First, the influx in capital has reduced the share of labor in total production. The recent Jobs Diagnostics conducted by USAID Philippines (Avila,et. al. 2017) presented various evidence showing the higher capital intensity of the more competitive firms in the country. In particular, the backward linkages of the largest firms, particularly in manufacturing, have slipped, as evidenced by the latest I-O tables. This divergence in backward linkages between the primary and service sectors and industry is also accompanied by declines in the employment multiplier in the latter sectors. Finally, there is also a divergence between the growth in household income multipliers, which had increased because of higher minimum wages, and employment multipliers.

Second, because of these changes, average labor productivity has improved due to greater capital share, but the real wage has nonetheless remained constant. Figure 9 shows that the output per worker has increased substantially because of GDP growth, but real average wages have remained constant. This means that the contribution of capital to GDP in the economy has outstripped labor as the relative share of capital to production relative to labor share has increased. In effect, the income benefits of economic growth have not been felt by a larger proportion of the population. More importantly, given that the country is abundant in labor, its competitiveness depends largely on how well it should be able to use its most available resource. This is particularly important since the country is currently undergoing a demographic transition, resulting in a greater proportion of people in their working ages to population.

Figure 9. Indices of Real Labor Productivity, and Real Minimum and Average Wages



Sources: National Wages and Productivity Commission, Philippine Statistical Authority, and DOF staff estimates.

These two issues, i.e., the limited trade volume and the increasing capital share in production, can be traced to two possible factors: (a) the skill-based technology change that can arise from the country's trade and (b) the current regulatory system which makes unskilled labor relatively more expensive. Despite the abundance of labor, these technological factors and regulations have made it more expensive to hire more labor and utilize more capital. In the case of regulations, both goods and factor markets cab be dominated by highly imperfect factor markets, hence failing to achieve full employment and inclusiveness.

The country's development has led to the concentration of manufacturing and investments in three main urban regions, i.e., Metro Manila, CALABARZON, and Central Luzon. While several key factors explain this phenomenon, such as comparative advantage, agglomeration economies, and regulatory policies, inordinate control of foreign exchange and import licenses are also found only in the capital city where banks and public agencies are found, making institutional structures another key factor (Tecson, 2007). This suggests that the observed regional concentration is as much a product of history and the consequent distribution of public goods and services which seemingly benefited these three regions.

An indication of geographic concentration is the share in the manufacturing gross value added (GVA) of each region as reflected in Table 4 from 2010 to 2018. Note that more than seventy percent of the total manufacturing GVA comes from only three regions. Table 5 shows the share in total manufacturing employment of each region. Roughly 70 percent of the total employment are also coming from these three regions.

Several points are noteworthy. First, instead of converging, the nation's regions and cities have been growing apart. This contradicts mainstream economic thought which presumes a self-regulation process within market forces whereby the poorer regions will eventually catch up with the more profitable and well-endowed regions. This presumed convergence can come in the form of wage equalization, investment, business formation, and technology. However, over the years there seems to be no convergence especially because new technologies and innovation have mainly benefited the three centers. The absence of any national effort to bring other regions to catch up with these centers can explain this observed divergence.
Second, the high levels of concentration are creating serious negative externalities. These range from spiraling housing prices, traffic gridlocks, and sorting difficulties of workers with college education clustering in these regions. Consequently, the entire nation falls into underdevelopment traps, as individuals who reside in the other regions will be burdened into supporting their local institutions as the more educated and more motivated individuals migrate into the centers (Lanzona, 1998).

Third, given the agglomeration benefits of these centers, industries locate to these areas. In the process, these firms obtain monopsony power in the labor market as workers are left with very limited options. This creates a situation of unemployment and informality as workers are unable to find higher-quality jobs.

Fourth, as already discussed in the literature review, the denser the population, the less likely will the firm invest in R&D. This can be attributed to free-riding tendencies as knowledge within larger cities become more widespread and easily accessible. The second reason is the fear of not being able to obtain the full returns of their technological investment. As a result, the firms would rather tie their innovation to a specific physical or human capital in order to maintain its control over the innovation.

Table 4. Gross Value Added in Manufacturing by Region in Millions of Pesos (Constant 2000 Prices), 2010-2018

	2010	Share	**2011**	Share	**2012**	Share	**2013**	Share	**2014**	Share	**2015**	Share	**2016**	Share	**2017[r]**	Share	**2018[p]**	Share
Philippines	1,930,779	1.000	1,324,330	1.000	1,395,711	1.000	1,538,912	1.000	1,666,514	1.000	1,760,989	1.000	1,885,514	1.000	2,044,186	1.000	2,145,011	1.000
NCR	**335,897**	0.174	**226,149**	0.171	**242,201**	0.174	**308,151**	0.200	**324,144**	0.195	**346,927**	0.197	**369,695**	0.196	**393,037**	0.192	**379,837**	0.177
CAR	78,156	0.040	51,078	0.039	50,011	0.036	50,694	0.033	51,162	0.031	53,401	0.030	55,454	0.029	66,321	0.032	72,560	0.034
I - Ilocos Region	14,224	0.007	9,132	0.007	9,400	0.007	10,453	0.007	11,380	0.007	11,747	0.007	12,061	0.006	12,709	0.006	12,910	0.006
II - Cagayan Valley	2,055	0.001	1,482	0.001	1,494	0.001	1,635	0.001	1,860	0.001	1,906	0.001	2,230	0.001	2,319	0.001	2,315	0.001
III - Central Luzon	**248,468**	0.129	**187,736**	0.142	**194,000**	0.139	**191,425**	0.124	**227,997**	0.137	**243,915**	0.139	**286,596**	0.152	**324,693**	0.159	**342,453**	0.160
IV-A CALABARZON	**844,200**	0.437	**548,548**	0.414	**581,084**	0.416	**620,058**	0.403	**664,103**	0.398	**700,331**	0.398	**726,068**	0.385	**779,712**	0.381	**842,437**	0.393
IV-B MIMAROPA	5,688	0.003	4,322	0.003	4,954	0.004	5,233	0.003	5,966	0.004	5,981	0.003	6,491	0.003	6,812	0.003	7,305	0.003
V - Bicol Region	4,788	0.002	3,776	0.003	3,965	0.003	4,346	0.003	5,173	0.003	5,364	0.003	6,013	0.003	6,215	0.003	6,501	0.003
VI - Western Visayas	21,529	0.011	15,731	0.012	19,102	0.014	21,167	0.014	23,353	0.014	24,140	0.014	25,041	0.013	26,060	0.013	27,278	0.013
VII - Central Visayas	122,912	0.064	86,011	0.065	91,418	0.065	104,185	0.068	114,612	0.069	120,736	0.069	127,938	0.068	135,005	0.066	146,276	0.068
VIII - Eastern Visayas	58,012	0.030	40,834	0.031	24,342	0.017	32,497	0.021	27,283	0.016	26,476	0.015	31,696	0.017	35,910	0.018	33,870	0.016
IX - Zamboanga Peninsula	36,045	0.019	26,690	0.020	36,083	0.026	36,057	0.023	39,577	0.024	40,803	0.023	41,459	0.022	42,825	0.021	45,041	0.021
X - Northern Mindanao	59,618	0.031	44,015	0.033	48,778	0.035	53,339	0.035	56,453	0.034	58,232	0.033	61,657	0.033	65,056	0.032	69,337	0.032
XI - Davao Region	52,206	0.027	39,742	0.030	45,322	0.032	52,043	0.034	61,804	0.037	69,468	0.039	77,314	0.041	86,139	0.042	91,622	0.043
XII – SOCCSK-SARGEN	43,002	0.022	36,191	0.027	40,544	0.029	44,649	0.029	48,343	0.029	48,150	0.027	52,189	0.028	57,585	0.028	61,385	0.029
XIII - Caraga	3,135	0.002	2,350	0.002	2,453	0.002	2,399	0.002	2,704	0.002	2,774	0.002	2,940	0.002	3,089	0.002	3,119	0.001
ARMM	843	0.000	543	0.000	560	0.000	582	0.000	599	0.000	637	0.000	672	0.000	699	0.000	765	0.000

Source: Philippine Statistical Yearbook, Philippine Statistical Authority.

Table 5. Employment in Manufacturing by Region in Thousands, 2014-2018

	2014	Share	2015	Share	2016	Share	2017	Share	2018	Share
Philippines	3,212	1.00	3,209	1.00	3,404	1.00	3,481	1.00	3,625	1.00
NCR	**469**	0.15	**480**	0.15	**512**	0.15	**514**	0.15	**521**	0.14
CAR	20	0.01	19	0.01	20	0.01	24	0.01	24	0.01
I - Ilocos Region	117	0.04	109	0.03	123	0.04	106	0.03	113	0.03
II - Cagayan Valley	44	0.01	43	0.01	42	0.01	60	0.02	53	0.01
III - Central Luzon	**439**	0.14	**458**	0.14	**554**	0.16	**562**	0.16	**557**	0.15
IV-A CALABARZON	**901**	0.28	**903**	0.28	**957**	0.28	**928**	0.27	**983**	0.27
IV-B MIMAROPA	69	0.02	61	0.02	60	0.02	67	0.02	74	0.02
V - Bicol Region	149	0.05	139	0.04	127	0.04	152	0.04	147	0.04
VI - Western Visayas	156	0.05	149	0.05	144	0.04	170	0.05	180	0.05
VII - Central Visayas	333	0.10	336	0.10	297	0.09	303	0.09	316	0.09
VIII - Eastern Visayas	43	0.01	39	0.01	81	0.02	91	0.03	93	0.03
IX - Zamboanga Peninsula	72	0.02	70	0.02	72	0.02	70	0.02	93	0.03
X - Northern Mindanao	111	0.03	102	0.03	104	0.03	122	0.03	135	0.04
XI - Davao Region	109	0.03	115	0.04	118	0.03	126	0.04	135	0.04
XII – SOCCSK-SARGEN	93	0.03	100	0.03	117	0.03	119	0.03	136	0.04
XIII - Caraga	72	0.02	69	0.02	55	0.02	54	0.02	71	0.02
ARMM	13	0.00	15	0.00	20	0.01	14	0.00	26	0.01

Source: Philippine Statistical Yearbook, Philippine Statistical Authority.

Last, the technological gap between regions is likely to increase. In addition to the favorable public goods provided to these regions, technology improves in these centers because of their being adjacent, thereby reinforcing agglomeration economies among the different industrial companies feasible. Moreover, these areas because of internal migration have the largest pool of skilled workers. Because of these reasons, the seventy-three percent contribution of these regions to the manufacturing sector did not decline over time. While the share of the CALABARZON may have declined over time, the increasing share of Central Luzon to total output is seen to have increased.

Another indication of geographical concentration is financial, perhaps an outcome of the concentration of manufacturing. Table 6 shows the foreign direct investments by region. As expected roughly 50 percent of the approved foreign investments are found in the same three regions. Although there seems to be increasing investments in Mindanao, particularly Northern Mindanao, investments in non-traditional regions are varied and unstable. Manufacturers which rely on imported materials for their production are thus more likely to locate near the capital city to obtain greater access to these funds. The average share of NCR has increased consistently even though the share of the CALABARZON area has decreased as other regional areas received investments. These investments, however, as in the case of Northern Mindanao, were related more to infrastructure.

Table 6. Approved Foreign Investments in Millions of Pesos, 2015-2018

	2015	%	2016	%	2017	%	2018	%
PHILIPPINES	245,215.70		219,038.60		105,745.46		178,967.35	
NCR	**34,137.33**	**13.92**	**37,572.42**	**17.15**	**17,404.60**	**16.46**	**37,467.17**	**20.94**
CAR	26,311.12	10.73	24,667.79	11.26	143.7	0.14	396.09	0.22
I - Ilocos Region	725.61	0.30	6,078.41	2.78	10,131.70	9.58	175.96	0.10
II - Cagayan Valley	595.68	0.24	2,164.50	0.99	82.54	0.08	1,322.74	0.74
III - Central Luzon	**22,714.93**	**9.26**	**13,716.72**	**6.26**	**10,623.75**	**10.05**	**21,286.56**	**11.89**
IV-A CALABARZON	**115,647.82**	**47.16**	**94,336.66**	**43.07**	**48,351.98**	**45.72**	**42,331.83**	**23.65**
IV-B MIMAROPA	3,842.71	1.57	1,272.28	0.58	955.07	0.90	1,000.17	0.56
V - Bicol Region	2,020.16	0.82	0	0.00	240.27	0.23	878.76	0.49
VI - Western Visayas	7,194.81	2.93	9,243.05	4.22	6,849.84	6.48	873.54	0.49
VII - Central Visayas	11,697.04	4.77	13,613.66	6.22	6,102.94	5.77	3,728.22	2.08
VIII - Eastern Visayas	38.15	0.02	2.58	0.00	141.25	0.13	0	0.00
IX - Zamboanga Peninsula	0	0.00	205.99	0.09	0	0.00	308.93	0.17
X - Northern Mindanao	3,869.68	1.58	1,520.70	0.69	2,081.76	1.97	64,605.25	36.10
XI - Davao Region	1,733.04	0.71	1,285.26	0.59	687.81	0.65	1,274.66	0.71
XII – SOCCSK-SARGEN	6,462.29	2.64	10,922.55	4.99	657.21	0.62	106.3	0.06
XIII - Caraga	3,114.63	1.27	1,395.95	0.64	409.05	0.39	26.4	0.01
ARMM	0	0.00	1,040.08	0.47	724.69	0.69	235.15	0.13

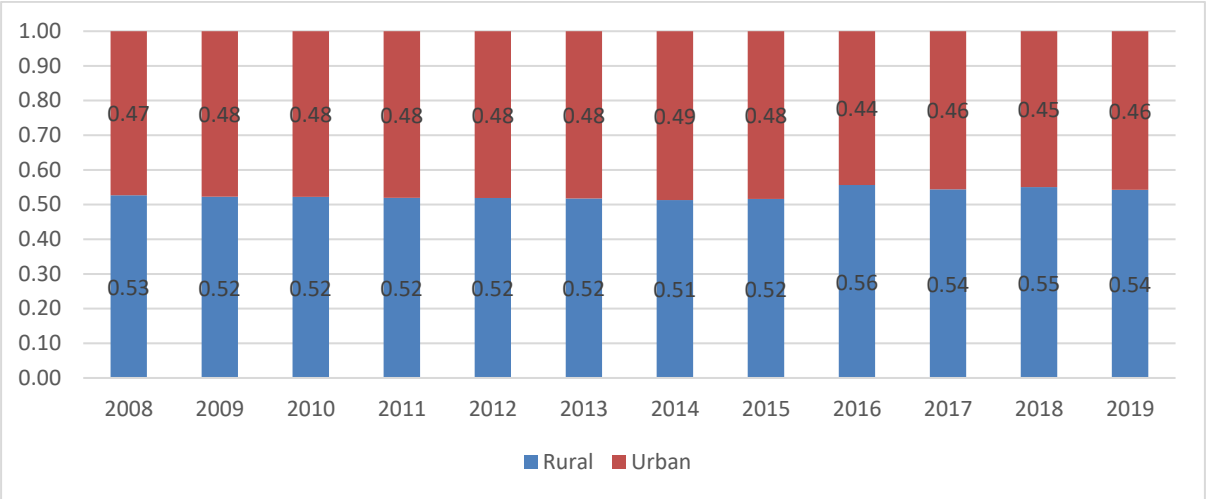
Source: Report on Regional Economic Developments in the Philippines, BSP

While Central Luzon has somehow been able to increase its share in manufacturing, it continues to be an agricultural area. The share of FDI remains only half of what NCR and CALABARZON receive. This suggests that the capital intensity of economic activities in this region is not too significant compared to the other industrial areas such

as NCR and CALABARZON. This can be attributed to the fact that no significant ports or trading stations exist in this area.

Finally, the presence of public goods such as infrastructure and public services e.g., electricity communication leads to urbanization and industrial concentration (Annez and Buckley, 2009). Because urbanization involves individual decisions relating to living and working, it usually accompanies industrialization and entry into export markets. Figure 10 shows that the level of workers in rural areas has remained steady over the years despite attempts to expand urbanization in government plans such as the National Spatial Strategy (NSS) in the Philippine Development Plan.[4] This is consistent with the declining levels of industrialization.

Figure 10. Distribution of Workers by Urbanization, 2008-2019



Source: ILO Modelled Statistics

While it is difficult to determine which factor causes or precedes the other, both urbanization and industrialization are simultaneously driven by public goods and services. A central message in urban studies has been the role of innovation in creating and maintaining cities (e.g., Goi, 2017). Thus, the inability to foster technological innovation in rural areas is one of the key factors explaining why rural areas have remained constant. Given a rapid rise in the number of people who move into and reside in urban areas, the demand for energy management, infrastructure development, waste and environment management, private-public partnerships, economic development plans, healthcare, and education programs. All of these require the implementation of technological innovation.

4.3 Regression Results

The objective of this section is to infer the effects of technological adaptation on workers' decisions to be employed across various sectors using the regression model discussed in the empirical model. Table 7 Panel A shows the means and standard deviations of individual-specific variables by urban-industrial areas (defined as Metro Manila, CALABARZON, and Central Luzon). Panel B of the same table shows the

[4] Since this based on the ILO definitions, the urban areas are not limited to Metro Manila, CALABARZON and Central Luzon.

distribution of work employment categories. Individuals in the main urban areas are observed to be younger, more educated, and employed. Also, these persons worked in services, industry, and manufacturing while those in the rural areas are more employed in agriculture or not working.

Table 7. Means and standard deviations of Individual-specific Variables and Distribution of Employment Categories

	Rural	Urban
Panel A: Individual-specific Variables		
Exogenous Variables:		
Years of Schooling	7.61 (4.39)	9.21 (4.33)
Age	41.09 (16.73)	39.99 (16.15)
Endogenous Variable:		
Employment	0.23 (0.36)	0.23 (0.42)
Panel B: Distribution of Individuals by Work Category		
Unemployed	76.99	66.63
Agriculture	5.94	1.48
Manufacturing	1.66	4.42
Other Industry	4.41	5.33
Services	11	22.14
No. of Observations	756,570	647,712

Notes: Figures in parentheses are standard deviations

Table 8 shows the means and standard deviations of aggregate variables that were used to reflect the policy and programs of the government. All these variables exhibit limited variability, except for Gross Capital Formation and Industrial Power Demand which seem to exhibit episodic movements. Capital accumulation and energy thus remain one of the constraints for structural transformation.

Table 8. Descriptive Statistics of Aggregate Exogenous Variables

Variables	Mean	Standard deviation	Coefficient of Variation	Units
Capital Accumulation:				
Gross Capital Formation	3,360	1020	3.29	Millions (Php)
Private Inventories	-32.60	12	-0.28	Millions (Php)
Trade:				
Exports	3,980	975	0.24	Millions (USD)
Imports	5,140	1590	0.31	Millions (USD)
Labor Regulation:				

Minimum Wage	291.74	67.3	0.23	Daily Rate (Php)
Investments				
BOI Investment (Foreign)	82,381	82,468	1.00	Millions (Php)
BOI Investment (Filipino)	478,870	238,607	2.01	Millions (Php)
PEZA Investment (Foreigner)	123,616	52,280	2.36	Millions (Php)
PEZA Investment (Filipino)	100,491	35,294	2.85	Millions (Php)
Industrial Power Demand	22,867	3,163	7.23	Kilowatt Hours

Table 9 features the computed employment elasticities of the independent variables.[5] The first column considers the probit estimates the probability of engaging in wage employment. The next columns are the multinomial probit results which measure the probability of engaging with different sectors or no work as the base outcome. As indicated earlier for the policy variables, only the interaction terms have some interest in welfare.

The following points are noteworthy. First, schooling raises the probability of wage employment and choosing to work in manufacturing and services. Second, experience also increases the probability of receiving a wage and a higher propensity to work in manufacturing and other industry. Third, urbanization is observed to be important in increasing manufacturing and industry. Creating more urban centers is thus crucial for structural transformation. More importantly, this shows that industrialization is concentrated in the three regions of Metro Manila, CALABARZON and Central Luzon, suggesting that industry dispersal as envisioned by AFMA did not happen. Fourth, gross capital formation however reduces wage employment, suggesting that these assets could have resulted in less employment. Fifth, private inventories, particularly because they relate to investment in direct inputs are also associated with less employment, specifically for agriculture and manufacturing. Sixth, trade variables are seen to have a mixed impact. While imports which increase resources for the economy raise the probabilities of employment in manufacturing and agriculture, exports however reduce these probabilities, especially so for agriculture. This suggests that trade has not been effective for structural transformation in contrast to the experiences of other countries.

Table 9. Elasticities of Wage Employment Based on Regression Estimates

	Wage Employment	Agriculture	Manufacturing	Other Industry	Services
VARIABLES					
Years of Schooling	0.409***	-2.282***	0.148***	-0.875***	1.575***
Age	5.012***	3.014***	7.026***	6.710***	5.107***
Age Squared	-2.696***	-1.861***	-4.053***	-3.567***	-2.689***
Grosss Capital Formation (GCF)	0.919*	6.817***	-14.988***	25.784***	-7.867***
Private Inventories (INV)	0.007	0.056***	-0.097***	0.184***	-0.059***
Exports (EXP)	-0.134	2.786***	1.643	1.023	-1.272*
Imports (IMP)	-1.257**	-10.055***	6.101**	-17.831***	5.811***
Minimum Wage (MINW)	0.044	-0.073	-1.110***	-0.019	0.333***

[5] The full regression models are shown in the Appendix.

BOI Foreign (BOIF)	-0.003	0.030	-0.044***	0.010	-0.036***
BOI Filipino (BOIP)	-0.063	0.734***	-2.437***	3.395***	-1.379***
PEZA Foreign (PEZAF)	-0.0005	0.323***	-0.844***	1.086***	-0.427***
PEZA Filipino (PEZAP)	0.034**	-0.014	0.136**	-0.114**	0.046*
Industrial Power (INDPWR)	3.075***	0.452*	32.047***	-31.330***	14.552***
Year (YEAR)	-0.153***	-0.041***	-0.843***	0.629***	-0.439***
Urban (URB)	-15.529	89.127	-93.124**	-119.024***	-6.552
URB_YEAR	15.619	-91.069	95.247**	122.348**	6.264
GCF_URB_YEAR	-0.963***	-7.531***	-2.550**	3.927***	-0.762*
INV_URB_YEAR	-0.011***	-0.064***	-0.027***	0.026*	-0.009**
EXP_URB_YEAR	-0.360**	-4.489***	-1.992***	0.335	0.073
IMP_URB_YEAR	1.128***	10.343***	4.887***	-3.244**	0.307
MINW_URB_YEAR	-0.010	-0.044	0.695***	-0.012	-0.124***
BOIF_URB_YEAR	0.004	0.058***	0.046***	-0.008***	0.002
BOIP_URB_YEAR	-0.093**	-0.719***	-0.235	0.632***	-0.086
PEZAF_URB_YEAR	-0.031	-0.352***	-0.013	0.209***	-0.017
PEZAP_URB_YEAR	0.001	0.201***	0.084**	-0.033	-0.011
INDPWR _URB_YEAR	0.329	4.104	-2.656	-5.053***	1.067

Notes: Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

Seventh, minimum wages raise the probability of working in manufacturing but reduce that of services. This indicates monopsony power on the part of manufacturing firms, and hence the results indicate the need for more manufacturing firms. Eighth, foreign investments owned by foreigners raise the probability of work in agriculture and manufacturing, but the opposite is found for investments by Filipinos. This indicates that foreign investments in corporations have a better sense of hiring workers. Ninth, in the case of PEZA-registered investments, Filipino-initiated activities are more favorable for employment as foreign-owned investments tend to be labor-saving. These export-oriented activities tend to be more conducive for structural transformation if owned by Filipinos. Finally, industrial power use is associated with less employment in other industries.

These findings suggest the need to consider technology transfers in the push for capital accumulation, industrialization, and structural transformation. This is because most of these findings are contrary to positive expectations. Furthermore, similar elasticities are observed for wage employment in manufacturing and agriculture, suggesting joint movements that are favorable to agro-industrial activities. This means that backward linkages can be crucial in achieving industrialization with the development of backward linkages.

Conclusion and policy directions

The results of the paper show why it is important to consider technology transfers and investments and to focus less on capital accumulation and expanding trade opportunities in the struggle for structural transformation. While the existing national policies on trade and investments are crucial, their implementation may have limited efficacy, if not contradictory effects, unless technology concerns are brought in the open. The goal is to maximize the use of existing technology to develop more efficient

allocations for resources and to determine the appropriate amount of public goods and services. Market power is also observed because of the existing technology situation. Finally, the technology gap found between rural and urban areas form a hindrance towards greater urbanization and industrialization.

The results of the paper have the following policy implications:

1. Trade policy: Being engaged in trade is a means of understanding and adapting to technological innovation. Externalities from trade in the form of learning by doing and knowledge spillovers that come from expanding markets are necessary for the economy to raise its technological status. However, technological investments and the associated investments in training and technical education must be undertaken to ensure that all sectors of the economy benefit. The goal is to prevent the possibility of locking producers in agriculture and industry into the use of outmoded technologies. In which case, a consistent policy of trade liberalization and technological development should be forged by the private and public stakeholders.
2. Public Investment policy: Public investment should not be limited to infrastructure and building fixed assets. Public R&D investments can yield returns in terms of structural transformation. The public sector's role as an entrepreneur and a direct investor in science development is too much taken for granted. Government extension to industry can be expanded by providing subsidies to private sectors suppliers of technology where returns can exceed public sector extension. An expanding scale of production should lead the way towards implementable adaptive inventions coming largely from production experience and knowledge spillovers.
3. Financial incentives: Private investments in industrial research can be subsidized or incentivized through taxes. The overall goal of providing financial incentives to generate capital investments may prove detrimental to technological change as firms may likely choose to spend more on capital rather than to spend on technology. Such incentives are intended to raise the scale of production which technological change may not necessarily provide. The CREATE law which reduces corporate taxes is more superior to the previously offered financial incentives since technological investments are essentially fixed costs that do not change the optimal scale of production needed for profits. In this case, the reduced corporate taxes may be viewed as a technological transfer if the tax savings are made conditional to technology improvements.
4. Backward Linkages: It is not just the development of technology, but technology that can reduce the cost of production and make the process more sustainable. Even without government support, firms may find it profitable access the agricultural products as key inputs. However, technological innovations are necessary for such linkages to happen. Given recent trade policies, which opened importation of food items, especially in rice, more lands can be devoted to producing agricultural inputs for industry. The important point is that these linkages should emerge from the decisions of the private sector and not imposed by the government. In particular, the use of contract farming can be a means to improve backward linkages.
5. Market power: The technological gap between the industrial regions and the rest of the regions of the country can be a source of market power. Government should improve on its urbanization efforts in the other regions to take advantage of knowledge spillovers to increase the utilization of its indigenous resources. The proposed creation of regional centers in the NSS can be the first step in achieving this goal. This can take the form of encouraging regional state universities to invest more in high-level human capital formation coupled with sufficient progress in realizing technological innovation.

It needs to be stressed that the issue of technological change cannot be treated separately from the usual policies on trade and investments. What the analysis calls for is a comprehensive approach that will integrate these policies of technology, trade, and investments into one system. What should initially be avoided is the exclusion and rivalry of technological innovations among firms, regions and sectors. As seen in the analysis, this system has resulted in regional concentration of industries, thus discriminating rural firms and increasing income inequality. Moreover, this type of governance creates a disincentive to create, engage and innovate. Assuming that farmers are already on the frontier of this technology where agricultural labor productivity is low, the government should provide subsidies for knowledge formation, and distribute spillovers of innovations emerging from the industry as a way of increasing productivity and mitigating the possible adverse effects of trade policies, such as the rice tariffication law.

More importantly, the government needs to transform the innovation process itself. The paper shows that necessary reforms and upgrades in the knowledge structure of the economy are crucial, but the traditional research and extension system in AFMA, where innovation is simply the responsibility of the government, is insufficient in meeting the new technological challenges. Instead, a holistic and multidisciplinary innovation system should be implemented. In this system, the role of the private firms would be crucial in developing innovation and processes that incorporate emerging reforms for agricultural and industrial development.

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Appendix. Results of Probit Estimates on Wage Employment

VARIABLES	Wage Employment	Agriculture	Manufacturing	Other Industry	Services
Years of Schooling	3.616e-02***	-9.892e-02***	2.970e-02***	-2.990e-02***	1.343e-01***
	(3.703e-04)	(8.835e-04)	(9.793e-04)	(7.866e-04)	(6.260e-04)
Age	1.191e-01***	1.057e-01***	1.635e-01***	1.667e-01***	1.548e-01***
	(5.321e-04)	(1.227e-03)	(1.461e-03)	(1.177e-03)	(8.710e-04)
Age Squared	-1.562e-03***	-1.473e-03***	-2.244e-03***	-2.173e-03***	-2.005e-03***
	(7.025e-06)	(1.63e-05)	(1.98e-05)	(1.55e-05)	(1.15e-05)
Grosss Capital Formation (GCF)	2.298e-10*	9.98e-10***	-2.29e-09***	4.27e-09***	-1.64e-09***
	(1.245e-10)	(2.44e-10)	(3.67e-10)	(2.59e-10)	(2.12e-10)
Privare Inventories (INV)	-1.845e-10	-9.08e-10***	1.62e-09***	-3.35e-09***	1.36e-09***
	(1.196e-10)	(2.31e-10)	(3.49e-10)	(2.57e-10)	(2.04e-10)
Exports (EXP)	-2.826e-11	3.46e-10***	2.04e-10	1.37e-10	-2.27e-10**
	(5.578e-11)	(1.11e-10)	(1.58e-10)	(1.18e-10)	(9.26e-11)
Imports (IMP)	-2.060e-10**	-1.04e-09***	5.49e-10**	-1.99e-09***	7.39e-10***
	(8.731e-11)	(1.78e-10)	(2.49e-10)	(1.81e-10)	(1.45e-10)
Minimum Wage (MINW)	1.258e-04	-4.62e-05	-1.833e-03***	4.64e-05	8.581e-04***
	(9.952e-05)	(2.154e-04)	(2.806e-04)	(2.103e-04)	(1.615e-04)
BOI Foreign (BOIF)	-2.849e-08	8.19e-08	-3.75e-07***	-2.89e-08	-3.97e-07***
	(5.177e-08)	(1.12e-07)	(1.42e-07)	(1.04e-07)	(8.37e-08)
BOI Filipino (BOIP)	-1.118e-07	5.27e-07***	-2.86e-06***	3.76e-06***	-2.23e-06***
	(9.988e-08)	(1.94e-07)	(3.03e-07)	(2.03e-07)	(1.72e-07)
PEZA Foreign (PEZAF)	-3.137e-09	1.02e-06***	-3.68e-06***	4.58e-06***	-2.59e-06***
	(1.977e-07)	(3.79e-07)	(5.72e-07)	(4.16e-07)	(3.36e-07)
PEZA Filipino (PEZAP)	2.843e-07**	-1.96e-09	7.45e-07**	-5.63e-07**	3.74e-07*
	(1.351e-07)	(2.81e-07)	(3.71e-07)	(2.78e-07)	(2.21e-07)
Industrial Power (INDPWR)	1.127e-04***	1.089e-04*	8.083e-04***	-6.687e-04***	5.253e-04***
	(3.121e-05)	(5.96e-05)	(9.01e-05)	(6.63e-05)	(5.32e-05)
Year (YEAR)	-6.368e-02***	-5.502e-02***	-2.558e-01***	1.306e-01***	-1.890e-01***

	(7.682e-03)	(1.475e-02)	(2.204e-02)	(1.637e-02)	(1.306e-02)
Urban (URB)	-2.794e+01	7.014e+01	-1.269e+02**	-1.674e+02***	-3.223e+01
	(2.191e+01)	(6.108e+01)	(5.624e+01)	(4.662e+01)	(3.530e+01)
Interaction terms:					
URB_YEAR	1.395e-02	-3.561e-02	6.437e-02**	8.527e-02***	1.599e-02
	(1.115e-02)	(3.107e-02)	(2.862e-02)	(2.372e-02)	(1.797e-02)
GCF_URB_YEAR	-2.595e-13***	-1.306e-12***	-5.066e-13**	6.189e-13***	-2.458e-13*
	(8.791e-14)	(2.440e-13)	(2.305e-13)	(1.824e-13)	(1.419e-13)
INV_URB_YEAR	2.975e-13***	1.152e-12***	5.571e-13**	-3.383e-13*	3.092e-13**
	(8.452e-14)	(2.300e-13)	(2.194e-13)	(1.802e-13)	(1.365e-13)
EXP_URB_YEAR	-8.161e-14**	-6.720e-13***	-3.360e-13***	-9.287e-15	-3.989e-14
	(3.956e-14)	(1.114e-13)	(9.977e-14)	(8.414e-14)	(6.263e-14)
IMP_URB_YEAR	1.987e-13***	1.188e-12***	6.170e-13***	-2.901e-13**	1.255e-13
	(6.217e-14)	(1.764e-13)	(1.579e-13)	(1.299e-13)	(9.864e-14)
MINW_URB_YEAR	-2.768e-08	-7.59e-08	1.17e-06***	-2.74e-08	-2.90e-07***
	(5.157e-08)	(1.35e-07)	(1.38e-07)	(1.07e-07)	(8.20e-08)
BOIF_URB_YEAR	4.403e-11	4.42e-10***	3.61e-10***	-8.892e-12	6.70e-11
	(3.720e-11)	(1.10e-10)	(9.15e-11)	(7.66e-11)	(5.79e-11)
BOIP_URB_YEAR	-1.755e-10**	-8.33e-10***	-2.87e-10	7.80e-10***	-1.48e-10
	(7.058e-11)	(1.95e-10)	(1.89e-10)	(1.43e-10)	(1.15e-10)
PEZAF_URB_YEAR	-2.218e-10	-1.52e-09***	-6.90e-11	9.82e-10***	-1.07e-10
	(1.390e-10)	(3.86e-10)	(3.59e-10)	(2.92e-10)	(2.24e-10)
PEZAP_URB_YEAR	1.319e-11	1.14e-09***	5.26e-10**	-1.29e-10	-1.729e-11
	(9.696e-11)	(2.80e-10)	(2.38e-10)	(2.04e-10)	(1.52e-10)
INDPWR_URB_YEAR	1.292e-08	9.08e-08	-6.86e-08	-1.37e-07***	2.96e-08
	(2.198e-08)	(6.06e-08)	(5.67e-08)	(4.65e-08)	(3.55e-08)
Region Effects:					
regn1	-1.680e-01***	1.122e+00***	-3.831e-01***	4.444e-02	-2.676e-01***
	(1.781e-02)	(5.822e-02)	(4.353e-02)	(3.842e-02)	(2.756e-02)

regn2	-1.026e-01***	1.555e+00***	-5.075e-01***	-2.004e-01***	-3.096e-01***
	(1.589e-02)	(5.380e-02)	(3.979e-02)	(3.444e-02)	(2.456e-02)
regn3	-9.485e-02***	1.059e+00***	1.780e-01***	1.621e-02	-2.160e-01***
	(1.372e-02)	(5.022e-02)	(3.170e-02)	(2.945e-02)	(2.099e-02)
regn4	-2.440e-01***	9.189e-01***	-4.202e-01***	-1.260e-01***	-3.348e-01***
	(1.727e-02)	(5.709e-02)	(4.190e-02)	(3.721e-02)	(2.674e-02)
regn5	-9.419e-02***	1.256e+00***	-3.808e-01***	-4.427e-02	-1.585e-01***
	(1.663e-02)	(5.578e-02)	(4.032e-02)	(3.606e-02)	(2.564e-02)
regn6	-3.272e-02**	7.148e-01***	2.386e-01***	1.792e-02	-2.544e-02
	(1.445e-02)	(5.221e-02)	(3.349e-02)	(3.112e-02)	(2.211e-02)
regn7	-2.152e-01***	9.194e-01***	-5.492e-01***	-2.120e-01***	-2.498e-01***
	(1.677e-02)	(5.597e-02)	(4.147e-02)	(3.630e-02)	(2.591e-02)
regn8	-3.073e-01***	7.553e-01***	-4.174e-01***	-3.208e-01***	-3.907e-01***
	(1.594e-02)	(5.404e-02)	(3.844e-02)	(3.445e-02)	(2.464e-02)
regn9	-1.041e-01***	1.317e+00***	-2.351e-01***	-6.160e-02*	-2.298e-01***
	(1.529e-02)	(5.273e-02)	(3.638e-02)	(3.293e-02)	(2.351e-02)
regn10	-1.429e-01***	1.386e+00***	-3.206e-01***	-1.855e-01***	-3.208e-01***
	(1.340e-02)	(4.854e-02)	(3.148e-02)	(2.884e-02)	(2.047e-02)
regn11	-2.879e-01***	1.146e+00***	-3.907e-01***	-5.056e-01***	-4.749e-01***
	(1.580e-02)	(5.354e-02)	(3.780e-02)	(3.466e-02)	(2.447e-02)
regn13	-3.209e-01***	9.366e-01***	-7.775e-01***	-1.543e-01***	-5.102e-01***
	(1.687e-02)	(5.630e-02)	(4.255e-02)	(3.642e-02)	(2.610e-02)
regn14	-9.783e-01***	-2.528e-01***	-1.574e+00***	-1.364e+00***	-1.127e+00***
	(1.788e-02)	(5.807e-02)	(5.024e-02)	(4.033e-02)	(2.798e-02)
regn15	-2.112e-01***	9.623e-01***	-2.782e-01***	-1.214e-01***	-3.141e-01***
	(1.610e-02)	(5.445e-02)	(3.852e-02)	(3.464e-02)	(2.489e-02)
regn16	-5.184e-02***	7.576e-01***	4.246e-01***	5.026e-02	-1.736e-01***
	(1.534e-02)	(5.424e-02)	(3.565e-02)	(3.315e-02)	(2.352e-02)
regn17	-2.004e-01***	1.001e+00***	-5.247e-01***	-9.363e-02**	-2.688e-01***
	(1.800e-02)	(5.820e-02)	(4.464e-02)	(3.906e-02)	(2.792e-02)
Constant	1.234e+02***	1.049e+02***	4.983e+02***	-2.593e+02***	3.676e+02***

	(1.509e+01)	(2.897e+01)	(4.329e+01)	(3.215e+01)	(2.564e+01)
Observations	1,271,337	1,271,337	1,271,337	1,271,337	1,271,337

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0