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Structural change and economic growth: Empirical evidence and policy insights from Asian economies

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ABSTRACT

This paper introduces a new measure of structural change labeled the effective structural change (ESC) index, and applies it to study the effects of structural change on economic growth, using a sample of 19 Asian economies for the period from 1970 to 2012. This new approach provides an effective tool to examine growth effects of structural change. The paper's findings suggest the importance of reforms to foster productivity-enhancing structural change and need for strategies to overcome their short-term costs. The paper also indicates that ESC can be used as a useful indicator for monitoring the impacts of structural reforms.

1. Introduction

Structural change defined as the reallocation of productive resources among sectors in the economy is a prominent feature of economic growth. The important role of structural change in driving economic growth and productivity improvement has been empirically supported by influential studies such as Lewis (1954), Clark (1957), Kaldor (1966), Kuznets (1966), Kuznets (1979), Denison (1967), Cheery et al. (1975), Syrquin (1988), Lin and Monga (2010), and Lin (2009), Lin (2012a), Lin (2012b). The expected nature of structural change dynamics is the continual shift of factor inputs from lower to higher productivity sectors, which consequently raises productivity at the aggregate level. Lewis (1954) uses a classical framework of dual economy to provide insights into the following dynamic: the shift of surplus labor from subsistence agriculture towards the modern sector increases worker productivity, a country's overall productivity, and output per capita.[1] Echevarria (1997), employing general equilibrium methods and simulation techniques, confirms a positive link between sectoral composition change and growth.

Empirical evidence on the effect of structural change on growth has been found in a number of previous studies. Using growth decomposition methods, Denison (1967: 319–322) shows that reallocation of productive inputs from agriculture to other sectors was a significant factor explaining why the United States outperformed the UK but was behind Germany in GDP growth between 1950 and 1962. Employing regression techniques to analyze OECD countries, Kaniovski and Peneder (2002) and Dietrich (2012) provide further evidence that structural change plays an important role in driving economic growth. Caselli and Coleman (2001), examining the growth dynamics of the U.S. states, evidence that structural transformation is a main factor driving the U.S. regional convergence. With regard to Asia, van Ark and Timmer (2003) show that resource reallocation from agriculture towards other sectors is a powerful source of growth for lower income countries, while for more advanced economies the shift of labor towards services sectors such as finance has a notable contribution to overall productivity growth. Fan et al. (2003) find the essential role of sectoral composition change in China's economic growth.

Structural change, however, is not always found to be growth-enhancing. For example, McMillan et al. (2014) show that, unlike in Asia, the contribution of structural change to productivity growth

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[1] Lewis (1954) also points out that this pattern of growth will reach a turning point as the surplus of labor is exhausted. Then, the modern sector would need to raise wages to attract labor from agriculture for further expansion; and hence it may be more challenging for the economy to sustain previous high rates of growth.

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was negative for Latin America during the period 1990–2005 and for Africa during 1990–2000.

There are also studies contending that structural change may not be conducive to productivity growth. Baumol (1967) shows that labor may shift from a sector with higher and rapidly-growing productivity to sector with a lower and stagnant productivity, which causes a decline in the overall economy's productivity growth rate, ceteris paribus. The case of rapid expansion of the lower-productivity service employment in the US can serve as a piece of evidence Baumol et al. (1985). Furthermore, Ngai and Pissarides (2007) introduce a model that suggests that the effect of structural change may not show up in aggregate growth; while using a theoretical approach with restrictive assumptions, Meckl (2002) asserts that sectoral composition change can be a byproduct of economic growth and may have no feedback effect on the growth process. At the sector level, Fagerberg (2000), examining manufacturing industries from a sample of 39 countries over period 1973–1990, finds that structural change does not contribute to productivity growth. Likewise, Timmer and Szirmai (2000) arrive at a similar conclusion for Asian manufacturing.[2]

The discussions above calls for additional studies that provide not only more conclusive evidence on the effect of structural change on economic growth, but also a deeper understanding of the nature of structural change and the mechanism through which structural change influences growth. This paper aims to make contribution in this direction by introducing a new approach to measure structural change labeled as "effective structural change" (ESC) and use the panel data of 19 Asian economies over the period from 1970 to 2012 to examine the effect of ESC on growth.

Among its main findings, the paper shows that ESC has a robust positive effect on productivity, wage, and GDP growth; while its effect on employment is negative and sizable in the short-term and insignificant in the long-term. These findings reveal several important policy insights. In particular, fostering productivity-enhancing structural change is an effective way to promote economic growth. However, the short-term cost of this process in term of rising unemployment could be formidable, which policy makers may hesitate to accept. This explains why structural reforms tend to be sluggish in many countries.

The paper proceeds as follows. Section 2 provides an overview of the dataset. Section 3 introduces the ESC measure and highlights its patterns. Section 4 investigates the causal link between ESC and economic performance, and discusses the empirical results. Section 5 makes concluding remarks with a brief policy discussion.

2. Overview of data and salient facts

This paper uses data from the Asian Productivity Organization (APO) dataset,[3] which covers 19 Asian economies over 43 years from 1970 to 2012. The dataset, which is compiled based primarily on the System of National Accounts (SNA),[4] covers nine sectors(under the international standard industrial classification provided in Appendix A):(1) Agriculture; (2) Mining; (3) Manufacturing; (4) Utility; (5) Construction; (6) Trade and hotels; (7) Transport and communications; (8) Finance, real estate, and business services; and (9) Government and community services. Note that the last four sectors ((6), (7), (8), and (9)) are usually combined into the aggregate "services" sector in many datasets.

A snapshot of the 20 Asian economies is provided in Table 1 and Table 2.[5] Table 1 highlights the key indicators of economic performance,[6] while Table 2 reports the simple measure of structural change in terms of changing employment share by sector in the economy. From Table 1, three observations stand out. First, labor productivity growth plays a major role in driving GDP growth[7] in most economies, especially in the economies with GDP growth of as high as 5% or above. Labor productivity growth was notably below employment growth only in five countries – Brunei, the Philippines, Bangladesh, Nepal, and Pakistan, for all of which GDP growth was well below 5%. This observation suggests that robust average labor productivity (ALP) growth is an important condition for an economy to achieve high GDP growth.

Second, for all countries, wage growth was generally equivalent to ALP growth. However there is some distinction between groups of countries. In the advanced economies, ALP grew faster than wages (with the exception of South Korea, for which both ALP and wage growth were both very strong). In most developing countries, however, wages grew faster than ALP. The slower wage growth compared to ALP in the Philippines, India, Bangladesh, and Nepal is likely a result of high unemployment rates associated with rapid population growth.

Third, total factor productivity (TFP) growth is positive for all the countries in this dataset. The share of TFP growth in GDP growth ranges from 15% to 35% for most countries. This share, however, is notably low (below 10%) for Singapore (TFP growth of 0.4% compared to GDP growth of 6.9%), Malaysia (0.5% vs. 6.3%), the Philippines (0.3% vs. 4.1%), and Bangladesh (0.3% vs. 3.8%). This implies that the share of TFP in GDP growth over a given period can be low not only in low-performing economies but also in high-performing economies. For low-performing economies, the low share of TFP is due to stagnation in efficiency improvement and slow technology progress. For high-income nation, the low share of TFP can be explained by significant capital accumulation and rapid employment expansion, which may have lowered the efficiency use of these productive inputs.

In addition to employment share change by sector for each individual economy over the period 1970–2012,[8] Table 2 describes employment share change by sector for the 19 countries under investigation over period 1970–2012.[9] The following observations are notable from the Table. First, the employment share of the agriculture sector shrank in all economies. This contraction was largest for Korea (−44.1% points), China (−37.1), and Thailand (−37.1). Developing economies with small contraction in

[2] Silva and Teixeira (2008), Krüger (2008), and Herrendorf et al. (2014) provide excellent reviews of major studies on the link between structural change and growth.

[3] This dataset is a joint research project between the APO and the Keio Economic Observatory of Keio University, Tokyo (for details, see Nomura and Lau, 2014). The salient advantage of this project is its close collaboration with the national statistical agencies from the Asian economies. The online version of the dataset is available athttp://www.apo-tokyo.org/wedo/measurement, accessed September 10, 2015.

[4] The System of National Accounts 1993 was adopted by the United Nations Statistical Commission in 1993 as the international standard for compilation of national accounts statistics and for the international reporting of comparable national accounting data (source: http://unstats.un.org/unsd/nationalaccount/sna1993.asp).

[5] The dataset covers 20 Asian economies. However, the sector-level data needed for structural change analysis is not available for Laos. Therefore, only 19 remaining economies will be examined in this study.

[6] In Table 1, the average labor productivity (ALP) and average wage are calculated as GDP and total labor compensation, respectively, divided by the number of workers. The ALP and average wage will be simply referred to as labor productivity and wage, correspondingly.

[7] Note GDP growth is equal to ALP growth plus employment growth.

[8] Data on this measure is available only until 2012.

[9] For a given economy, the Norm of Absolute Values (NAV) indexis calculated for period [0,T] as follows: $NAV = 0.5 * \sum_{k=1}^{n} |S_{kT} - S_{k0}|$ Where n is the number of sectors in the economy; S_{k0} and S_{kT} represent the employment share of sector k in time 0 and T, respectively. The 0.5 factor is to correct the double count of employment share changes. This measure is also called. More details can be found in Dietrich (2012).