

# Export-biased Productivity Increase and Exchange Rate Regimes in East Asia and Europe

Hiroyuki Uni<sup>1</sup>

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<sup>1</sup> Graduate School of Economics, Kyoto University. E-mail: uni@econ.kyoto-u.ac.jp

Kaldor's policy proposal on exchange rate, which is based on his export-led growth model, is unilateral. By introducing the institutional analysis of wages and exchange rates into Kaldor's model and measuring productivity growth based on input-output tables, we theoretically and empirically clarify how export-biased productivity increase supported export-led growth and gave rise to inflation or accumulative trade imbalance in Japan, Korea, China, Hungary, the Czech Republic and Slovakia. We then propose an exchange rate regime based on multilateral coordination for East Asia, whose growth is strongly characterized by export-biased productivity increase.

**Keywords:** Kaldorian export-led growth model, exchange rates, productivity, East Asia, economic integration

**JEL Classification Numbers:** E12, F14, F31

## 1. Introduction

Since one of the aims of regional integration is the formation of a common currency zone, the features of the exchange rate systems of major countries have important bearings on the process of regional integration. At present, East Asian countries are characterized by enormous disparities in their levels of economic development and a considerable variety in their exchange rate systems. The existence of these differences, however, does not imply that it is not necessary to build a more desirable exchange rate regime in this region. In this regard, we can refer to the eastern enlargement of the European Union (EU). The levels of economic development of the new member states are largely different from those of the original member states. Although most of the new member states have not joined the eurozone, they aim at accession in future, and have presently adopted Exchange Rate Mechanism II (ERMII) as a transitional exchange rate system.

As is well known, one of the main characteristics of the contemporary economy is

that the growth rate of trade is considerably higher than that of GDP. The past decades witnessed an ever-increasing intra-regional trade, Foreign Direct Investment (FDI) and economic interdependence. This trend is more clearly visible in East Asia. Moreover, in many catch-upping countries, the labour productivity growth in the export goods sector often exceeds that in the nontradable goods sector.

There is a possibility that an export-biased productivity increase might cause either inflation or accumulative trade imbalance. Inflation is the result of the price increase of nontradable goods by the Balassa-Samuelson effect. Accumulative trade imbalance results from the price decrease of export goods under a fixed exchange rate. However, as will be shown in this paper, the possibility of inflation depends on the institutions regarding wage indexation, and the possibility of accumulative trade imbalance depends on the institutions regarding exchange rate adjustment. In this paper, we aim to investigate the relationships between export-biased productivity increase, wage institution and exchange rate system, while paying special attention to the ongoing East Asian economic integration and European experiences.

This paper is organized as follows. In Section 2, we revisit Kaldor's growth theory and point out ways to expand the Kaldorian export-led growth model by linking it to the exchange rate system and wage institution in the international context. Next, based on Hicks, Pasinetti, Balassa and Samuelson's theories of trade under export-biased productivity increase, we show three types of economic growth, which are based on the differences in the exchange rate system and wage institution. In Section 3, by measuring the growth rate of labour productivity in the export goods and nontradable goods sectors and by analysing institutional arrangement, we clarify the types of economic growth in Japan, Korea, China, Hungary, the Czech Republic and Slovakia. In Section 4, we discuss the general characteristics of productivity growth in the East Asian countries comparing them with the EU countries. In Conclusions, we propose an exchange rate regime based on multilateral coordination for East Asia, whose growth is strongly characterized by export-biased productivity increase.

## **2. Institutional Aspects of the Kaldorian Export-led Growth Model**

Kaldor first addressed the question of 'why growth rates differ among economies/regions' (Kaldor, 1966, 1970). Based on the recognition that the difference in the growth rates can be partly attributed to the performances of the export sector, he positioned the expansion of this sector as an important means to achieve sustainable development and full employment<sup>1)</sup>.

It is well known that the core of Kaldor's economic growth theory is the concept of cumulative causation that operates between productivity growth and demand growth. Kaldor (1971) investigated problems regarding cumulative causation that are encountered in consumption-led growth. The role of cumulative causation in consumption-led growth is clear. Wage increase, which is distributed as the benefit of productivity growth, enables the growth in consumer demand. The growing

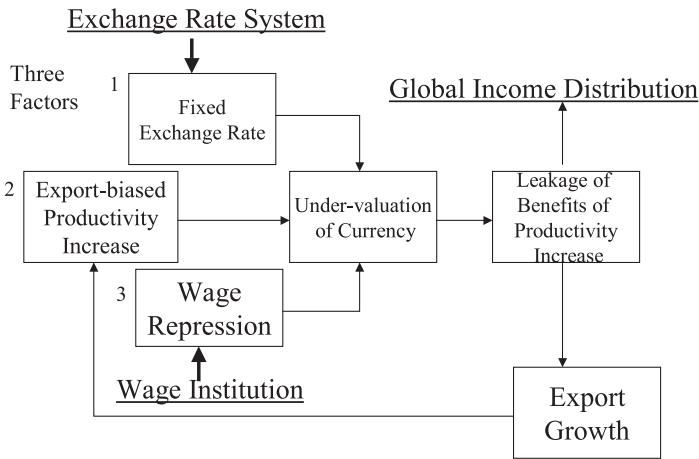


Figure 1 A simple model of export-led growth.

consumer demand brings about an increase in output, which in turn gives rise to productivity growth, through dynamic increasing returns due to various factors such as learning by doing. The route from productivity growth to demand growth is mediated by income distribution. In general, the range of income distribution is limited within the national economy. Therefore, under consumption-led growth, cumulative causation plays its role domestically.

In the case of export-led growth, cumulative causation works as shown in Figure 1. Under export-biased productivity increase, a fixed exchange rate and the repression of wage rise leads to an undervalued currency. When a country's currency is undervalued, the price of its export goods declines consequently. Therefore, when the consumers in other countries purchase these goods their purchasing power increases. In other words, part of the benefit of productivity growth leaks abroad and is distributed to consumers in other countries. The global

<sup>1)</sup> Kaldor's verbal explanation of export-led growth can be further understood with the help of a model proposed by Beckerman (1962). Accordingly, the Kaldorian export-led growth model is also known as the Kaldorian-Beckerman export-led growth model. Generally speaking, criticisms of the Kaldorian export-led growth model focus on the following two aspects. First, Kaldor did not pay complete attention to the aspect of upgrading the export structure (Pugno, 1996). Second, the Kaldorian hypothesis of unexhausted labour surplus is undesirable (Balassa, 1963). We attempt to partially solve these problems as follows. As shown in Section 3, the first problem will be solved by introducing the method of vertical integration based on input-output tables. We measure the labour productivity of the total activity related to export in the whole national economy through the following procedure. We first measure the amount of labour directly and indirectly necessary for the production of one unit of commodity; we then calculate their weighted average by the composition of the exports. By calculating these, we can quantify the structural change, such as the upgrading of export goods (Uni, 1995). Since the second problem concerns unemployment and wage determination, we attempt to solve it by introducing the institutional analysis of wages into Kaldor's export-led growth model.

distribution of the benefit of productivity growth mediates the other route of cumulative causation, by giving rise to an increase in the demand for export goods. The growing export demand brings about an increase in output, which in turn gives rise to productivity growth, through dynamic increasing returns. In the case of export-led growth, cumulative causation plays its role internationally.

Here, we must point out the unilateral nature of Kaldor's analysis. For example, Kaldor emphasized that the exchange rate transforms domestic prices into international prices and recommended the intensification of international competitiveness by the depreciation of one country's currency. In this regard, he overlooked the fact that the discretionary control of the exchange rate tends to give rise to international and domestic conflicts. For example, in some cases, it is likely that depreciation results in the rise of import prices, the decrease of real wages in one's own country, while leading to the accumulation of trade deficits, de-industrialization and unemployment in other countries. Therefore, it is necessary to establish institutions for domestic and international coordination to alleviate such conflicts and promote economic integration. According to our analytical framework (Pasinetti, 1993, Chap. 9, and Uni, 1995), the domestic and international distribution of the benefit of productivity growth in the export sector is a major source of these conflicts. The change in the distribution of this benefit is mediated by the exchange rate system and wage institutions. Therefore, we place our analysis of export-led growth in the international context and pay special attention to the exchange rate system and wage institutions.

When the growth rate of the productivity of the export goods exceeds that of the nontradable goods, in line with the combination of wage institution and exchange rate system, three types of economic growth are likely to come into being. These patterns respectively relate to the theories of Hicks, Pasinetti, Balassa and Samuelson.

Motivated by the trade imbalance between the US and the U.K. in the 1950s, Hicks (1953) theoretically discussed the effects of imbalanced changes in productivity in two countries under a fixed exchange rate system. He assumes that country A enjoys a productivity increase, whereas country B shows no change in productivity. In the case that the productivity increase only occurs in the export goods in country A and when the wage rate and profit rate remain unchanged, the prices of country A's export goods decrease. Thus, this country's benefits deriving from its productivity increase leak to country B. In this case, the productivity growth in the export goods does not affect the wage growth because Hicks implicitly assumes that wage growth is indexed to the productivity growth of the nontradable goods.

Pasinetti (1993) discussed the effects of productivity increase on international trade under a flexible exchange rate system. Exchange rate adjustment is based on the purchasing power parity regarding tradable goods. Such an exchange rate system brings about the law of one price. When, in the abovementioned Hicks' case, the prices of country A's export goods decrease in terms of its currency, this decrease would be exactly compensated by a variation of the exchange rate.

Therefore, in terms of country B's currency, the prices of country A's export goods do not change and the latter's benefits deriving from its increases in productivity do not leak to the former. Pasinetti argues that the 'complete domestic closure of the benefits of productivity increase' is 'the principle or general law'. He terms the exchange rate that causes the complete closure 'the natural exchange rate'<sup>2)</sup>. However, as he points out, in the short term, the actual exchange rate deviates from the natural exchange rate and part of the benefit leaks.

When we expand Baumol's imbalanced growth model (Baumol, 1967) to a two-country model, the implication of Hicks and Pasinetti's ideas mentioned above becomes clearer. In country A,  $q_{TA}$  is the productivity of the export goods,  $q_{NA}$  is the productivity of the nontradable goods and the nominal wage rate  $w_A$  is common in the export goods and nontradable goods sectors. For country B, these variables are represented by subscript B. The variables with hat marks represent the growth rates of these variables.

The respective unit labour costs of the export goods and nontradable goods in country A are as follows.

$$C_{TA} = w_A / q_{TA}; \text{ that is, } \hat{C}_{TA} = \hat{w}_A - \hat{q}_{TA} \quad (1)$$

$$C_{NA} = w_A / q_{NA}; \text{ that is, } \hat{C}_{NA} = \hat{w}_A - \hat{q}_{NA} \quad (2)$$

In the above-mentioned Hicks' case,  $\hat{q}_{TA} > \hat{q}_{NA} = \hat{w}_A$ . We suppose that the price of each good is proportional to its unit labour cost and the mark-up rate is constant. Then, in country A, the price of nontradable goods would be constant and that of export goods would decrease at the rate  $\hat{w}_A - \hat{q}_{TA} < 0$ . Since we suppose that  $\hat{w}_B = \hat{q}_{TB} = \hat{q}_{NB}$ , the prices of both goods in country B remain unchanged over time.

Furthermore, we suppose that the export goods of these two countries compete in the international market.  $e$  denotes the exchange rate of country A's currency in terms of country B's currency, which is international currency. In this case, the rate of change in the international price of country A's export goods is  $\hat{w}_A - \hat{q}_{TA} + \hat{e}$ . As, in the above-mentioned Hicks' case,  $\hat{e}$  is zero under the fixed exchange rate regime, the international price of country A's export goods decreases and the country's share in the international market would increase. Country B's share would decline because the international price of its export goods is constant. Consequently, the trade surplus in country A and the trade deficit in country B would accumulate, although country A might enjoy employment growth.

On the other hand, in the case of Pasinetti's theory discussed above, country A's currency appreciates against that of country B along with a change in the natural exchange rate. If  $\hat{e}_n$  denotes the rate of change in the natural exchange rate,  $\hat{e}_n$  satisfies the following equation.

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<sup>2)</sup> As the change in the natural exchange rate depends on the wage institution, the adjective 'natural' is inappropriate. Throughout this paper, however, we use this Pasinetti's word.

$$\hat{w}_A - \hat{q}_{TA} + \hat{e}_n = \hat{w}_B - \hat{q}_{TB}, \text{ that is, } \hat{e}_n = \hat{w}_B - \hat{q}_{TB} - (\hat{w}_A - \hat{q}_{TA}) \quad (3)$$

In the above case, this equation becomes,  $\hat{e}_n = \hat{q}_{TA} - \hat{w}_A > 0$ ; therefore, the natural exchange rate increases and offsets the price decrease of country A's export goods. When the actual exchange rate changes in the same direction as that of the natural exchange rate, the international price of country A's export goods remains unchanged and country A's share in the international market would not change.

Equation (3) shows the link between two institutional factors (exchange rate system and wage institution) and a technological factor (export-biased labour productivity increase). Whether the actual exchange rate changes along with the change in the natural exchange rate depends on the exchange rate system. For example, under the fixed exchange rate system or monetary integration, an adjustment of the actual exchange rate is impossible. At the same time, the change in the natural exchange rate depends on wage institution. For example, both Hicks and Pasinetti implicitly assume the existence of a wage institution under which the nominal wage growth is indexed to the productivity growth in the nontradable goods. Therefore, the productivity growth in the export goods exceeds the wage growth. According to equation (3), the disparity between the labour productivity growth of the export goods and the nominal wage growth generates the pressure to change the natural exchange rate. In this case, an exchange rate system that enables the frequent adjustment of exchange rate is necessary. In the case of Pasinetti's theory discussed above, such a flexible exchange rate system is assumed.

On the other hand, the wage institution under which the nominal wage growth is indexed to the productivity growth of export goods should also be examined. In many interpretations of the Balassa-Samuelson model (Balassa, 1964; Samuelson, 1964), the following two assumptions are adopted. The first assumption is that of the correspondence of the actual exchange rate with the natural exchange rate. The second assumption is that the wages and the productivity in the export goods sector increase at the same rate<sup>3)</sup>. Hereafter, we refer to this case as the 'Balassa-Samuelson-type'. According to equation (3), the natural exchange rate remains constant in this case. As shown in equation (2), in Balassa-Samuelson's case, however, the prices of the nontradable goods increase at the same rate as the

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<sup>3)</sup> Under the two assumptions, when the labour productivity growth of the tradable goods sector exceeds that of the nontradable goods sector, the price of tradable goods will not change and that of the nontradable goods will increase. Consequently, an increase in the general prices, that is, the weighted average of the prices of tradable and nontradable goods, will give rise to the appreciation of the real exchange rate (Balassa-Samuelson effect). However, the regular interpretation of the Balassa-Samuelson effect is based on the disparity of productivity between sectors and neglects the roles of the exchange rate system and wage institution. As mentioned above, the credibility of the two assumptions heavily depends on the characteristics of the exchange rate system and wage institution. In fact, the first assumption is not supported by some empirical researches (Canzoneri et al, 1999; Égart, 2002; Kovács, 2004; Kawai, Kasuya and Hirakata, 2003) and the second assumption is not supported in many cases (see Table 2-5).

**Table 1** Three types of economic growth with export-biased productivity increase

Type	Productivity Growth	Wage Indexation	Exchange Rate	Inflation	Trade Imbalance	Examples
Hicks	Export-biased	Nominal wage growth is indexed to nontradable goods' productivity growth	Fixed	Low	Accumulative	China (1997–)
Pasinetti	Export-biased	To export goods' productivity growth	Managed Appreciation	Low	Non-accumulative	The Czech Republic
Balassa-Samuelson	Export-biased	To all goods' productivity growth	Fixed	High	Non-accumulative	Hungary
Maastricht	Proportional	To all goods' productivity growth	Fixed	Low	Non-accumulative	EU15

Notes: The Maastricht-type will be mentioned in Section 4.

disparity between nominal wage growth and labour productivity growth in the nontradable goods sector.

Table 1 summarizes three types of economic growth with export-biased productivity increase. Hicks' case is that of typical export-led growth because it is accompanied by the three factors in Figure 1 and is likely to cause accumulative trade imbalance. Both the Pasinetti-type and Balassa-Samuelson-type growth are not accompanied by accumulative trade imbalance while the latter is accompanied by inflation. The difference between the Hicks-type and Pasinetti-type growth exists in the adjustment of the exchange rate, which is affected by the exchange rate system. The difference between the Hicks-type and Balassa-Samuelson-type growth exists in the nominal wage indexation, which relates to wage institutions.

### 3. Types of Economic Growth in Six Countries

#### 3.1. Measuring the Labour Productivity of Export Goods and Nontradable Goods

Following the above-mentioned analytical framework, we need to measure the labour productivity of the export goods and nontradable goods sectors<sup>4)</sup>. The summary of the method is as follows (the details are provided in Appendix). Using the Leontief inverse matrix derived from input-output tables, we measured the amount of labour directly and indirectly required to produce one physical unit of

<sup>4)</sup> When investigating the Balassa-Samuelson effect, it is necessary to measure the labour productivity of tradable and nontradable goods. However, in most previous studies (Canzoneri et al., 1999; Égart, 2002; Kovács, 2004; Kawai, Kasuya and Hirakata, 2003), the manufacturing and service sectors are respectively considered as the tradable and nontradable goods sectors. It is evident that this dichotomy is not satisfactory.

each commodity. Pasinetti termed this amount of labour ‘the vertically integrated labour input coefficient’. If the share of various items in the total exports is used as the weight, the weighted average of this amount of labour can be defined as ‘the vertically integrated labour input coefficient of the export goods’. The decreasing rate of this coefficient is assumed to be the growth rate of the labour productivity of the export goods. We can derive the growth rate of the labour productivity of the nontradable goods in a similar manner.

### 3.2. Japan

From the mid-1970s to the 1980s, Japan maintained sound economic performance through export-biased productivity increase. Although this was the common characteristic during this period, Table 2 shows that there were three types of economic growth. The growth rate of wages was similar to that of the productivity of export goods until 1980. After this, it declined and was close to the growth rate of the productivity of nontradable goods. Consequently, inflation slowed down after 1980. Following are the causes for the slowdown of the wage rise. First, as the high economic growth in Japan ended after the Oil Shock, the demand for labour decreased and the labour market relaxed. Second, as the management made an attack on the labour unions, particularly the left-wing unions, the bargaining power of the union weakened.

On the other hand, the trend of exchange rate and trade imbalance underwent a change in 1985. Under the strong dollar policy of the Reagan Administration, the US dollar was overvalued until 1985. The actual rate had been maintained at

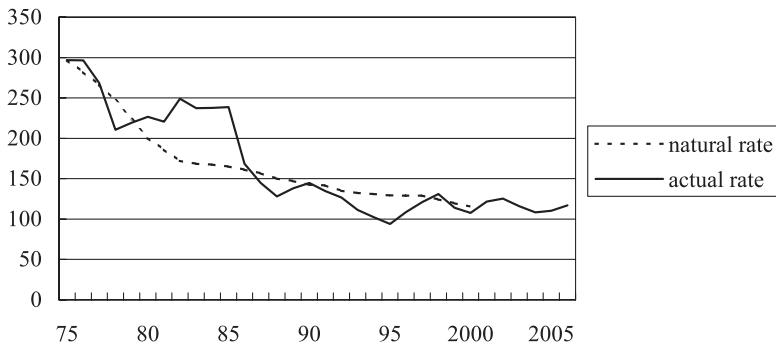
**Table 2** Productivity, wages and exchange rates in Japan (Unit: %)

	Productivity Growth		Wage Growth	Inflation Rate	Exchange Rate Appreciation	Change in Trade Imbalance
	Non-tradable Goods	Export Goods				
<b>1975–80 BS</b>	<b>2.8</b>	<b>7.5</b>	<b>7.7</b>	<b>6.4</b>	<b>5.4 (7.8)</b>	<b>-0.9</b>
<b>1980–85 H</b>	<b>2.4</b>	<b>4.3</b>	<b>3.9</b>	<b>2.7</b>	<b>-1.0 (3.9)</b>	<b>4.7</b>
<b>1985–90 P</b>	<b>3.0</b>	<b>6.5</b>	<b>3.0</b>	<b>1.3</b>	<b>10.0 (3.0)</b>	<b>-2.3</b>
1990–95	0.7	4.3	2.4	1.3	8.6 (1.9)	0.7
1995–2000	1.0	1.6	0.7	0.3	-2.7 (2.3)	0.4
2000–2005			-0.3	-0.4	-0.5	1.1

Notes: The growth rate is the average annual logarithmic difference except for Change in Trade Imbalance, which refers to a five-year increase in the ratio of Current Accounts to GDP. The exchange Rate Appreciation mentioned within parentheses is that of Natural Exchange Rates against the US Dollar.

Sources: Productivity and Natural Exchange Rates were calculated from the Input-Output Tables (Ministry of internal affairs and communications) and the deflators in National Accounts (Economic and Social Research Institute), other variables: IFS (IMF). The US productivity was calculated from Input-Output Tables (BEA) and the deflators in NIPA (BEA), The US wage: NIPA (BEA).





**Figure 2** The yen rate against the dollar (Base Year: 1975).

around 230 yen/dollar despite the decrease in the natural exchange rate. Owing to the overvalued dollar (that is, the undervalued yen), the prices of Japanese export goods had declined continuously on a dollar basis. As a result, the exports of the Japanese machinery industry expanded rapidly. The trade deficit in the US increased and the criticism of the Japanese policies intensified. After the Plaza Accord in 1985, however, the currency authorities guided the exchange rate in the direction of dollar depreciation by coordinated intervention. As shown in Figure 2, the actual rate moved along with the natural rate after 1985.

Therefore, the following types of economic growth are observed in Japan. From 1975–80, it was the Balassa-Samuelson-type growth, which was accompanied by inflation. Because of the success of wage repression, it shifted to the Hicks-type growth from 1980–85, when trade imbalance and conflict especially against the US increased. As the Plaza Accord changed the adjustment pattern of the exchange rate in 1985, the Pasinetti-type growth emerged.

### 3.3. Korea

In Korea, as shown in Table 3, the export-biased productivity increase became clear in the 1990s. The reason for this lag is as follows (The details are shown in Uni, Song and Yang (2003)). The export-oriented industrialization started in the mid-1960s. Until the beginning of the 1970s, the main export goods of Korea were textiles, which occupied about 40% of the total exports in 1970. The Korean government implemented a plan for the promotion of heavy and chemical industries from 1973. Steel, nonferrous metals, general machinery, shipbuilding, petrochemicals and electrical machinery were selected as the strategic industries to which low-interest funds and advantageous tax rates were supplied. The promotion of the heavy and chemical industries brought about the over-capacity of production, serious inflation and the pressure of wage claim. In order to resolve these problems, the Chun Doo-Hwan Administration (1980–87) repressed the wage/price rise by the suppression of the labour movement. This ruthless wage repression was a cause of the slow growth of labour productivity in the 1980s despite the promotion of export

**Table 3** Productivity, wages and exchange rates in Korea (Unit: %)

	Productivity Growth		Wage Growth	Inflation Rate	Exchange Rate Appreciation	Change in Trade Imbalance
	Non-tradable Goods	Export Goods				
1975–80	4.7	9.5	26.9	15.9	−4.5 (−9.1)	
1980–85	7.0	7.4	12.1	6.9	−7.2 (−1.5)	7.7
1985–90	7.5	9.7	15.7	5.3	4.1 (−5.5)	0.1
<b>1990–95 BS</b>	<b>4.9</b>	<b>14.1</b>	<b>14.5</b>	<b>6.0</b>	<b>−1.7 (0.8)</b>	<b>−0.9</b>
<b>1995–2000 H</b>	<b>5.4</b>	<b>13.2</b>	<b>5.0</b>	<b>3.9</b>	<b>−7.7 (7.4)</b>	<b>4.1</b>
2000–2005			8.4	3.3	2.0	−0.5

Notes: See the notes of Table 2.

Sources: Productivity and Natural Exchange Rates were calculated from the Input-Output Tables (Korea Bank) the deflators in National Accounts (Korea Bank), other variables: IFS (IMF).

growth by the discretionary devaluation of the won. The industrial policies in the 1980s also involve some problems. These policies did not benefit the producers of the intermediate goods used in electric and transport machinery. This was crucial to productivity in these industries. In addition, the abolition of advantageous policies for light industries in the 1980s brought about the concept of ‘moral hazard’. The managers lost the incentive to invest and the growth rate of labour productivity declined in the light industries, too.

In 1987, the Chun Doo-Hwan Administration collapsed due to the citizen/student movements and the workers’ struggle. As a result, the industrial relations law was revised favourably on the labour side, which strengthened the workers’ power of wage bargaining and the growth rate of wages recovered and came close to the growth rate of the labour productivity of export goods. The new industrial relation and wage rise contributed to the export-biased productivity increase in the 1990s. Although it is likely that the appreciation of the won resulting from the Plaza Accord eroded international competitiveness, the loss could be mitigated by labour productivity growth. Furthermore, after the appreciation of the won against the dollar, in place of exports to the US, exports to Japan and Asian countries increased considerably in the second half of the 1980s and the first half of the 1990s.

Thus, from 1990–97, Korea experienced the Balassa-Samuelson-type growth, which was accompanied by inflation. Due to the outflow of short-term funds in 1997, Korea was involved in the Asian currency crisis. The unemployment rate jumped from about 2% to 6.8% in 1998 and the growth rate of wages declined and reached a level similar to that of the productivity growth of nontradable goods. Consequently, as shown in Table 3, the inflation slowed down. On the other hand, the won rate depreciated considerably. It was at about 800 won/dollar before the

crisis and about 1200 won/dollar for seven years after the crisis. Under the large disparity between the actual exchange rate and the natural rate, the Korean trade balance has been in surplus since the crisis. Therefore, the Korean economic growth after the crisis is Hicks-type.

### 3.4. China

With regard to China, due to limits of data availability, the growth rate of labour productivity is obtained only for 1992–2002. As shown in Table 4, the export-biased productivity increase is prominent. The reason for this is as follows (the details are shown in Uni, Song and Yang (2003)). China implemented an open-door policy in which the promotion of the export sector was ranked highest in the list of priorities since the late 1970s. The policymakers regarded the export sector as important because exporting enables a country to pay for the imports of capital goods. Since 1979, the government has supported the export goods sector through the decentralization of the foreign trade regime, the establishment of an ‘export goods production system’ and the export subsidy system. From the late 1970s to the early 1980s, the textile industry was a major exporting industry. In 1988, Prime Minister Zhao Zhi Yang adopted the so-called ‘International Big Cycle strategy’. According to this strategy, China should realize its industrialization in a step-by-step manner. In the first step, the government should support the export of the labour-intensive industry in the coastal areas. In the second step, the funds accumulated in the process of export growth of the labour-intensive industries should be used to build the infrastructure and strengthen the foundation of capital-intensive industries. In the third step, capital- and technology-intensive industries should evolve into the core of the export sector. Although the Tiananmen Square incident ended Zhao Zhi Yang’s political career, this strategy influenced his successors deeply. Moreover, the government depreciated the exchange rate of RMB against the dollar by 50% in 1994. As the result of these policies, the exports of the machinery industry have expanded rapidly since the 1990s.

As the growth rate of wages was similar to that of productivity growth of export

**Table 4** Productivity, wages and exchange rates in China (Unit: %)

	Productivity Growth		Wage Growth	Inflation Rate	Exchange Rate Appreciation	Change in Trade Imbalance
	Non-tradable Goods	Export Goods				
<b>1992–97 BS+H</b>	<b>8.3</b>	<b>20.5</b>	<b>17.4</b>	<b>12.3</b>	<b>-8.2 (1.9)</b>	<b>2.5</b>
<b>1997–2002 H</b>	<b>11.7</b>	<b>17.1</b>	<b>13.0</b>	<b>-0.5</b>	<b>0.0 (4.6)</b>	<b>-1.3</b>
2002–06			13.0	2.1	0.9	7.1

Notes: See the notes of Table 2.

Sources: Productivity growth rates were calculated from the Input-Output Tables (National Bureau of Statistics in China) and the deflators in National Accounts (National Bureau of Statistics and the Chinese Customs House). Wage: China Statistical Year Book, other variables: IFS (IMF).

goods until 1997, the rate of inflation was high. Therefore, the economic growth from 1992–97 was of the Balassa-Samuelson-type. However, it had also a Hicks-type characteristic because the disparity between the actual exchange rate and the natural rate was expanded through the discretionary depreciation of RMB.

From 1998, the nominal wage growth slowed down. As the growth rate of wages declined and nearly reached that of productivity growth of nontradable goods, the inflation came to an end. The main reason for this slowdown is that the reform of the State-Owned Enterprises and the Collective-Owned Enterprises began from 1998 and about 29 million workers of these enterprises were rendered jobless. The most important characteristic of China's labour market is that supply exceeds demand significantly. Moreover, independent unions are prohibited and the government/company-dominated unions exercise no effects on either employment protection or wage determination. Under these conditions, if the state-owned sector shrinks and the effect of the labour market on wage determination strengthens, the nominal wage growth would slow down.

The slow wage growth and the high productivity growth of export goods from 1998 brought about the appreciation of the natural exchange rate. However, the actual rate of RMB was fixed at 8.28 RMB/dollar until July 2005. As a result, the deviation of the actual rate from the natural exchange rate increased. The undervalued RMB contributed to the growth of exports and the accumulation of the trade surplus, especially against the US. In July 2005, China accepted international criticisms to some extent and adopted a managed float system based on currency basket. However, as the appreciation of RMB has been very slow, the large disparity between the actual rate and the natural rate continues to exist. The trade surplus in China has increased accumulatively and reached 9.5% per GDP in 2006. Thus, the economic growth from 1997 is of the Hicks-type.

### 3.5. Central European Countries

Using Standardized Input-Output Tables<sup>5)</sup> prepared by Eurostat, we calculated labour productivity (a vertically integrated labour input coefficient) in Hungary, the Czech Republic, Slovakia and Germany in 1998 and 2003. As shown in Table 5, the export-biased productivity increase is prominent in Hungary, the Czech Republic and Slovakia. The main reason for this is the large inflow of FDI. From 1998, when these countries' accession to the EU became decisive, the amount of FDI into these countries increased sharply. About 40% of the FDI comprised

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<sup>5)</sup> Regarding Germany and Hungary, the sectoral data of the number of persons engaged in production in 1998 are not available. They are estimated by using the sectoral data in 2003, the total number of persons in 1998 and the sectoral compensation for employees in 1998 and 2003. Regarding the Czech Republic and Slovakia, the sectoral data of the number of persons engaged in production in both years are not available. We calculated 'the vertically integrated unit labour cost' (the details are shown in Appendix). We obtained the growth rates of productivity by subtracting the growth rates of these unit labour costs from the growth rate of the nominal wage. We abstracted self-employed persons in this calculation. This does not affect the result to a great extent because the share of self-employed persons in the total number persons engaged in production is small (about 10%) in the Czech Republic and Slovakia.

**Table 5** Productivity, wages and exchange rates in Central European countries

(1998–2003, Unit: %)

	Productivity Growth		Wage Growth	Inflation Rate	Exchange Rate Appreciation	Change in Trade Imbalance
	Non-tradable Goods	Export Goods				
Hungary BS	3.2	11.1	12.4	7.5	0.1 (–0.5)	–0.8
Czech P	3.3	9.1	7.2	2.5	2.9 (2.6)	–4.2
Slovakia BS	2.9	8.3	7.2	8.0	1.9 (1.5)	8.6
Germany	0.8	1.9	2.6	1.3		3.2

Notes: See the notes of Table 2. The Exchange Rate Appreciation within parentheses is that of Natural Exchange Rates against the EURO.

Sources: Productivity and Natural Exchange Rates were calculated from the Input-Output Tables (Eurostat) and the deflators in National Accounts (OECD), other variables: IFS (IMF).

investment in manufacturing industries. In particular, many automobile, electric and electronic multinational enterprises constructed factories for the final products or parts. As these factories are involved in the international division of labour and are equipped with the most advanced technology and equipment, the growth rate of labour productivity is high. Most of the products of these factories are exported. According to the input-output tables in 2003, the ratio of exports to the total products in machinery manufacturing industries (Sector code: 29–35) was 89% in Hungary, 77% in the Czech Republic and 88% in Slovakia. In the twenty-first century, the annual growth rate of exports in these countries was about 10%, which was twice that of the real GDP growth.

Inflation rates in Table 5 differ largely by country. The inflation in the Czech Republic was lower than those in Hungary and Slovakia from 1998–2003. Moreover, in the Czech Republic, the growth rate of wages was 14% and the inflation rate was 9% from 1993–97. The main reason for this slowdown is that the unemployment rate in Czech doubled after the economic crisis in 1997, which was caused by the outflow of speculative foreign capital. When the growth rate of wages is less than that of the productivity of export goods, the natural exchange rate tends to appreciate. In the Czech Republic and Slovakia, the actual rates appreciate corresponding to the appreciation of the natural rates. It is remarkable that the disparity between these two rates was very small in all the three countries. This forms a striking contrast to the large disparity in Japan, Korea and China.

The change of the actual rates along with the natural rates is guided by the exchange rate system in the new member countries of the EU. Most of the new member countries adopt ERM II or ERM II-compatible systems. ERM II is the modified version of the ERM, which started in 1979 for the collective adjustment of exchange rates of the member countries of the EC. According to Bofinger and Wollmershauser (2002), the most important elements of ERM II are as follows: the

definition of central rates and fluctuation bands; the rules for marginal and intramarginal interventions; the provision of short-term financing facilities for interventions; an exit option especially for the European Central Bank (ECB). For the sustainability of economic integration, the first element is decisively important. Under ERM II, the decision on central rates and fluctuation bands has to be made by the mutual agreement of the eurozone member states. This eliminates one of the main risks of a unilateral managed float system, wherein individual countries are tempted to use the devaluation of their own currency for a beggar-my-neighbour-policy.

One of the four criteria required for eurozone entry is ERM II membership for at least two years, without devaluation. Slovakia adopted the managed floating from 1998 without large devaluation and joined ERM II in November 2005 aiming to introduce the EURO in 2009. Despite not joining ERM II, Hungary unilaterally shadows it from 2001. In addition, the Czech Republic has not joined ERM II and has instead adopted the managed float with a direct inflation-targeting framework from 1998 (Rawdanowicz, 2006).

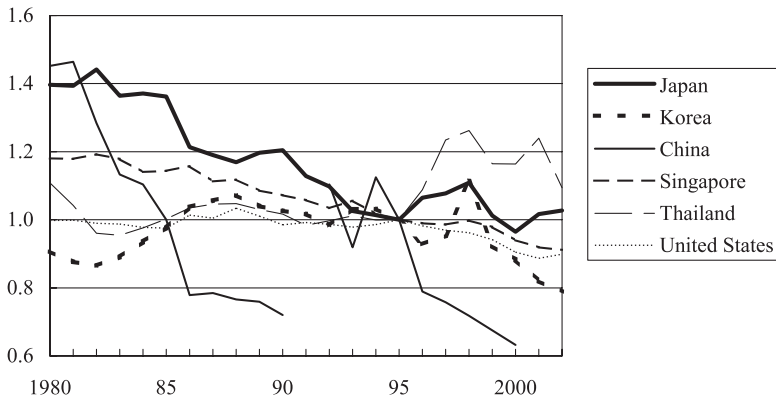
As Hungary and Slovakia have not resolved their inflation, their economic growth is of the Balassa-Samuelson-type. After the crisis in 1997, the Czech Republic shifted to the Pasinetti-type growth.

#### 4. Export-biased Productivity Increase in East Asia

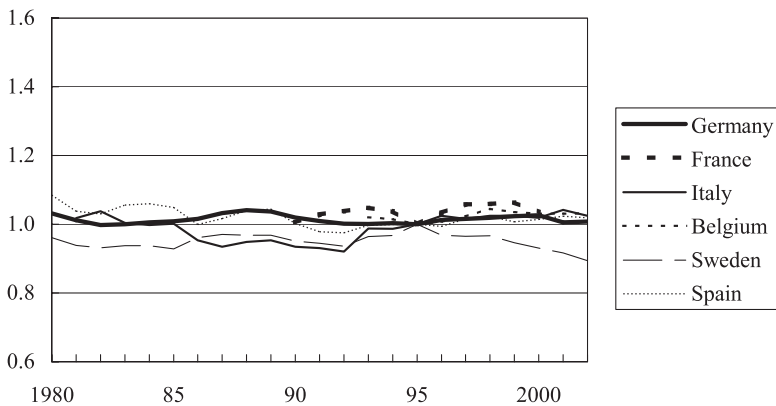
Here, we discuss the general characteristics of the productivity growth in the East Asian countries compared with that of the EU countries. First, we confirm the fact that the labour productivity growth of export goods obviously exceeds that of nontradable goods in most East Asian countries. According to equations (1) and (2), the unit labour costs of export goods and nontradable goods can be compared in the following manner:

$$\frac{C_{TA}}{C_{NA}} = \frac{q_{NA}}{q_{TA}} \quad (4)$$

We suppose that the price of each good is proportional to its unit labour cost and the mark-up rate is constant. Then, the rate of change of the relative price of export goods to nontradable goods would be  $\hat{q}_{NA} - \hat{q}_{TA}$ . In other words, when the labour productivity growth of the exports sector exceeds that of nontradable goods sector, the relative price of export goods declines. The relative price of the export goods of the East Asian countries and the US are shown in Figure 3. With the exception of Thailand, the relative price of export goods declines in the East Asian countries. This trend indicates that the labour productivity growth of export goods exceeds that of nontradable goods. The export-biased productivity increase is the common prerequisite of Hicks, Pasinetti and the Balassa-Samuelson-type growth. In other words, all the three types of growth discussed above are likely to appear in East Asia and the combination of the exchange rate system and wage institution will



**Figure 3** Ratios of export prices to wholesale prices in East Asia; 1995 = 1 (except for China 1980–90; 1985 = 1).



**Figure 4** Ratios of export prices to wholesale prices in EU; 1995 = 1.

determine the growth type in each country.

The relative prices of the EU countries' export goods are shown in Figure 4. As opposed to East Asia, the decline of the relative prices of export goods was not observed in these countries. This fact suggests that the EU countries did not experience disproportional productivity growth. According to equations (1) and (2), if equal wage growth is brought into line with equal labour productivity growth, the unit labour cost of both export goods and nontradable goods will be stabilized. Furthermore, when the mark-up rate is constant, the stability of the unit labour cost leads to the price stability of both goods. In other words, if the inflation rate is zero in all the member countries, the prices of export goods will not change and any adjustment of exchange rates will be unnecessary. Therefore, as shown in

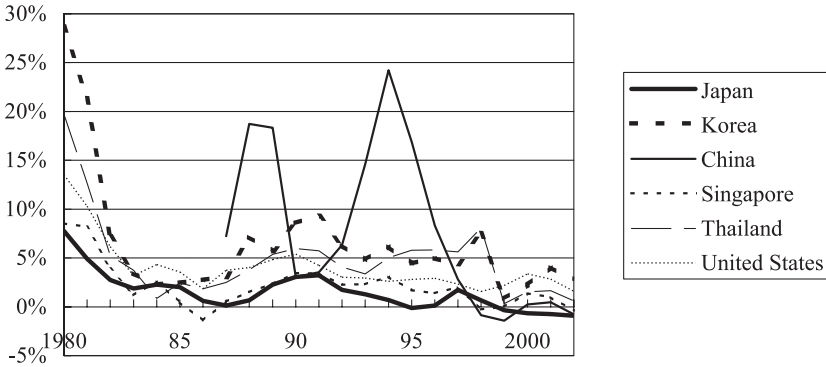


Figure 5 Rates of inflation in East Asia.

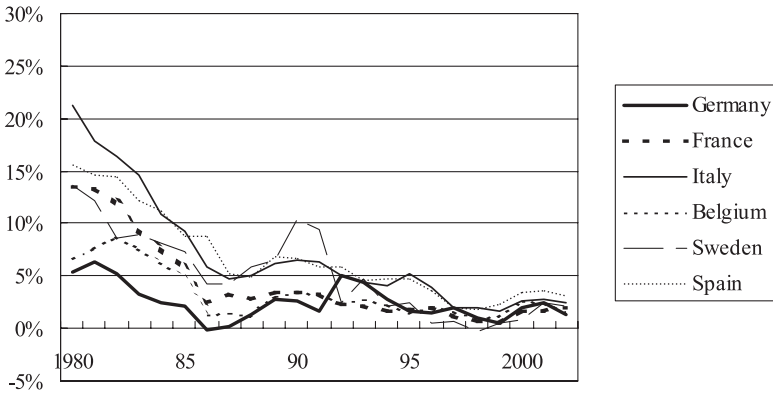


Figure 6 Rates of inflation in the EU countries.

the Maastricht criteria of economic conversion, equalizing the inflation rate to a low level was one of the major issues of the process of currency unification in the EU.

The changes of inflation rates are shown in Figures 5 and 6. As shown in Figure 6, it took EU countries many decades to equalize their inflation rates to a low level. As shown in Figure 5, in many East Asian countries, the inflation rates were fairly high before the currency crisis in 1997 and have declined since then. Japan and China also experienced deflation. Even if East Asian countries' inflation rates are equalized to zero, the export-biased productivity increase will unavoidably account for a change in prices of export goods. Therefore, as long as an export-biased productivity increase exists, the adjustment of exchange rates on a long-term basis will still be an urgent institutional issue.

The reason for the export-biased productivity increase in the East Asian countries is as follows. Following the NIES' success in export-oriented industrial-



ization, many East Asian countries made serious efforts to introduce foreign capital and technology and to implement an export promotion policy. As the result of these endeavours, the export-oriented factories that are equipped with new technology succeeded in achieving high labour productivity growth through large-scale production. The export-biased productivity increase is likely to continue until these countries reach the technological frontiers. On the other hand, in more recent years, nominal wage growth slowed down and reduced inflation. Therefore, in the near future, the gap between the nominal wage growth and the labour productivity growth of export goods will be considerably large and the natural exchange rates of these countries will rise on a long-term basis. In order to avoid the under-valuation of currency, a mechanism for adjusting the actual exchange rate along with the change in the natural exchange rate is required.

As mentioned in Section 3, in Japan, Korea and China, the actual exchange rate sometimes diverged from the natural rate. This divergence brought about accumulative trade imbalance, which finally led to international conflicts. In some cases of the under-valuation of currency, the allegation that the home country was solely responsible for this is not true. For example, the strong dollar policy of the Reagan Administration was also responsible for the under-valuation of the yen and the extremely volatile foreign investment of speculative funds was also responsible for the under-valuation of the won. However, the EU countries have already created an institutional arrangement such as ERM II for preventing the under-valuation of currency. It is evident that the institutional arrangement for multilateral coordination of exchange rates is insufficient in East Asia, compared with the EU.

## 5. Conclusions

The export-biased productivity increase is likely to continue for several decades in some East Asian countries until these countries reach the technological frontiers. On the other hand, under the international trend of an excess of labour supply, the slowdown of both wage rise and inflation tends to be a common feature in East Asia, too. When the growth rate of the labour productivity of export goods exceeds that of the wages in a country, the natural exchange rates of its currency appreciates against the currencies of other countries, where these two growth rates are equal. In this case, in order to avoid accumulative trade imbalance, the actual exchange rate of its currency has to appreciate along with the natural exchange rate on a long-term basis.

Therefore, it is necessary to establish an exchange rate regime under which the actual exchange rates vary along with the change of natural exchange rates on a long-term basis in East Asia. It is important that this adjustment of the actual rates is based on the mutual agreement of the East Asian countries. A unilateral managed floating system such as contemporary China's exchange rate system is not appropriate because it involves the risk of discretionary control for unilateral interests. Although some East Asian countries including Korea followed the IMF's

suggestion and adopted the so-called free-floating system after the currency crisis, this is also not appropriate because it is nothing more than a de facto dollar pegged system, as McKinnon (2001) explained<sup>6)</sup>.

We propose a 'collectively managed floating system', which is similar to ERM. This system refers to an exchange rate regime under which the actual exchange rate varies along with the change in the natural exchange rate on a long-term basis and the regime itself is guaranteed by the institutionalised cooperation of governments.

The institutional foundations of the 'collectively managed floating system' will be composed of the following four points<sup>7)</sup>.

- 1) Define a calculation formula to calculate the natural exchange rate based on objective data.
- 2) Establish the rules to adjust the exchange rate by mutual agreement when the actual exchange rate deviates from the natural exchange rate on a long-term basis.
- 3) Establish rules on collective intervention to defend East Asian countries' currencies when these currencies face speculative attack.
- 4) Agree on the need for policy coordination to maintain the actual exchange rate's short-term deviation from the natural exchange rate at an acceptable size.

Under a similar institutional framework, the ERM contributed to the stability of exchange rates among the EU countries from 1979–99. During this period, with the help of the collective adjustment of exchange rates and collective intervention, the exchange rates between the currencies of this region were comparatively stable, although the Mark rate against the US dollar fluctuated dramatically. In addition, these collective actions enabled the autonomy of the European currencies from the US dollar. These collective actions should be viewed as criticisms against the US who abandoned its responsibility of being the key-currency country. Although the ERM faced speculative attack when the capital flow was deregulated in the 1990s, it succeeded in escaping from the crisis by expanding fluctuation bands. Moreover, ERM II functions as a transitory system for new member countries after the currency unification in 1999.

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<sup>6)</sup> Under such a dollar-pegged exchange rate system, when the yen is undervalued against the US dollar, the international competitiveness of these countries against that of Japan will be eroded. It is one of the reasons that led to the East Asian financial crisis in 1997 (Bayoumi et al., 2000; Kawai, 2002). When the yen was devalued again in 2002, the won and other Asian currencies loosened their linkage with the US dollar slightly and strengthened that with the yen to a certain degree (Kawai, 2002).

<sup>7)</sup> We referred to the key points outlined in Tanaka (1996) and Aglietta et al. (1995). Our proposal is similar to 'the reference rate system' that Williamson proposed recently. One of the rules of the reference rate system is that 'the structure of reference rates would be revised at periodic prespecified intervals through some defined international procedure'. As the principles of determination of reference rates, Williamson recommended three approaches: large macroeconomic models; an adjusted purchasing power parity approach; Goldman Sachs' dynamic equilibrium exchange rates. Our proposal is belongs to the second approach.

In East Asia, adopting the above rules will alleviate the adverse effect of the instability of the yen rate against the US dollar. With the help of the collective adjustment of exchange rates and collective intervention, the overshooting of East Asian countries' exchange rates against the yen can be avoided to a considerable extent. In other words, the East Asian countries will be able to avoid the vicious sequence that surfaced in 1997: under-valuation of the yen against the US dollar; overvaluation of the dollar pegged East Asian currencies against the yen; decline of East Asian countries' international competitiveness against Japan; accumulation of trade deficit; crises.

In fact, in order to avoid the above-mentioned vicious sequence, the East Asian countries began to peg their own currencies to both the US dollar and the yen from the end of 2000, when the yen was undervalued. The purpose of our proposal is to multilaterally institutionalise the stability of the East Asian currencies, which is being individually pursued by the East Asian countries at present<sup>8)</sup>.

### **Appendix. The procedure for measuring labour productivity**

The productivity growth of the export goods and nontradable goods was estimated in the following manner.

$X$  is a column vector in which each entry shows the total amount of output of each commodity.

$Y$  is a column vector in which each entry shows the total final demand for each commodity. It is the sum of the domestic final demand (denoted by  $D$ ) and exports (denoted by  $F$ ).

$A$  is the input coefficient matrix in which entries in each column show the amount of domestic commodity used by the industry to obtain one unit of output.

$a$  is a row vector in which each entry shows the amount of labour directly required to obtain one unit of output in each industry (unit: persons engaged in production).

$L$  is a scalar to denote the total labour force (unit: persons engaged in production). The following two equations show the quantity system in a country.

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<sup>8)</sup> It took Europe several decades to establish the rules for collective adjustment and intervention and Europe endured a long process of trial and error. Similarly, institutionalising the cooperation in East Asia is doomed to be a time-consuming process. As a temporary measure, some researchers propose that the East Asian countries peg their own currencies to a currency basket composed of their major trade/investment partners, rather than only the dollar and yen. They emphasize that the managed floating rates should reflect the major players' international competitiveness (French and Japanese Staff, 2001; Asian Policy Forum, 2000; Kawai, 2002). However, considering the export-biased productivity increase in this region, these measures are still insufficient. Institutionalising the multilateral mechanism of adjustment of exchange rates on a long-term basis is even more necessary for East Asia than that for the EU. As Williamson (2007) mentioned, 'the present growth in global imbalances threatens to end up inducing a collapse of the dollar, ... that is why the merits of a reference rate system need to be discussed now even if one is not optimistic about the chances of its imminent adoption'.

$$(I - A)X = Y$$

$$aX = L$$

We obtain the following from these equations:

$$a(I - A)^{-1}Y = L$$

If we define  $a(I - A)^{-1} = v$  ( $v$  is a row vector in which each entry shows the amount of labour directly and indirectly required to produce one physical unit of each commodity, that is, ‘the vertically integrated labour input coefficient’. In practice, we use the Leontief inverse matrix modified to remove the effect of imports):

$$vY = v(D + F) = L$$

Column vector  $D$  is the product of the total domestic final demand (denoted as  $\Sigma D$ ) and the share of each commodity in this total (denoted as column vector  $d$ ). Therefore,

$$D = d\Sigma D$$

Similarly,

$$F = f\Sigma F$$

We obtain

$$v(d\Sigma D + f\Sigma F) = vd\Sigma D + vf\Sigma F = L$$

$vd$  and  $vf$  are scalars.  $vd$  is the quantity of labour directly and indirectly required to obtain one physical unit of domestic final demand, that is, ‘the vertically integrated labour input coefficient of the nontradable goods’. Further,  $vf$  is ‘the vertically integrated labour input coefficient of the export goods’. The rates of decrease of these two coefficients can respectively be regarded as the growth rates of the labour productivity of the nontradable goods and the export goods.

‘The vertically integrated unit labour cost’ is calculated as follows. Persons engaged in production consist of employees and self-employed persons. With regard to the latter, wage income does not dissociate from profit income. Therefore, ‘compensation for employees’ in the Input-Output Tables does not contain ‘wage income’ for self-employed persons. To measure wage cost, we have to estimate ‘wage income’ for self-employed persons. We adapted the employees’ wage rates in each industry to self-employed persons as follows.

Wage costs in the  $i$  th industry = {(‘compensation for employees’ in the  $i$  th industry) / (the number of employees in the  $i$  th industry)}  $\times$  (the number of persons engaged in production in the  $i$  th industry)

If  $W$  denotes a row vector in which each entry shows unit labour costs in each industry calculated by dividing the above wage costs by the amount of output.  $W(I - A)^{-1} = w$  is a row vector in which each entry shows wage costs directly and indirectly required to produce one unit of each commodity, that is, ‘the vertically integrated unit labour cost’.

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