Estimating Industrial Development Paths for Two Countries Based on The Multiple-Cone Heckscher-Ohlin Model

Kensuke Suzuki* Yasuhiro Doi†

December 16, 2015

Abstract

In this paper, we empirically estimate industrial development paths for two countries –Malaysia and Singapore– based on the two-cone Heckscher–Ohlin model. Our research question is whether industrial development paths arise not only in one country but also within two countries whose industries and markets are tightly connected through trade liberalization. In accordance with Schott (2003) and Kiyota (2014), we adopt the empirical technique to test the multiple-cone HO model and estimate the parameters by using a seemingly unrelated regressions model and maximum likelihood estimation. The results support our hypothesis that the two countries are involved in the common industrial development paths. The results also imply that the gap in the capital–labor ratio has increased between the two countries, and production specialization is observed more determinately at the end of the data set.

*Corresponding author. Ph.D. Student, Graduate School of Economics, Nagoya University; Research Fellowship, Japan Society for the Promotion of Science. E-mail:k.suzuki@nagoya-u.jp

†Associate Professor, Graduate School of Economics, Nagoya University. E-mail: doi@soec.nagoya-u.ac.jp

1 Introduction

Trade literature has discussed whether free trade affects the production patterns of countries within the transboundary market. Since liberalization of trade integrate national economies into a single market, member countries' industrial development may be affected and depend on each other. In this paper, we examine empirically whether two countries are involved in the common industrial development paths based on the multiple-cone Heckscher–Ohlin (HO)model.

Trade liberalization is one of the most significant forms of in the process of economic integration. Balassa (1961) classified the process of economic integration into five stages: (1) free trade area, (2) custom union, (3) common market, (4) economic union, and (5) total economic integration. Liberalization of commodity trade falls into the first phase of the economic integration. Since trade liberalization opens up national commodity market to the international market, it may have significant impact on production as well as consumption of countries involved. Classical trade theories expect that trade liberalization affect the reallocation of resources and thus production through countries' comparative advantage (Balassa, 1965).

We develop our analysis based on the HO model. Within the basic HO model with 2 goods and 2 factors of production, the patterns of production and trade are determined by country's relative factor endowments under free trade. This single-cone version of the HO model has countries producing both two goods, i.e., labor-intensive and capital-intensive goods, and factor prices are equalized across all countries. In the dynamic context of this single-cone version of the HO model, e.g. Deardorff (1974), countries will converge to the single steady state and therefore to the same patterns of production. Thus, the single-cone HO model appears to be equipped with the convergence mechanism of patterns of production as well as per capita income.

Meanwhile, various studies have reported the significant differences in industrial structure and factor prices across countries in the free trade area. The multiple-cone version of the HO model is an approach to bridge the discrepancy between the implication of the basic HO model and the reality. By assuming more than two goods, the multiple-cone HO model enable countries with sufficiently disparate endowments to specialize in unique subsets of goods. Factor prices are equalized only across countries sharing the same mix of goods. More importantly, countries move in and out of the sectors – climb a ladder of comparative advantage (Deardorff, 2000) – as they accumulate the productive factors. Consequently, the multiple-cone HO model derives the spine functional form of the development paths which depict the relationship between country's capital–labor ratio and the sectoral outputs. Furthermore, different steady states can result from this multiple-cone HO model, that may explain the difference in patterns of production as well as economic disparity across countries.

Our testing hypothesis is whether industrial development paths arise within two countries in the free trade area. In this paper, we empirically estimate industrial development paths for two countries –Malaysia and Singapore– based on the two-cone HO model adopting the empirical technique of Schott (2003). Malaysia and Singapore were selected because of their close bilateral relationship promoted by ASEAN Free Trade Area (AFTA) started in 1993, as well as geographical adjacency. Industrial development of the two countries may be affected through the market integration. Furthermore, this empirical exploration may test whether the dynamics of economic growth tends to steer countries into the same cone or into different cones. This question is similar to the issue of convergence in growth literature.

The rest of this paper is structured as follows; section 2 introduces previous works, section 3 explains the theoretical model, section 4 describes the empirical analysis, and section 5 concludes.

2 Literature Review

The interaction between trade and growth has been explored in literature on neoclassical international trade. Oniki and Uzawa (1965), a pioneering research in this field, developed a dynamic model of international trade within the framework of 2-good and 2-factor HO model. They analyzed interaction between the process of capital accumulation and the pattern of trade by introducing two types of goods, namely, consumption goods and investment goods. Following studies, e.g., Deardorff (1974) discussed how economic growth matters for patterns of production and trade based on the HO model with a single cone of diversification. The word "cone" refers to the set of endowment vectors that select a unique product mix and it corresponds to the factor price equalization (FPE) set. A key implication derived from the single-cone HO model is that there is no disparities in patterns of production as well as factor prices across countries. Moreover, the assumptions of identical technology and behavioral parameters across countries result in the existence of a single steady state. Countries with initial heterogeneity in relative factor endowment may converge to the same capital–labor ratio.

Regarding this topic, Deardorff (2000) refreshed a discussion. As Deardorff (2001a) points out, while most of the literature has been generally focused on the single-cone HO model, there are reasons to think that the multiple-cone HO model may be more relevant and plausible for the real world. In contrast to the single-cone model, the multiple-cone model may have diversity of production that prevent global FPE. Factor prices are equalized only within each cone and not between different cones. More importantly, countries move in and out of the sectors as they accumulate capital relative to labor. Consequently, the multiple-cone HO model derives the spine functional form of the "paths of development" (Leamer, 1987) which depict the linear relationship between country wide capital–labor ratio and the sectoral outputs.

Meanwhile, much empirical research has been conducted to explore how we can utilize the essential idea of HO model within the framework of the single-cone equilibrium, e.g., Harrigan (1995) and Bernstein and Weinstein (2002), etc. Based on the empirical studies by Leamer (1987), Davis and Weinstein (2001) and others, Schott (2003) introduces an empirical technique to test the multiple-cone HO model using a cross section of countries' output and endowments data. In his empirical analyses, development paths are estimated by grouping the International Standard Industrial Classification (ISIC) industries into theoretically more appropriate aggregates according to capital intensity. The empirical results suggest the strong support for the multiple-cone equilibrium.

Kiyota (2011, 2012) adopt Schott's technique for a one-country dataset and empirically test the fit of the single- and multiple-cone models. His results support the greater efficiency of the multiple-cone HO model compared with the single-cone model. Furthermore, Kiyota (2014) estimates one-country's dynamic development paths of industries, focusing on a series of industries that appear, prosper, decline and finally disappear one after the other in a country. We label Kiyota's dynamic series of industrial development as "industrial development paths". This paper combines multi-country static analysis of Schott (2003) and single-country dynamic analysis of Kiyota (2014) to estimate the multi-country dynamic industrial development paths.

This paper's search for evidence of the common development paths within multiple countries also relates to the issue of convergence, e.g., Baumol (1986), as well as discussion on the growing polarization of the world economy into rich and poor nations, e.g., Leamer and Levinsohn (1995) and Leamer and Schott (2005). Inspired by theoretical discussion by Galor (1996), Deardorff (2001b) explains how the multiple steady states can result from the multiple-cone HO model. He concludes that this model can provide explanation on the growing polarization of the world economy into nations that are rich and nations that are poor. Empirical exploration of the multi-country development paths would add another perspective to see the underlying mechanism of economic disparities across countries.

3 Model

The basic structure of our model is based on Schott (2003). To facilitate our discussion, we will focus on three-good, two-cone model. Suppose that there are three goods (a labor-intensive good X, an intermediate capital-intensive good Y and a capital-intensive good Z) and two productive factors (capital K and labor L).

In accordance with the previous studies, we employ the following assumptions; 1) each sector has constant return to scale production technology, 2) countries are small open economies and possess a perfectly competitive markets, 3) productive factors are perfectly mobile across sectors within each country, but not across countries, and 4) all individuals in all countries have identical homothetic preferences. In addition to these basic assumptions of the HO framework, Schott (2003) imposes the additional assumption to prevent the indeterminacy of outputs,[1] that is, 5) There exists an equal number of goods and factors in each cone of diversification, i.e. evenness is present. Let the value added and the capital intensity of good i be Q_i and $k_i \equiv K_i/L_i$, respectively. Following Schott (2003) and Kiyota (2012, 2014), we specify the production technology as Leontief production function.[2] Assumption of Leontief technology allows industrial factor intensity to be independent from product prices. Nation-wide capital–labor ratio in country c is denoted by $\overline{k}_c \equiv \overline{K}_c/\overline{L}_c$.

[1] Violation of the evenness may results in the indeterminacy of outputs. For a detailed explanation, see Melvin (1968).

[2] The assumption of Leontief technology can rule out the possibility of complete specialization and factor intensity reversals. It also reduce the number of parameters to be estimated.

Figure 1: Lerner-Pearce Diagram of the Two-Cone HO Model

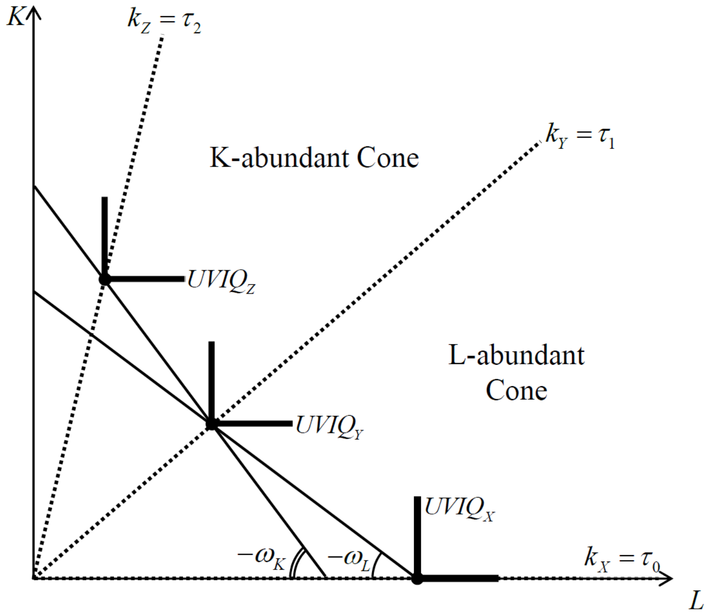


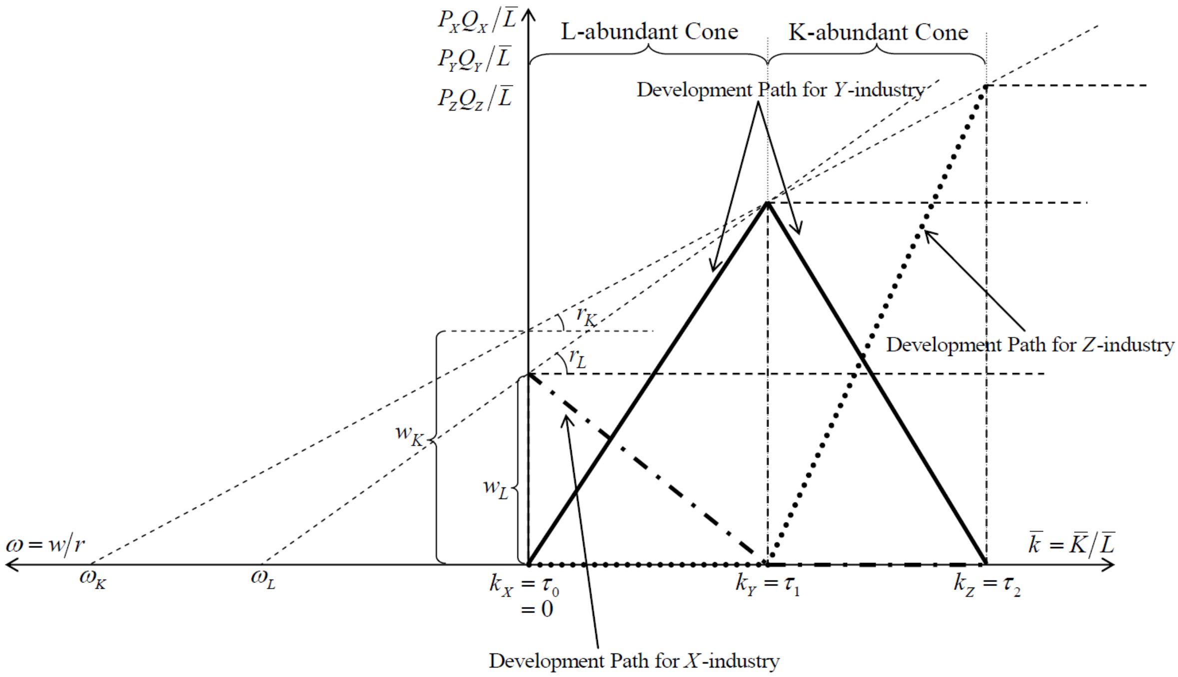
Figure 1 shows the Lerner-Pearce diagram (Lerner, 1952; Pearce, 1951) of a two-factor three-good world. Two regions delineated by the industrial capital intensities are the familiar cones of diversification. In our model, we assume that capital intensity of X sector is zero ($k_X = 0$), which allows even least capital-abundant countries to specialize in a subset of goods. Meanwhile, capital intensity of Z sector takes a finite value that at least exceeds the country wide capital–labor ratio of countries in this economy. Thus, all countries are assumed to fall into either of two cones of diversification.

Figure 2 demonstrates the expected paths of development that can arise within the two-cone HO model presented above. The splines depict the piecewise linear relationships between the country-wide capital–labor ratio ($\overline{k}$) and per capita sectoral value added ($Q_i/\overline{L}$ for $i = X, Y, Z$). Inflection points of the splines are called knots, denoted by τ_j for $j = 0, 1, 2$. Each knot's location corresponds to the industrial capital intensity.[3] The location of the interior knot (τ_1) divides countries into labor- and capital-abundant cones.

Countries within the labor-abundant cone, $\overline{k}_c \in (\tau_0, \tau_1)$, produce X and Y. On the other hand, countries within the capital-abundant cone, $\overline{k}_c \in (\tau_1, \tau_2)$, produce Y and Z. Factor prices are equalized across countries within the same cone, but not across cones. Specifically, the interest rate is higher in the labor-abundant cone, $r_L > r_K$, and the wage is higher in capital-abundant cone, $w_K > w_L$.

[3]See Figure 1

Figure 2: Paths of Development in the Two-Cone HO Model



In accordance with Kiyota (2012, 2014), regression equations (3.1)–(3.3) specify the development paths of three sectors[4]:

Labor-intensive goods:

$$\frac{Q_{Xct}}{\overline{L}_{ct}} = \beta_X(\overline{k}_t - \tau_1)I\left\{\tau_0 \leq \overline{k} < \tau_1\right\} + \epsilon_{Xt} \tag{3.1}$$

Intermediate capital-intensive goods:

$$\frac{Q_{Yct}}{\overline{L}_{ct}} = \beta_Y\left\{\overline{k}_t I\left\{\tau_0 \leq \overline{k} < \tau_1\right\}\left\{\frac{\tau_1}{(\tau_1 - \tau_2)}\right\}(\overline{k} - \tau_2)I\left\{\tau_1 \leq \overline{k} < \tau_2\right\}\right\} + \epsilon_{Yt} \tag{3.2}$$

Capital-intensive goods:

$$\frac{Q_{Zct}}{\overline{L}_{ct}} = \beta_Z(\overline{k}_t - \tau_1)I\left\{\tau_1 \leq \overline{k} < \tau_2\right\} + \epsilon_{Zt} \tag{3.3}$$

[4]See the Appendix of Kiyota (2012) for the derivation.

where subscripts indicate country c and year t. $I\{\bullet\}$ is the indicator function that equals unity if the relationship in brackets is true and equals zero otherwise.

In this paper, we assume that industrial development paths consist of two countries. Suppose that there is a disparity in countries' initial factor endowments. Namely, in our model, assume that one country has a less-developed economy which located in the labor-abundant cone, and the other county has a developed economy in the capital-abundant cone. Deardorff (2001a,b) argues that the initial differences may remain indefinitely due to the multiple steady states that result from the multiple-cone HO model under the assumptions of identical technology and behavioral parameters. Hence, estimation of the industrial development paths of two countries may demonstrate whether the less-developed country joins the more capital-abundant cone by bridging the capital–labor ratio gap or remains in the original cone.

4 Empirical Analysis

Our estimation of make us of country wide data on capital capital and labor and sectoral value added. The country wide data are retrieved from the World Bank. We utilize gross fixed capital formation and total labor force from the two sampled countries –Malaysia and Singapore– from 1968 to 2010. Following Hall and Jones (1999), capital stock is calculated using the perpetual inventory method (PIM).[5] Gross fixed capital formation from 1968 to 1980 is used to estimate the capital stock in 1980. A constant depreciation rate of 13.3% is applied.

The sectoral data is sourced from the United Nations Industrial Development Organization (UNIDO, 2014), and industries are classified by the International Standard Industrial Classification (ISIC). The dataset covers 23 manufacturing industries which are listed in Table 1. We combine following five pairs of industries into one: [15+16], [18 +19], [29+30], [31+32] and [34+35], and excluded [37] due to lack of data. Thus, the total number of ISIC industries is reduced to 17.

Since ISIC groups output loosely according to similarity of end use, capital intensity may varies by industry across countries and years. This intra-industry product heterogeneity (Schott, 2003) contradicts the theoretical conceptualization of goods in the factor

[5] See OECD (2009) for a general introduction.

proportion framework. We adopt the empirical technique introduced by Schott to recast industry-level data into more theoretically appropriate "HO aggregates". In order to preserve the evenness, ISIC industries are grouped into three HO aggregates, X, Y, and Z, by defining the two capital intensity cutoffs, $\check{k}$ and $\hat{k}$, which are irrespective of year and country:[6]

$$\begin{cases} \text{Labor-intensive aggregate } (X) & Q_{Xct} \equiv \displaystyle\sum_{n \in \{n | 0 \leq k_{nct} < \check{k}_t\}} Q_{nct} \\ \text{Intermediate capital-intensive aggregate } (Y) & Q_{Yct} \equiv \displaystyle\sum_{n \in \{n | \check{k}_t \leq k_{nct} < \hat{k}_t\}} Q_{nct} \\ \text{Capital-intensive aggregate } (Z) & Q_{Zct} \equiv \displaystyle\sum_{i \in \{n | k_{nct} \geq \hat{k}_t\}} Q_{nct} \end{cases}$$

where Q_{ict} (for $i = X, Y, Z$) is valued added of the HO aggregate i in country c in year t. Subscript n denotes ISIC industries. In order to calculate capital intensities of each ISIC industry by year and country, we employ the PIM as well.

All variables explained above are measured in real terms to exclude the effect of changes in price and are displayed in terms of the Singapore dollar.[7] The years 1980 to 2010 are utilized to estimate industrial development paths.

Equations (3.1)–(3.3) are our regression equations for the industrial development paths which are introduced in Section 2. We grid overall possible combinations of the two cutoffs and the interior knot for a given interval size. For the interval size, we use a grid interval of $\gamma = 0.1$ for capital-intensity cutoffs ($10^{0.7} \leq 10^{\gamma} \leq 10^{3.0}$) and 1,000 SGD for the interior knot ($\tau_0 < \tau_1 < \tau_2$). τ_0 is assumed to be zero and τ_2 is assumed to be 149,000 SGD, which is 1,000 SGD above the upper range of the sample's observed capital–labor ratios. For every combination of the interior knot and capital-intensity cutoffs, we estimate the slope parameters iteratively by using a seemingly unrelated regressions (SUR) model. The two

[6] As explained in Schott (2003), we impose an additional assumption that prices are such that the unit-value isoquants of all goods within a given derived aggregate are tangent to a single iso-cost line.

[7] The deflator for the gross fixed capital formation of Singapore was retrieved from the Department of Statistics Singapore. The Singapore dollar is adopted to mitigate the impact of the exchange rate shock on the variables in terms of the US dollar during the Asian Financial Crisis. The World Bank exchange rate is used to convert the currency unit.

Table 1: List of 2-digit ISIC Industries

Code	Description
15	Food products and beverages
16	Tobacco products
17	Textiles
18	Wearing apparel; dressing and dyeing of fur
19	Tanning and dressing of leather; luggage, handbags, saddlery, harness and foot wear
20	Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials
21	Paper and paper products
22	Publishing, printing and reproduction of recorded media
23	Coke, refined petroleum products and nuclear fuel
24	Chemicals and chemical products
25	Rubber and plastics products
26	Other non-metallic mineral products
27	Basic metals
28	Fabricated metal products, except machinery and equipment
29	Machinery and equipment n.e.c.
30	Office, accounting and computing machinery
31	Electrical machinery and apparatus n.e.c.
32	Radio, television and communication equipment and apparatus
33	Medical, precision and optical instruments, watches and clocks
34	Motor vehicles, trailers and semi-trailers
35	Other transport equipment
36	Furniture; manufacturing n.e.c.

cutoffs and the location of the interior knot are estimated via maximum likelihood.[8]

Estimated parameters, the two capital intensity cutoffs and the location of the knots are reported in Table 2. The location of the interior knot τ_1 is 105,000 SGD and two capital-intensity cutoffs are $\check{k} = 10^{1.1}$ and $\hat{k} = 10^{2.0}$ respectively.[9] All the estimated coefficients are statistically significant at the 1% level. These results support our hypothesis that the two countries are involved in common industrial development paths based on the two-cone HO model.

Figure 3 depicts the industrial development paths of the two countries. In the figure, each observation with positive value-added is plotted and identified by the number indicating the year. Countries are distinguished by the marker symbols: $\times$ is Malaysia and $\bullet$ is Singapore. Panel [A] exhibits several outliers generated by Singapore in the 1980s,

[8]See Cameron and Trivedi (2005) for a general explanation on maximum likelihood estimation. We utilized the Akaike Information Criteria (Akaike, 1998) for the estimation of the interior knot location and the capital intensity cutoffs.

[9]While the results of iterative estimation revealed that the global minimum of AIC appeared when $\tau_1 = 25$, $\check{k} = 10^{0.7}$, and $\hat{k} = 10^{0.8}$ (in thousand SGD), most ISIC industries are classified as a capital-intensive HO aggregate and there are only two observations in the labour-abundant cone. We ruled out these estimates taking into account the fit of the three HO aggregates as a whole.

Table 2: Estimated coefficients of development paths

Capital intensity cutoffs of the HO aggregates: $\check{k} = 10^{1.1}$, $\hat{k} = 10^{2.0}$					AIC:3057.94
Location of knots: $\tau_1 = 105$, τ_2=149					
	Coefficient	Std.Error	p-value	N	RMSE
labour-intensive (β_x)	-2.16	0.22	0.00	62	162.83
Intermediate capital-intensive (β_y)	157.18	4.53	0.00	62	1888.19
Capital-intensive (β_z)	378.49	22.95	0.00	62	2207.84

Notes: Unit is thousand SGD. Standard errors are bootstrapped using 1000 replications to obtain heteroskedasticity robust standard errors.

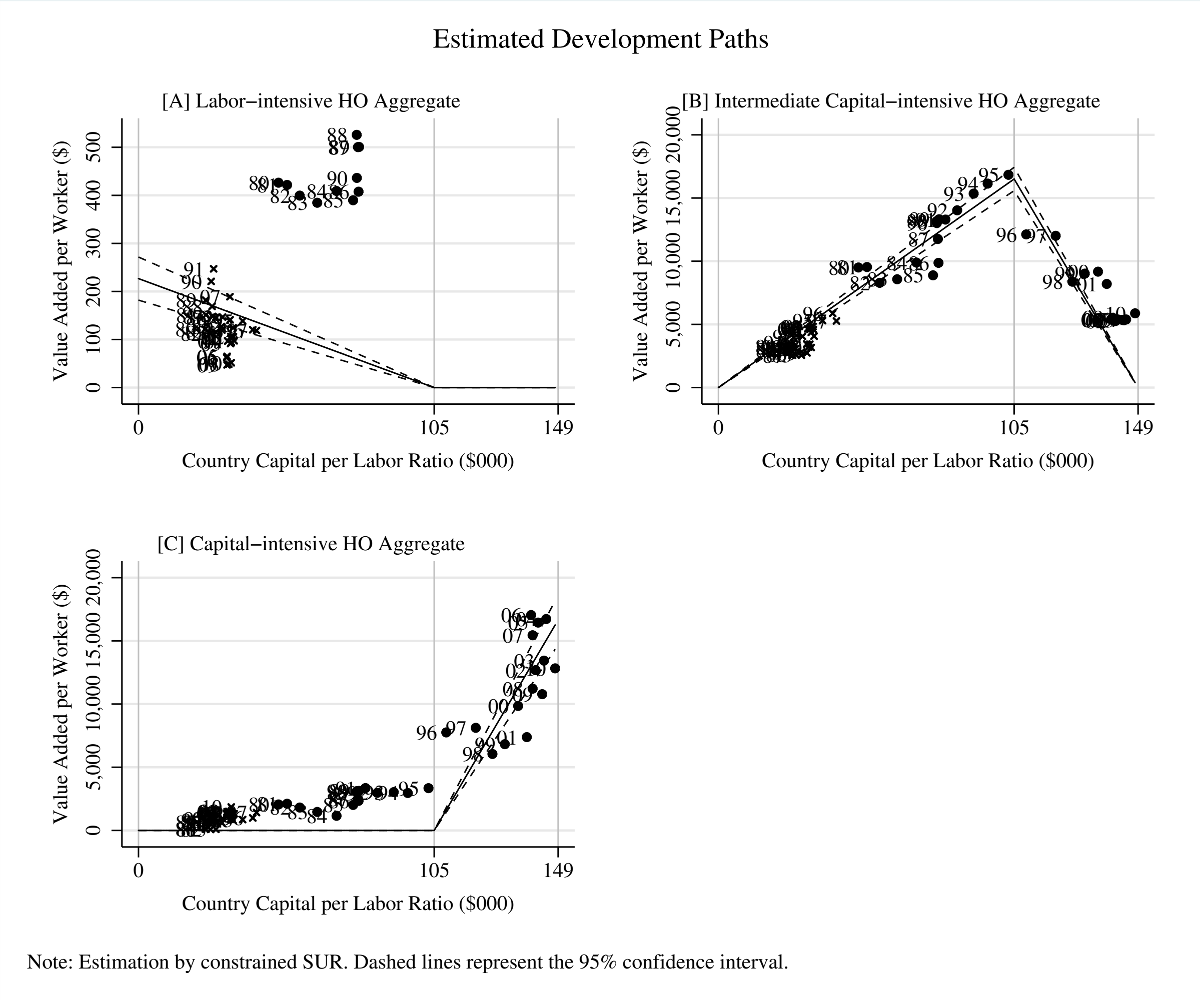
that is pre-AFTA period. Absence of free trade may be a potential explanation of the higher-than-expected labor-intensive aggregate production during this period. Indeed, Singapore produces no labor-intensive aggregate after 1991.

The figure also indicates that Malaysia exhibited inferior growth in the capital–labor ratio. Malaysia has remained in the labor-abundant cone during the whole sample period and there are no significant changes in production patterns over time. On the other hand, Singapore has experienced superior growth in its capital–labor ratio and moved into the capital-abundant cone around the late 1990s. In terms of the relationship between the two countries, our results imply that there has been increasing specialization between two countries. Consequently, the gap in the capital–labor ratio has increased between two countries and production specialization is evident.

5 Conclusion

In this paper, we estimated the industrial development paths for two countries –Malaysia and Singapore– based on the two-cone HO model. Our empirical results suggest that the two countries within the single market may have common industrial development paths. Estimated development paths and actual value–added of labor-intensive HO aggregate exhibit outliers generated by Singapore in the pre-AFTA period. Such outliers disappeared in the early 1990s. These observations also support the idea that trade liberalization may involve member countries in the common development paths. Moreover, our results suggest that there has been growing separation of the cone and production specialization between the two countries. Singapore has grown steadily in per capita capital and successfully moved into the capital-abundant cone. On the other hand, capital

Figure 3: Estimated Development Paths



accumulation was slower in Malaysia, and the country remained in the labor-abundant cone during the whole period of our analysis.

Our results may imply the increasing economic disparity across countries within the single market; i.e., rich country remains rich and poor country remains poor. It is partly consistent with the implication of theoretical studies of Deardorff (2001a,b). Deardorff points out that countries remain divided into two groups if initial differences in factor endowments are sufficiently large. In our case study, however, both countries originally resided in the same cone in 1980. Despite this, only Singapore moved out from the labor-abundant cone while Malaysia fell into a sluggish growth in capital–labor ratio. The cause of this growing gap between two countries is beyond the scope of this paper. Further analysis taking into account of the effect of FDI as well as labor mobility would play a significant role to discuss the effective policies on economic growth and industrial development.

There are other future research tasks. First, the location of knots may shift over time in accordance with technological changes. It is worth introducing the time-variant knots' location in the estimation of development paths, as conducted in Batista and Potin (2014). Second, since the HO model builds on the general equilibrium framework, it is important to investigate the relationship between trade liberalization and wage difference across two countries. Thirdly, detailed specification of production function also constitutes important questions for future research. In this paper, we assumed that production function is Leontief type and the most labor-intensive sector utilize only labor as factor input. Relaxation of these assumptions will change the design of the industrial development paths.

References

Akaike, Hirotogu (1998) "Information Theory and an Extension of the Maximum Likelihood Principle," in Emanuel Parzen, Kunio Tanabe, and Genshiro Kitagawa eds. *Selected Papers of Hirotugu Akaike*: Springer New York, pp. 199–213.

Balassa, Bela (1961) *The theory of economic integration*: Irwin, Homewood, Illinois.

——— (1965) "Trade liberalisation and revealed comparative advantage1," *The Manchester School*, Vol. 33, pp. 99–123.

Batista, Catia and Jacques Potin (2014) "Stages of diversification in a neoclassical world," *Economics Letters*, Vol. 122, pp. 276–284.

Baumol, William J (1986) "Productivity growth, convergence, and welfare: what the long-run data show," *The American Economic Review*, pp. 1072–1085.

Bernstein, Jeffrey R and David E Weinstein (2002) "Do endowments predict the location of production?: Evidence from national and international data," *Journal of International Economics*, Vol. 56, pp. 55–76.

Cameron, A. Colin and Paravin K. Trivedi (2005) *Microeconometrics: Methods and Applications*, Cambridge: Cambridge University Press.

Davis, Donald R and David E Weinstein (2001) "An Account of Global Factor Trade," *American Economic Review*.

Deardorff, Alan V (1974) "A geometry of growth and trade," *Canadian Journal of Economics*, pp. 295–306.

——— (2000) "Patterns of trade and growth across cones," *De Economist*, Vol. 148, pp. 141–166.

——— (2001a) "Does growth encourage factor price equalization?" *Review of Development Economics*, Vol. 5, pp. 169–181.

——— (2001b) "Rich and poor countries in neoclassical trade and growth," *The Economic Journal*, Vol. 111, pp. 277–294.

Department of Statistics Singapore, "National Accounts," `http://www.singstat.gov.sg/statistics/browse-by-theme/national-accounts`, (accessed August 7, 2015).

Galor, Oded (1996) "Convergence? Inferences from theoretical models," *The Economic Journal*, pp. 1056–1069.

Hall, Robert E and Charles I Jones (1999) "Why Do Some Countries Produce So Much More Output Per Worker Than Others?" *Quarterly Journal of Economics*, Vol. 114, pp. 83–116.

Harrigan, James (1995) "Factor endowments and the international location of production: econometric evidence for the OECD, 1970–1985," *Journal of International Economics*, Vol. 39, pp. 123–141.

Kiyota, Kozo (2011) "Paths of development and wage variations," *Review of International Economics*, Vol. 19, pp. 697–717.

——— (2012) "A many-cone world?" *Journal of International Economics*, Vol. 86, pp. 345–354.

——— (2014) "Industrial Upgrading in a Multiple-cone Heckscher–Ohlin Model: The Flying Geese Patterns of Industrial Development," *Review of Development Economics*, Vol. 18, pp. 177–193.

Leamer, Edward E. (1987) "Paths of development in the three-factor, n-good general equilibrium model," *The Journal of Political Economy*, pp. 961–999.

Leamer, Edward E and James Levinsohn (1995) "International Trade Theory: The Evidence, Chapter 20 of G. Grossman and K. Rogoff (eds), Handbook of International Economics vol. III."

Leamer, Edward E and Peter Schott (2005) "The rich (and poor) keep getting richer," *Harvard Business Review*, Vol. 83, p. 20, URL: `https://hbr.org/product/rich-and-poor-keep-getting-richer/F0504H-PDF-ENG`.

Lerner, Abba P (1952) "Factor prices and international trade," *Economica*, pp. 1–15.

Melvin, James R (1968) "Production and trade with two factors and three goods," *The American Economic Review*, pp. 1249–1268.

OECD (2009) *Measuring Capital - OECD Manual 2009*: OECD Publishing.

Oniki, Hajime and Hirofumi Uzawa (1965) "Patterns of trade and investment in a dynamic model of international trade," *The Review of Economic Studies*, pp. 15–38.

Pearce, Ivor F (1951) "The factor price equalisation myth," *The Review of Economic Studies*, pp. 111–120.

Schott, Peter K. (2003) "One Size Fits All? Heckscher-Ohlin Specialization in Global Production," *American Economic Review*, Vol. 93.

UNIDO (2014) "Industrial Statistics Database at 2-Digit Level of ISIC Rev.3," CD-ROM.

World Bank, "World Development Indicators," `http://data.worldbank.org/data-catalog/world-development-indicators`, (accessed May 23, 2015).