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Application of Factor Decomposition Techniques to Vertical Specialisation Measurements

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Keywords: vertical specialisation, factor decomposition, input-output

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Abstract

The increasing importance of vertical specialisation (VS) trade has been a notable feature of rapid economic globalisation and regional integration. In an attempt to understand countries' depth of participation in global production chains, many Input-Output based VS indicators have been developed. However, most of them focus on showing the overall magnitude of a country's VS trade, rather than explaining the roles that specific sectors or products play in VS trade and what factors make the VS change over time. Changes in vertical specialisation indicators are, in fact, determined by mixed and complex factors such as import substitution ratios, types of exported goods and domestic production networks. In this paper, decomposition techniques are applied to VS measurement based on the OECD Input-Output database. The decomposition results not only help us understand the structure of VS at detailed sector and product levels, but also show us the contributions of trade dependency, industrial structures of foreign trade and domestic production system to a country's vertical specialisation trade.

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1. Introduction

The recent increasing importance of vertical specialisation (VS) trade has been considered one of the most outstanding features of the rapid economic globalisation and regional integration. Notably, more intermediate parts and components are produced in subsequential stages or processes across different countries, and then exported to other countries for further production. The phenomenon of increasingly prevalent VS trade has been explained by an extended Dornbusch-Fischer-Samuelson Ricardian trade model (Hummels *et al*., 2001) and a two-country dynamic Ricardian model (Yi, 2003). The common conclusion of both models suggests that vertical specialization can serve as a propagation mechanism magnifying tariff reductions into large increases in trade, since a one-percentage-point reduction in tariffs leads to a multiple of one percentage-point decline in costs and prices. Yi (2003) also shows that at least half of the observed increase in world trade since the 1960s can be explained by means of vertical specialization.

In order to measure the magnitude of such vertical specialisation trade, various measurements have been developed in a range of empirical literature. The most widely used measure of vertical specialisation trade is the "import contents of export" (VS share) based on non-competitive type Input-Output (I-O) tables. This indicator was originally proposed by Hummels *et al.* (2001). Since this measurement captures the embodied intermediate imports in exports or the direct and indirect imports of intermediates induced by export demand, it has been considered a useful proxy indicator to illustrate a country's degree of participation in vertical specialisation trade. This indicator has been extended and applied in various studies recently, such as Koopman *et al*., 2008, Uchida and Inomata (2009), Yang *et al*, 2009, Yamano *et al.* (2010), Hiratsuka and Uchida (2010), Koopman *et al*. (2010) and Meng *et al.* (2010). However, most of the above studies only focus on showing the overall magnitude of vertical specialisation for a target country, rather than explaining the roles specific sectors or products play in VS trade and what factors makes the VS share change over time.

Estimated indicators of import contents of exports show that large countries, like the United States, Japan, and China have relatively low VS shares while small countries, like Singapore and Luxembourg, have higher VS shares (Figure 1).

Figure 1. Import contents of exports (national VS share), 1995 and 2005

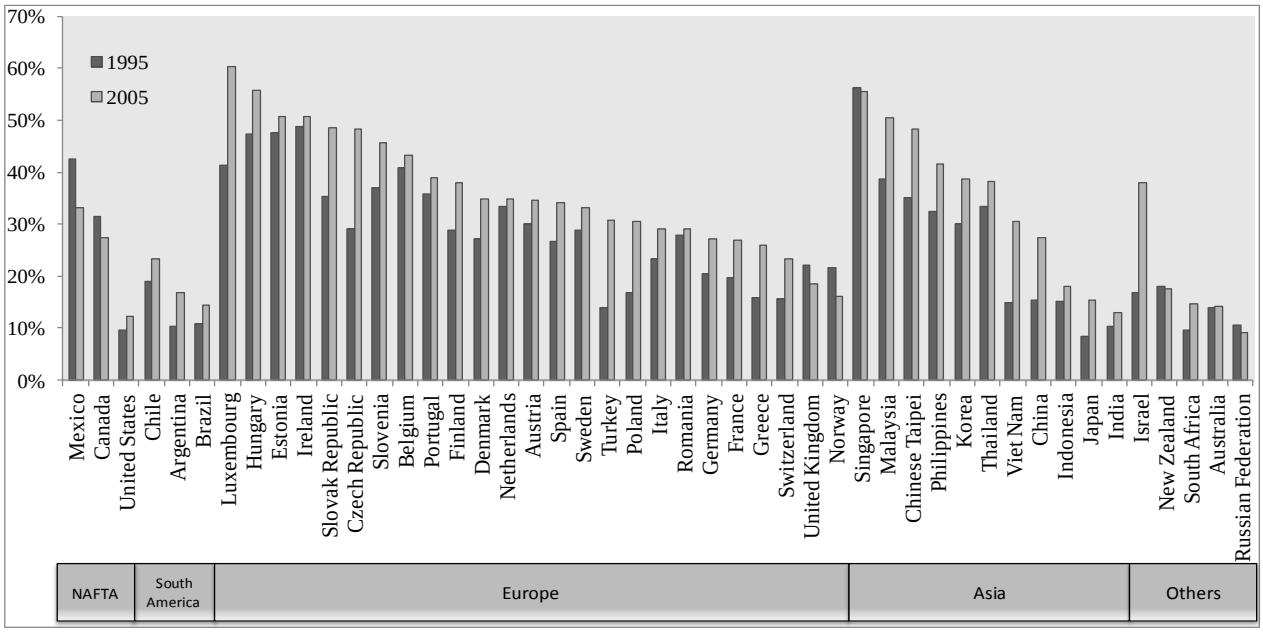
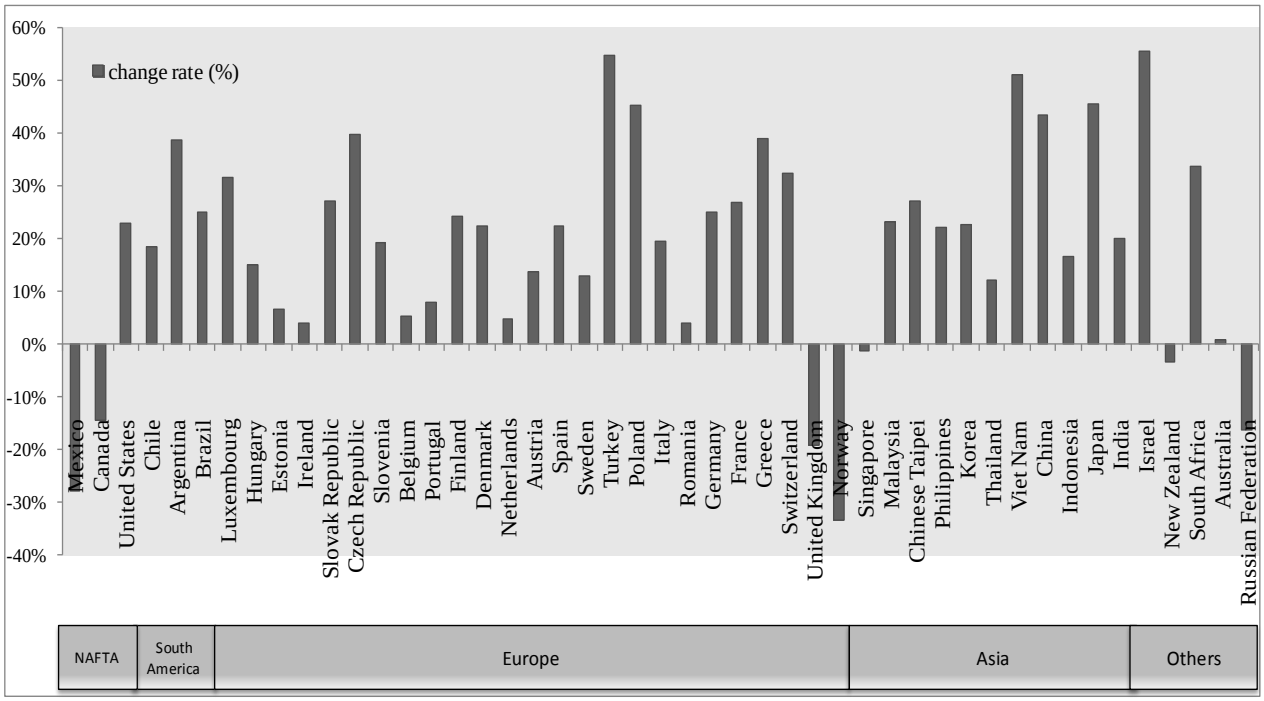


Figure 2. Import contents of exports (national VS share), percentage change, 1995 to 2005



Note: *Mining and quarrying* sector (ISIC Rev.3, 10-14) and *Utility* sector (ISIC Rev.3, 40-41) are not included in the calculation of national VS share.
Source: OECD Input-Output database, 2010: www.oecd.org/sti/inputoutput

That the VS share seems to depend on a country's economic size and the degree of its international openness is not surprising, since large countries are likely to be able to conduct more stages of production within their borders (possibly across different regions) and their export share of output will be lower because of the larger size of their domestic markets. For small countries, their higher share is partly due to their high dependence on the overseas market. In addition, from Figure 2 it's easy to see that there is a large variation in the changing pattern of VS share across countries. Most countries have experienced an increase in VS share with some showing significant growth such as China, Israel, Japan, Poland, Turkey and Vietnam. However, for countries such as Canada, Mexico, Norway, the Russian Federation, and the United Kingdom, VS shares decreased between 1995 and 2005.

In order to investigate the structure of vertical specialisation and its changing pattern in detail, two decomposition techniques are applied to the VS measurement in this paper. The first one decomposes the national import contents of export into individual VS linkages, which helps us understand the role of a specific sector or product in a country's vertical specialisation trade. The second one is an I-O based factor decomposition technique. This kind of technique has been widely used in the analysis of structural change and long-term economic growth (Rose and Casler, 1996; Dietzenbacher and Los, 1998). Using this technique, we aim to examine the contributions of trade dependency, industrial structure of traded goods and domestic production system to the changes in vertical specialization.

This paper proceeds as follows: the next section shows how a country's total VS measure can be decomposed into individual VS linkages at the sector level. Then, the contribution rate of individual VS linkage to national total VS is used to investigate the structural changes. We also aggregate the individual VS linkages by exporting sector and importing product respectively. This helps us identify the leading sectors or key products in vertical specialisation. Secondly, we show how to apply an I-O based factor decomposition technique to the absolute change of some VS measurements. This technique provides

insights into which factors contribute most to the change in VS shares over time; Section 3 shows the cross-country application results of the decomposition techniques using the harmonised OECD I-O database. The concluding remarks are given in Section 4.

2. Decomposition of vertical specialisation indicators

2.1 Individual VS linkage at sector level

The most widely used vertical specialisation measure (import contents of export or VS share) based on Leontief's demand driven I-O model can be rewritten as follows:

$$\text{VS share} = \mathbf{u}\cdot\mathbf{m}\cdot\mathbf{L}\cdot\mathbf{EX}/\mathbf{u}\cdot\mathbf{EX}, \quad (1)$$

where, $\mathbf{u}$ is a 1 × n vector of 1's; $\mathbf{m}$ is the matrix (n × n) constructed by import coefficients (the share of imported intermediate goods to total input); $\mathbf{L} = (\mathbf{I}-\mathbf{A_d})^{-1}$ is the domestic Leontief inverse matrix where $\mathbf{A_d}$ is the domestic input coefficient matrix (n × n) and $\mathbf{I}$ is an n × n identity matrix; and $\mathbf{EX}$ is the n × 1 column vector of exports. The VS share measure represents the intermediate imports directly and indirectly induced by export demand, which can also be described as the value of imported intermediates embodied in a country's exports. This indicator also represents the backward linkage in inter-industrial production chains, since it's based on the Leontief inverse. In order to investigate how different individual linkages contribute to the national VS, equation (1) can be expressed as:

$$\begin{aligned}\text{VS share} &= \sum^{j}\sum^{i}(VS^{ji})/\mathbf{u}\cdot\mathbf{EX} \\ &= \sum^{j}\sum^{i}(\mathbf{m}^{j}\cdot\mathbf{L}\cdot\mathbf{EX}^{i})/\mathbf{u}\cdot\mathbf{EX}, \quad (2)\end{aligned}$$

where, $\mathbf{m}^{j}$ is the jth row (1 × n) of matrix $\mathbf{m}$, namely, the row vector of intermediate import coefficients of product j. $\mathbf{EX}^{i}$ is the column vector (n × 1) constructed by the export of product (sector) i and zero elements of other products (sectors). The VS^{ji} measure represents how many intermediate imports of product j are directly and indirectly necessary for producing exporting products i by the way of domestic inter-industry production system. The contribution ratio of VS^{ji} to the total VS can help us understand the structure of VS at a detailed product-to-product level.

Using equation (2), two alternative measures of the VS can be given as:

$$VS^{\bullet i} = \sum^{j}(VS^{ji}); \quad (3)$$
$$VS^{j\bullet} = \sum^{i}(VS^{ji}), \quad (4)$$

where, $VS^{\bullet i}$ represents the total intermediate imports of various products induced by the exports of sector i. $VS^{j\bullet}$ shows the intermediate imports of product j induced by the national total exports. Using these measures, we can identify the leading-sectors or key-products in national VS measures, namely we can understand which sector or product plays a relatively important role in a country's vertical specialisation trade.

2.2 Input-Output based factor decomposition in the change of VS share measurement

Equation (1) can be rewritten as the following form:

$$\text{VS share} = \mathbf{u}\cdot\mathbf{m}\cdot\mathbf{L}\cdot\mathbf{e}, \quad (5)$$

where $\mathbf{e} = \mathbf{EX}/\mathbf{u}\cdot\mathbf{EX}$, is the column vector (n × 1) constructed by the export share by sector (the share of sectors' exports in the national total exports). According to the above equation, the magnitude of the VS

share depends on the relationship between the intermediate import coefficients (**m**), the domestic Leontief inverse ($\mathbf{L} = (\mathbf{I}-\mathbf{A_d})^{-1}$) and the export share (**e**). Therefore, the absolute change of the VS share over time can be given as follows:

$$\Delta \text{ VS share} = \text{VS share}^1 - \text{VS share}^0 = \mathbf{u}(\mathbf{m}^1\cdot\mathbf{L}^1\cdot\mathbf{e}^1 - \mathbf{m}^0\cdot\mathbf{L}^0\cdot\mathbf{e}^0) \quad (6)$$

where, the subscripts 0 and 1 represent the base year and target year respectively.

We can use conventional techniques to decompose the change in VS share:

$$\Delta \text{ VSL share} = \text{VSL share}^1 - \text{VSL share}^0 = \mathbf{u}(\mathbf{m}^1\cdot\mathbf{L}^1\cdot\mathbf{e}^1 - \mathbf{m}^0\cdot\mathbf{L}^0\cdot\mathbf{e}^0).$$
$$= \mathbf{u}\cdot[(\mathbf{m}^0+\Delta\mathbf{m})\cdot(\mathbf{L}^0+\Delta\mathbf{L})\cdot(\mathbf{e}^0+\Delta\mathbf{e}) - \mathbf{m}^0\cdot\mathbf{L}^0\cdot\mathbf{e}^0]$$
$$= \mathbf{u}\cdot[\Delta\mathbf{m}\cdot\mathbf{L}^0\cdot\mathbf{e}^0 + \mathbf{m}^0\cdot\Delta\mathbf{L}\cdot\mathbf{e}^0 + \mathbf{m}^0\cdot\mathbf{L}^0\cdot\Delta\mathbf{e} + \Delta\mathbf{m}\cdot\Delta\mathbf{L}\cdot\mathbf{e}^0 + \Delta\mathbf{m}\cdot\mathbf{L}^0\cdot\Delta\mathbf{e} + \mathbf{m}^0\cdot\Delta\mathbf{L}\cdot\Delta\mathbf{e} + \Delta\mathbf{m}\cdot\Delta\mathbf{L}\cdot\Delta\mathbf{e}]. \quad (7)$$

According to the above equation, the change in VS share can be explained by the following seven factors:

the change of intermediate import coefficients ($\mathbf{u}\cdot\Delta\mathbf{m}\cdot\mathbf{B}^0\cdot\mathbf{e}^0$),
the change of domestic production technique ($\mathbf{u}\cdot\mathbf{m}^0\cdot\Delta\mathbf{B}\cdot\mathbf{e}^0$),
the change of export structure ($\mathbf{u}\cdot\mathbf{m}^0\cdot\mathbf{B}^0\cdot\Delta\mathbf{e}$),
the interaction change of import coefficients and domestic production technique ($\mathbf{u}\cdot\Delta\mathbf{m}\cdot\Delta\mathbf{B}\cdot\mathbf{e}^0$),
the interaction change of import coefficients and export structure ($\mathbf{u}\cdot\Delta\mathbf{m}\cdot\mathbf{B}^0\cdot\Delta\mathbf{e}$),
the interaction change of domestic production technique and export structure ($\mathbf{u}\cdot\mathbf{m}^0\cdot\Delta\mathbf{B}\cdot\Delta\mathbf{e}$), and
the interaction change of all individual factors ($\mathbf{u}\cdot\Delta\mathbf{m}\cdot\Delta\mathbf{B}\cdot\Delta\mathbf{e}$).

However, in the above decomposition it is difficult to make a clear distinction between each component within the terms of interaction changes.

Dietzenbacher and Los (1998) proposed the alternative decomposition technique in which cross-terms are explicitly removed. Following their methodology, equation (6) can be decomposed into six alternative formations such as

$$\mathbf{u}\cdot[(\mathbf{m}^0+\Delta\mathbf{m})\cdot(\mathbf{L}^0+\Delta\mathbf{L})\cdot\mathbf{e}^1 - \mathbf{m}^0\cdot\mathbf{L}^0\cdot(\mathbf{e}^1-\Delta\mathbf{e})]$$
$$= \mathbf{u}\cdot[\Delta\mathbf{m}\cdot\mathbf{L}^1\cdot\mathbf{e}^1 + \mathbf{m}^0\cdot\Delta\mathbf{L}\cdot\mathbf{e}^1 + \mathbf{m}^0\cdot\mathbf{L}^0\cdot\Delta\mathbf{e}], \quad (8.1)$$
$$= \mathbf{u}\cdot[\Delta\mathbf{m}\cdot\mathbf{L}^0\cdot\mathbf{e}^1 + \mathbf{m}^1\cdot\Delta\mathbf{L}\cdot\mathbf{e}^1 + \mathbf{m}^0\cdot\mathbf{L}^0\cdot\Delta\mathbf{e}] \quad (8.2)$$

or

$$\mathbf{u}\cdot[(\mathbf{m}^0+\Delta\mathbf{m})\cdot\mathbf{L}^1\cdot(\mathbf{e}^0+\Delta\mathbf{e}) - \mathbf{m}^0\cdot(\mathbf{L}^1-\Delta\mathbf{L})\cdot\mathbf{e}^0]$$
$$= \mathbf{u}\cdot[\Delta\mathbf{m}\cdot\mathbf{L}^1\cdot\mathbf{e}^1 + \mathbf{m}^0\cdot\Delta\mathbf{L}\cdot\mathbf{e}^0 + \mathbf{m}^0\cdot\mathbf{L}^1\cdot\Delta\mathbf{e}] \quad (8.3)$$
$$= \mathbf{u}\cdot[\Delta\mathbf{m}\cdot\mathbf{L}^1\cdot\mathbf{e}^0 + \mathbf{m}^0\cdot\Delta\mathbf{L}\cdot\mathbf{e}^0 + \mathbf{m}^1\cdot\mathbf{L}^1\cdot\Delta\mathbf{e}] \quad (8.4)$$

or alternatively,

$$\mathbf{u}\cdot[\mathbf{m}^1\cdot(\mathbf{L}^0+\Delta\mathbf{L})\cdot(\mathbf{e}^0+\Delta\mathbf{e}) - (\mathbf{m}^1-\Delta\mathbf{m})\cdot\mathbf{L}^0\cdot\mathbf{e}^0]$$
$$= \mathbf{u}\cdot[\Delta\mathbf{m}\cdot\mathbf{L}^0\cdot\mathbf{e}^0 + \mathbf{m}^1\cdot\Delta\mathbf{L}\cdot\mathbf{e}^1 + \mathbf{m}^1\cdot\mathbf{L}^0\cdot\Delta\mathbf{e}] \quad (8.5)$$
$$= \mathbf{u}\cdot[\Delta\mathbf{m}\cdot\mathbf{L}^0\cdot\mathbf{e}^0 + \mathbf{m}^1\cdot\Delta\mathbf{L}\cdot\mathbf{e}^0 + \mathbf{m}^1\cdot\mathbf{L}^1\cdot\Delta\mathbf{e}], \quad (8.6)$$

where $\mathbf{m}^1 = \mathbf{m}^0+\Delta\mathbf{m}$, $\mathbf{L}^1 = \mathbf{L}^0+\Delta\mathbf{L}$, $\mathbf{e}^1 = \mathbf{e}^0+\Delta\mathbf{e}$.

The existence of alternative formations implies the problem of non-uniqueness, namely the result of decomposition analysis depends on the technique chosen. Since the choice of decomposition technique does not have much influence on average results (see Dietzenbacher and Los, 1997) the index of change in the VS share can be given by average value of the above six elements:

Average change in VS share
$$= \mathbf{u}\cdot\Delta\mathbf{m}\cdot(2\mathbf{L}^0\cdot\mathbf{e}^0 + 2\mathbf{L}^1\cdot\mathbf{e}^1 + \mathbf{L}^0\cdot\mathbf{e}^1 + \mathbf{L}^1\cdot\mathbf{e}^0)/6$$

$$+ \mathbf{u}\cdot (2\mathbf{m}^0\cdot\Delta\mathbf{L}\cdot\mathbf{e}^0 + 2\mathbf{m}^1\cdot\Delta\mathbf{L}\cdot\mathbf{e}^1 + \mathbf{m}^0\cdot\Delta\mathbf{L}\cdot\mathbf{e}^1 + \mathbf{m}^1\cdot\Delta\mathbf{L}\cdot\mathbf{e}^0)/6$$
$$+ \mathbf{u}\cdot (2\mathbf{m}^0\cdot\mathbf{L}^0 + 2\mathbf{m}^1\cdot\mathbf{L}^1 + \mathbf{m}^0\cdot\mathbf{L}^1 + \mathbf{m}^1\cdot\mathbf{L}^0)\cdot\Delta\mathbf{e}/6. \quad (9)$$

The absolute change of VS share is thus finally decomposed into three factors, namely the change of intermediate import coefficients (Δ**m)**, the change in the domestic Leontief inverse (Δ**L**) and the change of export shares (Δ**e)**. These three factors represent the degree of a country's import dependency, domestic backward linkages and export structure respectively.

Similarly, an alternative vertical specialisation measurement using Ghosh's supply-driven I-O model (Meng *et al*., 2010) can be given as follows:

$$\text{VSG share} = \mathbf{u}\cdot\mathbf{IM}\cdot\mathbf{G}\cdot\mathbf{ex}/\mathbf{u}\cdot\mathbf{IM}\cdot\mathbf{u}^t = \mathbf{u}\cdot\mathbf{im}\cdot\mathbf{G}\cdot\mathbf{ex}, \quad (10)$$

where **IM** is the n × n intermediate import matrix; **G** is the n × n domestic Ghosh inverse; **ex** is the column vector (n × 1) constructed by export coefficients (the share of exports to the national total output by sector); and **u**·**im** is the 1 × n vector constructed by import shares (the share of sectoral intermediate imports to the total national intermediate imports). This measure indicates the exports resulting from (or induced by) the supply of intermediate imports as a share of total intermediate imports, namely it shows how much of the value of intermediate imports are re-exported. According to the decomposition technique applied in the VS measure, the change of VSG share can also be decomposed into three factors as shown below.

Average change in VSG share
$$= \mathbf{u}\cdot\Delta\mathbf{im}\cdot (2\mathbf{G}^0\cdot\mathbf{ex}^0 + 2\mathbf{G}^1\cdot\mathbf{ex}^1 + \mathbf{G}^0\cdot\mathbf{ex}^1 + \mathbf{G}^1\cdot\mathbf{ex}^0)/6$$
$$+ \mathbf{u}\cdot (2\mathbf{im}^0\cdot\Delta\mathbf{G}\cdot\mathbf{ex}^0 + 2\mathbf{im}^1\cdot\Delta\mathbf{G}\cdot\mathbf{ex}^1 + \mathbf{im}^0\cdot\Delta\mathbf{G}\cdot\mathbf{ex}^1 + \mathbf{im}^1\cdot\Delta\mathbf{G}\cdot\mathbf{ex}^0)/6$$
$$+ \mathbf{u}\cdot (2\mathbf{im}^0\cdot\mathbf{G}^0 + 2\mathbf{im}^1\cdot\mathbf{G}^1 + \mathbf{im}^0\cdot\mathbf{G}^1 + \mathbf{im}^1\cdot\mathbf{G}^0)\cdot\Delta\mathbf{ex}/6. \quad (11)$$

The three factors respectively represent the change of intermediate import structure (Δ**im**), the change of domestic forward linkages (Δ**G**) and the change of export dependency (Δ**ex**).

In addition, following the concept of import contents of export, the directly and indirectly induced domestic value added by export (primary input contents of exports) can also be defined as follows:

$$\text{VSV share} = \mathbf{u}\cdot\mathbf{v}\cdot\mathbf{L}\cdot\mathbf{EX}/\mathbf{u}\cdot\mathbf{EX} = \mathbf{u}\cdot\mathbf{v}\cdot\mathbf{L}\cdot\mathbf{e}, \quad (12)$$

where, **v** is the 1 × n vector of primary input coefficients (value added rates by sector). Similarly, the change of VSV share can also be decomposed into three factors as shown below, namely the change of primary input dependency (Δ**v**), the change of domestic backward linkages (Δ**L**) and the change of export structure (Δ**e**).

Average change in VSV share
$$= \mathbf{u}\cdot\Delta\mathbf{v}\cdot (2\mathbf{L}^0\cdot\mathbf{e}^0 + 2\mathbf{L}^1\cdot\mathbf{e}^1 + \mathbf{L}^0\cdot\mathbf{e}^1 + \mathbf{L}^1\cdot\mathbf{e}^0)/6$$
$$+ \mathbf{u}\cdot (2\mathbf{v}^0\cdot\Delta\mathbf{L}\cdot\mathbf{e}^0 + 2\mathbf{v}^1\cdot\Delta\mathbf{L}\cdot\mathbf{e}^1 + \mathbf{v}^0\cdot\Delta\mathbf{L}\cdot\mathbf{e}^1 + \mathbf{v}^1\cdot\Delta\mathbf{L}\cdot\mathbf{e}^0)/6$$
$$+ \mathbf{u}\cdot (2\mathbf{v}^0\cdot\mathbf{L}^0 + 2\mathbf{v}^1\cdot\mathbf{L}^1 + \mathbf{v}^0\cdot\mathbf{L}^1 + \mathbf{v}^1\cdot\mathbf{L}^0)\cdot\Delta\mathbf{e}/6. \quad (13)$$

Changes in vertical specialisation indicators are, in fact, determined by mixed and complex factors. The above structural decomposition techniques present an approach to disentangling the sources of change in a country's vertical specialisation into its component parts. This helps us to understand the evolution of vertical specialisation in detail.

3. Empirical results

In this section, the decomposition techniques shown in Section 2 are applied to the VS measures for 47 economies (33 OECD countries and 14 non-OECD countries) and 37 industries (see Appendix 2) using OECD's harmonised Input-Output database[1] and IDE-JETRO Input-Output tables (for three South East Asian countries)[2]. In order to increase the country coverage of analysis, some additional I-O tables for the reference years, i.e. 1995 and 2000, are estimated using National Accounts, trade statistics and other international industrial databases - for example, OECD's Structural Analysis (STAN) Database and the World Bank's World Development Indicators (WDI).

3.1 Individual VS linkages at detailed sector or product levels

In order to show which exporting sectors play important roles in a country's vertical specialisation trade, we calculate the contribution rate of sectoral VS ($VS^{\bullet i}$ and $VS^{j\bullet}$) to national total VS (Table 1).

The upper part of Table 1 shows the calculation results of $VS^{\bullet i}$ for 1995 and 2005 by country group. More detailed results by country can be found in Appendix 1. The main features of sectoral $VS^{\bullet i}$ can be summarized below.

(1) There is a great variation in the contribution rate by sector. Some sectors, like *Agriculture*, *Wood products*, *Pulp and paper*, *Coke, refined petroleum products*, *Rubber & plastics products*, have relatively low rates for most countries. This is mainly because the products from these sectors are almost land or natural resource dependent and most intermediate inputs used in their production may be from the domestic market rather than from overseas. Another possible explanation for the sector with lower VS is

Table 1. The contribution rate of sectoral VS in national VS by region

A: The contribution rate of exporting sector in national VS by country-group ($VS^{\bullet i}$)

		Agriculture, hunting, forestry and fishing	Food products, beverages and tobacco	Textiles, textile products, leather and footwear	Wood and products of wood and cork	Pulp, paper, paper products, printing and publishing	Coke, refined petroleum products and nuclear fuel	Chemicals	Rubber & plastics products	Other non-metallic mineral products	Basic metals	Fabricated metal products, except machinery & equip.	Machinery & equip., nec	Office, accounting & computing machinery	Electrical machinery & apparatus, nec	Radio, television & communication equipment	Medical, precision & optical instruments	Motor vehicles, trailers & semi-trailers	Other transport equipment	Manufacturing nec; recycling (include Fumiture)	Construction	Wholesale & retail trade; repairs	Hotels & restaurants	Transport and storage	Post & telecommunications	Finance & insurance	Other services	Total
	sector code	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27	28-37	
NAFTA	1995	2%	3%	4%	2%	3%	1%	5%	2%	0%	4%	2%	6%	12%	9%	1%	1%	30%	3%	2%	0%	3%	0%	3%	0%	1%	1%	100%
	2005	1%	2%	3%	1%	2%	1%	6%	3%	0%	4%	3%	7%	13%	4%	5%	1%	28%	5%	3%	0%	2%	0%	3%	0%	1%	2%	100%
South America	1995	6%	19%	8%	2%	6%	1%	10%	2%	1%	7%	2%	4%	1%	2%	1%	1%	11%	1%	1%	0%	3%	0%	13%	1%	0%	1%	100%
	2005	6%	14%	3%	2%	4%	4%	12%	2%	1%	7%	1%	4%	1%	1%	2%	0%	15%	3%	1%	0%	4%	0%	10%	1%	0%	2%	100%
Europe	1995	2%	7%	9%	2%	4%	1%	9%	3%	1%	7%	3%	8%	3%	3%	5%	2%	10%	2%	2%	1%	4%	1%	6%	0%	3%	3%	100%
	2005	1%	4%	5%	1%	3%	1%	10%	3%	1%	6%	3%	8%	2%	4%	7%	2%	13%	2%	2%	0%	3%	0%	9%	0%	4%	3%	100%
Asia	1995	2%	2%	17%	1%	1%	2%	5%	3%	1%	3%	2%	5%	7%	7%	18%	1%	3%	2%	5%	0%	4%	1%	5%	0%	1%	2%	100%
	2005	1%	3%	9%	1%	1%	2%	7%	3%	0%	4%	2%	8%	8%	6%	22%	2%	4%	2%	2%	0%	3%	1%	5%	0%	1%	2%	100%
Country Average	1995	2%	7%	10%	2%	3%	1%	8%	3%	1%	7%	3%	6%	4%	4%	7%	2%	9%	2%	3%	1%	4%	1%	7%	0%	2%	2%	100%
	2005	2%	5%	6%	1%	2%	2%	9%	3%	1%	6%	2%	7%	4%	4%	10%	2%	11%	2%	3%	0%	4%	1%	8%	0%	3%	3%	100%

B: The contribution rate of importing product in national VS by country-group ($VS^{j\bullet}$)

NAFTA	1995	2%	1%	4%	1%	3%	1%	9%	5%	1%	10%	5%	6%	9%	17%	0%	0%	17%	2%	1%	0%	0%	0%	1%	0%	1%	6%	100%
	2005	1%	1%	3%	1%	2%	3%	12%	5%	1%	12%	5%	5%	11%	6%	8%	0%	16%	2%	1%	0%	1%	0%	1%	0%	1%	2%	100%
South America	1995	5%	4%	5%	0%	5%	7%	24%	3%	1%	8%	2%	5%	1%	4%	1%	1%	6%	2%	1%	1%	2%	0%	7%	1%	1%	6%	100%
	2005	3%	2%	2%	0%	2%	10%	24%	3%	1%	7%	2%	7%	1%	3%	3%	0%	9%	2%	0%	1%	2%	0%	6%	1%	2%	5%	100%
Europe	1995	3%	3%	6%	1%	4%	3%	15%	4%	1%	12%	3%	6%	3%	4%	5%	1%	6%	2%	1%	0%	1%	1%	4%	1%	4%	13%	100%
	2005	2%	2%	4%	1%	3%	4%	13%	4%	1%	12%	3%	5%	2%	5%	6%	1%	8%	1%	1%	0%	1%	1%	7%	1%	5%	9%	100%
Asia	1995	2%	1%	9%	1%	2%	6%	14%	2%	1%	11%	1%	5%	2%	8%	14%	1%	2%	1%	3%	0%	4%	0%	3%	0%	1%	9%	100%
	2005	2%	1%	4%	0%	1%	9%	13%	2%	1%	11%	1%	5%	5%	8%	20%	2%	2%	1%	2%	0%	2%	0%	3%	0%	1%	5%	100%
Country Average	1995	3%	3%	7%	1%	4%	4%	15%	3%	1%	11%	3%	6%	3%	6%	6%	1%	5%	2%	1%	0%	2%	1%	4%	1%	3%	10%	100%
	2005	2%	2%	4%	1%	2%	6%	13%	3%	1%	11%	3%	6%	3%	6%	9%	1%	7%	1%	2%	0%	2%	1%	5%	1%	3%	7%	100%

[1] http://www.oecd.org/sti/inputoutput

[2] http://www.ide.go.jp/English/Publish/Books/Sds/material.html

that many of the intermediate inputs for this sector are imported, but its outputs are mainly for the domestic market, such as the case of *Coke and refined petroleum products.* On the other hand, some sectors, like *Food products, Textile, Chemicals, Basic metals, Machinery* and *Motor vehicles* have relatively higher average contribution rate. This suggests that these sectors are the leading VS sectors since the production of exports for these sectors require more foreign intermediate inputs.

(2) When we look at the figures for 1995, notable differences of the sectoral VS contribution rate between country groups can be observed. For example, the contribution rate of the *Textiles* sector is relatively high for most Asian economies and some medium-income countries of Europe (see Appendix 1a). The contribution rate of *Chemicals*, *Basic metals*, *Machinery* and *Motor vehicles* sectors is high in many European countries. Most countries in NAFTA and South America have relatively high contribution rate for *Motor vehicles* sector with the exception of Chile. The contribution rate of *Radio, television & communication equipment* sectors is very high for many Asian economies. These observations reflect the structure of the international division of labour .

(3) Comparing the figures of 1995 and 2005, some dynamic structural changes can be confirmed. For example, NAFTA, South America and Europe show a relatively steady structure, but in the Asian region the leading VS sector changed over time. In 1995, the main leading VS sectors for Asia were *Textiles* and *Radio, television & communication equipment*, but by 2005, the *Textiles* sector had lost its dominant role for half of the Asian economies (see Apendix 1a), especially for Korea (decline from 17% to 4%), The Philippines (decline from 30% to 4%) and Thailand (decline from 13% to 6%), while the presence of *Office, accounting & computing machinery* sector increased. In contrast to the decline of the contribution rate of the *Textiles* sector, the *Chemicals* sector showed a significant increase for some Asian economies like Chinese Taipei (increase from 6% to 12%), Korea (increase from 6% to 10%) and Japan (increase from 7% to 10%). This illustrates that the vertical specialisation trade in Asia experienced a great structure change or industrial upgrade process, since the leading VS sector moved from relatively low-technology production, such as *Textiles,* to the production of relatively high-technology goods, such as *Computing machinery* and *Chemicals*.

The lower part of Table 1 shows the contribution rate of $VS^{j\bullet}$ to the national total VS by country group. According to the definition of $VS^{j\bullet}$, this indicator can be used to identify the key product of intermediate imports in a country's VS trade. Obviously, *Chemicals* and *Basic metals* are the common key products in most countries' VS trade between 1995 and 2005. Looking at the table and Appendix 1b in detail, reveals that *Motor vehicles* products have been the more important intermediate inputs for NAFTA and for more than half of the European countries. *Textiles* was the key commodity for some Asian economies such as China, Indonesia, Philippines and Vietnam in 1995. However, its presence declined rapidly over time of 1995 and 2005. On the other hand, *Radio, television & communication equipment* still plays an important role in most Asian economies. Generally speaking, the overall structure of key products across countries is stable over time, but for some specific countries and commodities, there is great change. For example, *Electrical machinery & apparatus, nec*. lost its contribution rate sharply for the United States (from 11% to 2%) while for Japan its importance increased rapidly between 1995 and 2005 (from 8% to 22%).

In order to see the structure of VS measure at a more detailed product-to-product level, the contribution rate of VS^{ji} to national total VS is calculated. Table 2 shows the top five important individual VS^{ji} linkages across countries for 1995 and 2005. The main features of this table can be summarized as follows.

(1) Most economies have one or two leading individual VS linkages which account for more than 20% of the national VS. This implies that countries have a tendency to focus their participation in global production networks within specific sectors or products.

(2) The VS linkage between the same products plays an important role in vertical specialisation trade. For example, in Canada, the intermediate imports from *Motor vehicles* (commodity code number:18) induced by the export demand for *Motor vehicles* output itself accounts for 32.9% of the total national VS in 1995. These results depend on the sector classification used, but to some extent, it also reflects the relative importance of the domestic intra-industrial backward linkage and international intra-industrial trade in a country's vertical specialisation. On the other hand, we can find that the VS linkage between different commodities for some countries is also important. For example, the intermediate imports of *Electrical machinery & apparatus, nec* (16) induced by the export demand for *Office, accounting & computing machinery* (14) is larger than *computing machinery* itself for Japan and Chinese Taipei in 1995; while, the intermediated imports of *Other business activities* (32) embodied in the export of *Chemicals* (8) for Ireland in 2005 accounts for 16.5% of total national VS, which is also larger than the VS linkage of *Chemicals* itself (5.1%).

(3) For most economies, the leading individual VS linkage is a commodity-to-commodity type, but for several countries, their leading VS linkage is service-to-service type. For example, Luxembourg's VS linkage of *Finance & insurance* (27), Norway's VS linkage of *Transport and storage* (25) accounts for 68.8% and 21.8% of the national total VS in 2005 respectively.

(4) There is a great variation and remarkable dynamic structural change of individual VS linkage across countries or country groups. In NAFTA and South America, the key individual VS linkage remains relatively stable for Canada, Mexico and Argentina. Namely, Canada's *Motor vehicles*, Mexico's *Office, accounting & computing machinery* and Argentina's *Chemicals* maintained top positions over time. On the other hand, the United States and Brazil seems to experience a large structural change. The leading VS linkage for the United States has switched from *Office, accounting & computing machinery* in 1995 to *Radio, television & communication equipment* (15) and *Motor vehicles* in 2005. For Brazil, the top position of *Basic metals* (11) was replaced by *Motor vehicles* in 2005. In European region, it's easy to see that many countries (Austria, Belgium, Czech Republic, Germany, Poland, Portugal, Slovak Republic, Slovenia, Spain and Sweden) are involved in the production network of *Motor vehicles*. While, France, Italy, Netherlands, Switzerland and the United Kingdom enhanced their VS linkage of *Chemicals* over time of 1995 and 2005. In addition, it's also easy to confirm that the VS linkage of *Electrical machinery & apparatus, nec.* plays a dominant role in Estonia, Finland and Hungary; the importance of VS linkage of *Textile* decreased in most countries, remaining evident only in Italy, Portugal, Romania and Turkey. In the Asian region, much more diversity can be found. The VS linkage of *Electrical machinery & apparatus, nec* increased or maintained its importance in most Asian economies such as Chinese Taipei, Korean, Malaysia, Philippines and Thailand. Especially for Philippines, its figure increased from 18.5% to 51.1% between 1995 and 2005. *Textile* was a traditional exporting commodity of Asia, but its importance in VS trade declined sharply over time of 1995 and 2005. In contrary, the presence of *Office, accounting & computing machinery* became the leading VS linkage in some Asian countries, like China, India and Thailand. From Table 1, we can also find that the most important VS linkage for Australia, Russian Federation and South Africa is *Basic metals*, for New Zealand, it is *Food products, beverages and tobacco* (3) and for Israel, it's *Manufacturing nec; recycling* (20).

Table 2. The contribution rate of Individual VS linkage (product-to-product level)

Canada						Mexico						United states					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
18	18	32.9%	18	18	23.6%	14	14	8.7%	14	14	19.8%	14	14	6.4%	18	18	8.1%
15	15	4.1%	11	11	3.9%	15	18	6.7%	18	18	10.4%	15	15	5.7%	8	8	5.9%
8	8	2.4%	8	8	3.7%	18	18	6.6%	15	14	4.7%	15	14	5.5%	11	13	3.5%
11	11	2.1%	12	18	2.6%	15	14	4.4%	15	18	3.6%	18	18	5.2%	11	11	2.8%
19	19	2.1%	19	19	2.6%	4	4	4.3%	4	4	3.3%	8	8	4.5%	11	18	2.7%
Argentina						Brazil						Chile					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
8	8	12.7%	8	8	15.4%	11	11	6.2%	18	18	8.2%	25	25	8.2%	25	25	12.6%
18	18	8.0%	18	18	14.2%	8	8	5.4%	8	8	5.7%	3	3	5.6%	7	25	8.3%
8	3	6.8%	8	3	6.4%	25	25	5.4%	16	16	5.5%	1	3	4.6%	3	3	3.7%
8	1	4.1%	11	11	4.9%	4	4	5.2%	19	19	5.3%	8	3	3.7%	8	8	3.5%
11	11	3.8%	7	7	4.2%	1	3	4.2%	11	11	3.0%	8	8	3.5%	8	3	2.8%
Austria						Belgium						Czech Republic					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
18	18	8.8%	18	18	13.9%	18	18	14.2%	18	18	11.8%	11	11	8.5%	18	18	7.6%
4	4	5.4%	11	11	6.2%	8	8	9.1%	8	8	10.1%	4	4	4.3%	16	16	6.3%
11	11	5.2%	13	13	4.7%	11	11	7.4%	11	11	6.8%	15	15	4.1%	14	14	5.3%
8	8	4.8%	8	8	3.2%	4	4	3.3%	3	3	2.7%	8	8	3.0%	15	15	4.7%
13	13	4.7%	6	6	2.2%	3	3	3.1%	25	25	2.5%	11	12	2.5%	13	13	3.4%
Denmark						Estonia						Finland					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
25	25	14.6%	25	25	27.3%	4	4	9.5%	16	16	17.1%	16	16	8.6%	16	16	15.8%
3	3	7.0%	7	25	5.7%	16	16	8.2%	15	16	8.0%	8	6	5.3%	11	11	6.4%
8	8	5.7%	8	8	4.0%	14	16	4.5%	4	4	5.6%	13	13	5.1%	31	16	6.1%
13	13	3.6%	3	3	3.9%	25	25	4.2%	25	25	5.0%	11	11	4.6%	13	13	5.0%
1	3	3.3%	25	23	2.6%	7	25	3.1%	11	12	4.0%	8	8	3.6%	8	8	4.6%
France						Germany						Greece					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
8	8	6.8%	8	8	9.3%	18	18	7.7%	18	18	10.2%	3	24	8.4%	25	25	39.0%
18	18	5.7%	18	18	7.3%	8	8	6.6%	8	8	5.7%	11	11	8.1%	11	11	7.4%
11	11	5.4%	19	19	4.9%	11	11	5.4%	11	11	5.5%	4	4	5.1%	8	8	4.6%
14	14	5.1%	11	11	3.4%	13	13	4.1%	13	13	4.1%	8	8	4.0%	7	25	4.2%
19	19	3.7%	11	18	2.4%	11	18	3.5%	11	18	4.1%	1	3	3.0%	19	25	3.5%
Hungary						Ireland						Italy					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
11	11	7.1%	16	16	17.7%	14	14	16.9%	32	8	16.5%	8	8	6.6%	8	8	9.8%
18	18	5.6%	18	18	10.4%	32	3	5.9%	14	14	8.1%	4	4	5.8%	4	4	5.6%
16	16	5.1%	15	16	4.3%	8	8	5.7%	27	27	6.5%	11	13	4.2%	11	11	4.2%
4	4	3.5%	16	14	2.8%	32	8	4.4%	8	8	5.1%	13	13	3.4%	13	13	3.3%
3	3	3.2%	15	15	2.6%	16	14	4.3%	23	6	4.9%	11	11	3.4%	11	13	3.0%
Luxembourg						Netherlands						Norway					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
27	27	54.2%	27	27	68.8%	8	8	11.2%	8	8	12.4%	25	25	16.4%	25	25	21.8%
11	11	5.7%	32	27	5.2%	1	3	7.6%	3	3	4.9%	11	11	13.0%	11	11	14.1%
32	27	3.9%	32	30	1.9%	3	3	7.0%	1	3	4.1%	19	25	3.3%	8	25	4.2%
8	9	3.4%	26	30	1.7%	25	25	2.9%	18	18	3.2%	8	8	3.2%	8	8	4.0%
36	36	3.1%	11	11	1.5%	6	6	2.3%	25	25	3.1%	7	25	3.2%	3	3	2.7%
Poland						Portugal						Romania					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
8	8	2.9%	18	18	9.6%	4	4	17.3%	18	18	12.9%	4	4	26.9%	4	4	14.8%
13	18	2.9%	16	16	5.1%	18	18	10.5%	4	4	9.1%	8	8	5.6%	15	15	5.3%
4	4	2.3%	12	18	3.9%	16	16	6.6%	16	16	9.0%	15	15	3.5%	8	8	4.0%
27	27	2.0%	8	8	3.4%	8	4	4.5%	8	8	4.0%	8	4	2.6%	9	9	2.0%
11	11	1.8%	11	11	2.8%	8	8	4.1%	11	11	3.1%	4	23	2.3%	8	4	2.0%

Note: im and ex represent the sector codes for imported product and exporting product respectively.

Slovak Republic						Slovenia						Spain					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
8	8	6.5%	18	18	21.6%	18	18	11.9%	18	18	6.8%	18	18	22.6%	18	18	16.9%
18	18	6.4%	16	16	6.8%	4	4	7.8%	8	8	6.8%	8	8	5.6%	8	8	8.3%
11	11	5.8%	15	15	4.5%	8	8	6.1%	11	11	5.6%	11	18	4.0%	11	18	3.1%
6	6	2.5%	11	11	3.4%	13	13	4.6%	4	4	5.2%	9	18	3.1%	16	16	2.0%
8	9	2.3%	4	4	3.2%	11	11	4.5%	11	12	4.6%	8	9	2.9%	4	4	2.0%

Sweden						Switzerland						Turkey					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
18	18	8.1%	18	18	8.1%	8	8	8.5%	8	8	14.3%	8	4	11.7%	18	18	10.7%
11	11	5.6%	15	15	6.2%	27	27	5.9%	27	27	6.9%	4	4	10.2%	11	11	10.0%
16	16	4.9%	11	11	4.6%	11	13	2.9%	11	17	4.1%	11	11	6.5%	8	4	7.5%
8	8	4.2%	8	8	3.7%	12	13	2.6%	11	13	4.0%	8	8	6.1%	4	4	6.3%
13	13	3.9%	31	15	3.0%	13	13	2.3%	11	12	2.3%	7	25	3.0%	16	16	5.2%

United Kingdom						China						Chinese Taipei					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
8	8	8.9%	8	8	11.6%	4	4	14.7%	15	14	16.9%	16	14	16.8%	16	16	30.9%
14	14	4.1%	19	19	5.6%	8	4	6.1%	15	15	7.1%	16	16	12.2%	8	8	8.4%
18	18	3.9%	13	13	2.8%	16	16	3.1%	15	16	6.3%	8	8	5.3%	8	16	6.2%
16	16	3.6%	32	32	2.3%	16	13	2.6%	4	4	3.8%	8	4	3.4%	11	11	4.4%
16	14	2.8%	11	11	2.2%	16	14	2.3%	8	8	3.4%	8	9	3.3%	11	16	2.7%

India						Indonesia						Japan					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
8	8	8.0%	14	14	11.7%	4	4	12.1%	13	13	7.2%	16	16	9.6%	15	15	12.3%
8	4	5.2%	8	8	8.8%	8	4	8.7%	8	4	5.9%	16	14	5.8%	8	8	4.8%
7	25	4.9%	11	11	6.8%	13	13	6.7%	4	9	4.2%	14	14	5.6%	11	11	4.4%
36	23	3.8%	8	4	4.6%	8	9	5.3%	16	16	4.0%	11	11	5.0%	11	15	4.1%
11	20	3.8%	11	13	3.1%	16	16	5.1%	8	8	3.5%	8	8	4.5%	15	14	3.8%

Korea						Malaysia						Philippines					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
15	15	10.5%	16	16	25.2%	16	16	24.9%	16	16	20.9%	4	4	20.7%	16	16	51.1%
4	4	7.8%	8	8	5.6%	15	16	9.4%	16	13	20.7%	16	16	18.5%	17	17	6.0%
15	16	4.7%	11	11	5.0%	11	16	5.0%	13	13	5.1%	11	11	5.1%	14	14	3.7%
11	11	4.6%	25	25	3.3%	23	16	4.0%	15	13	3.5%	8	4	5.0%	4	4	2.1%
11	15	3.8%	8	16	3.2%	16	15	3.3%	8	8	2.7%	8	8	1.9%	7	25	1.7%

Singapore						Thailand						Vietnam					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
7	7	15.0%	7	7	20.8%	16	16	29.7%	16	16	21.5%	4	4	18.7%	4	4	14.8%
15	14	14.3%	16	16	11.1%	8	4	4.3%	14	14	10.1%	23	4	9.8%	23	4	8.4%
15	15	10.3%	7	8	4.9%	4	4	3.5%	8	8	4.2%	23	1	6.8%	7	25	3.3%
14	14	9.6%	14	14	4.7%	8	9	2.9%	18	18	3.5%	9	4	4.4%	9	4	2.8%
15	16	4.0%	25	25	4.6%	23	16	2.6%	16	14	3.1%	20	4	3.8%	8	1	2.7%

Australia						New Zealand						Russian Federation					
1995			2005			1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
4	4	5.1%	11	11	4.2%	9	3	4.9%	9	3	5.7%	11	11	13.2%	11	11	9.6%
8	8	4.7%	18	18	4.0%	1	3	4.3%	3	3	4.8%	13	13	9.1%	13	23	6.7%
25	25	3.3%	8	8	3.6%	3	3	4.3%	13	13	3.2%	8	8	6.6%	13	13	6.1%
11	11	3.2%	7	25	3.0%	7	25	4.2%	1	3	2.6%	13	11	5.0%	13	7	5.0%
14	14	3.0%	8	1	2.7%	8	3	4.0%	9	9	2.0%	11	13	3.5%	8	8	4.7%

Israel						South Afreica					
1995			2005			1995			2005		
im	ex	vs	im	ex	vs	im	ex	vs	im	ex	vs
25	25	11.3%	20	20	25.6%	8	8	8.0%	11	11	16.0%
16	16	8.1%	8	8	5.6%	13	11	6.4%	18	18	12.8%
16	17	6.2%	25	25	4.2%	11	11	4.7%	7	7	4.9%
8	8	5.1%	16	16	4.0%	18	18	4.5%	18	25	3.7%
4	4	4.6%	30	30	1.8%	4	4	2.7%	11	18	3.4%

3.2 Decomposition results of vertical specialisation measurements

3.2.1 Factor decomposition of the change in import contents of export

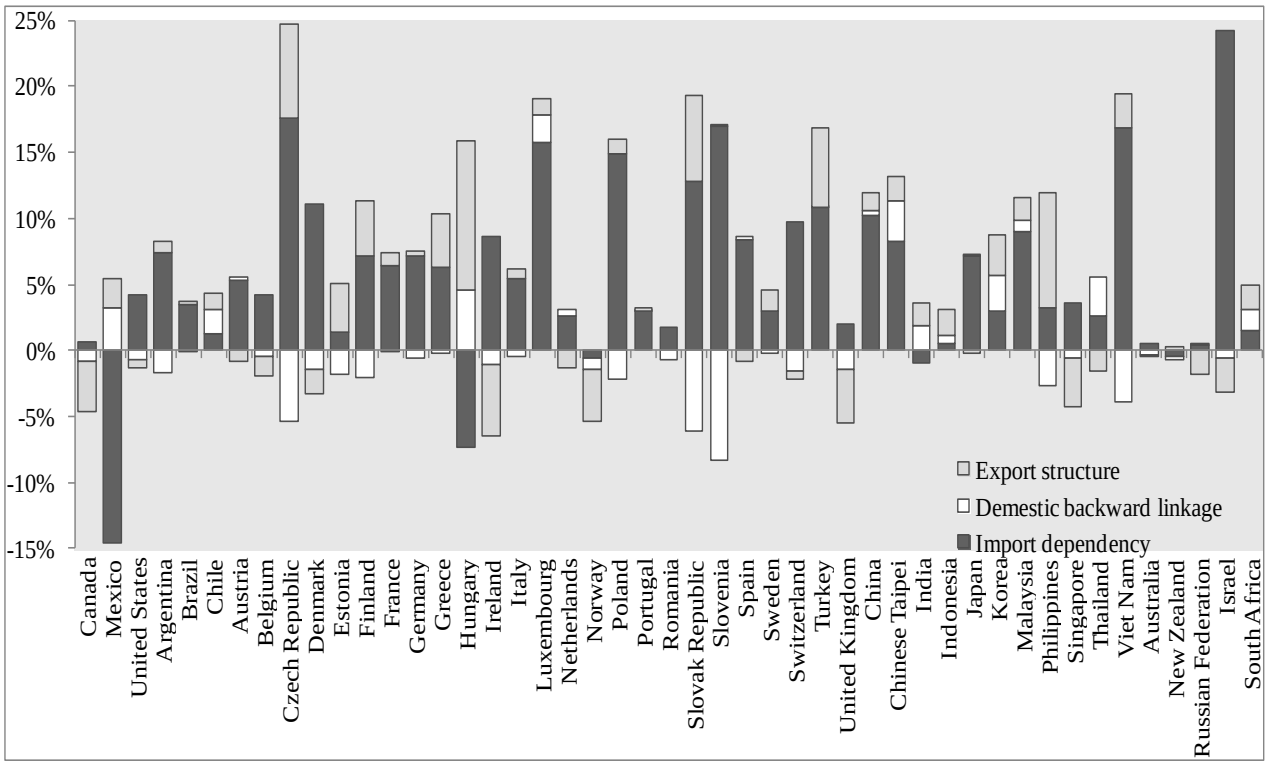
As shown in Section 2, the change of import contents of exports (VS share) over time can be decomposed into three individual factors, namely, the changes in import dependency, domestic backward linkages and export structure. Figure 3 shows the decomposition factors of VS change between 1995 and 2005.

The main features of these figures can be summarized as follows.

(1) Figure 3 illustrates that the structures of contribution rates by factor vary across countries. Import dependency clearly plays a positive role in most countries' VS change. This indicates that most countries take part in the international production network mainly by the way of increasing inputs of intermediate imports. This is not so surprising, since the continuous fall in cross-border trade costs (monetary and non-monetary) makes many imported goods much cheaper than their domestic equivalents – and substitution effects come in to play. Consequently, in more than half the countries, the contribution rate of domestic backward linkages plays a negative role in their VS changes. In addition, the change of export structure also makes a positive contribution to the VS change for more than half countries.

(2) A cross-country comparison can provide us very interesting views. For example, the VS shares for both Hungary and Ireland increased between 1995 and 2005. However, the change of export structure and domestic backward linkages play positive role for Hungary, while a negative role for Ireland. Another interesting example can be found for Slovak Republic, Slovenia and Turkey. The export structure change makes a positive contribution to the VS change for both Slovak Republic and Turkey, but no contribution for Slovenia; while the change of domestic backward linkages plays a negative role for both Slovak Republic and Slovenia, but no contribution on Turkey's VS change. Furthermore, when looking at Mexico and India, they have a similar structure, namely the negative contribution from the change of import

Figure 3. Factor decomposition of the change in VS share, 1995-2005: Absolute shares



dependency and the positive contribution from the other two factors. However, due to the magnitudes of different factors for each country, the absolute change of VS for Mexico is negative while for India is positive. All the above facts clearly imply that different countries join global supply chains by different ways.

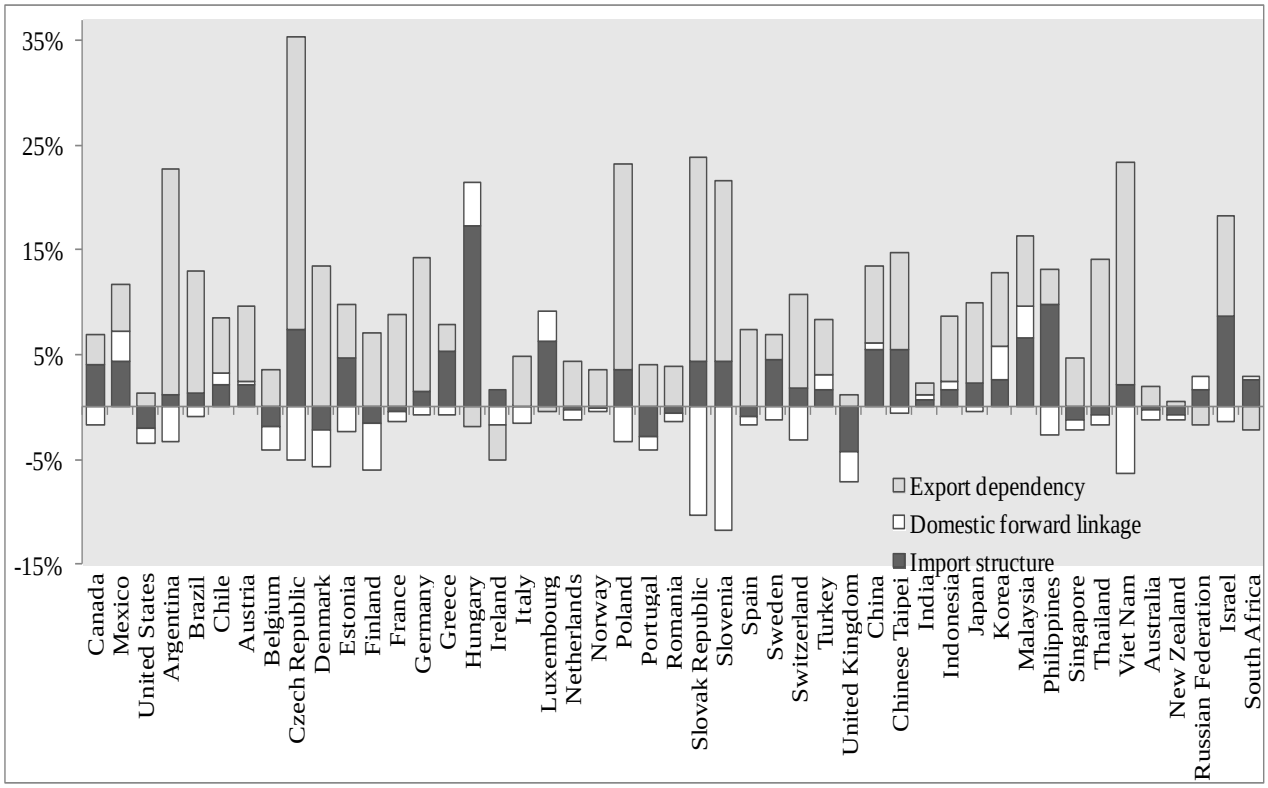
3.2.2 Factor decomposition of the change in re-exported intermediate imports

Figure 4 shows the factor decomposition results of re-exported intermediate imports (VSG share) for 1995 and 2005. As mentioned in the previous section, the VSG share indicates a country's participation degree of vertical specialisation from the viewpoint of supply side. In other words, the VSG share shows how many intermediate imports supplied by the rest of the world end up in a country's exports. The change of VSG share can be decomposed into three factors, namely the change of import structure (intermediate goods and services), the change of domestic forward linkages and the change of export dependency. Comparing with the factors in the VS change, the VSG related factors can provide us an alternative perspective to see the structure change of vertical specialisation. The main features of Figure 4 can be summarized as follows.

(1) Figure 4 reveals that the change of VSG share between 1995 and 2005 is positive for most countries. This indicates that imported intermediates in much more countries are used for producing exports rather than for domestic use. While, the magnitude of the VSG change shows a large diversity across countries. For example, great change can be found for Argentina, Czech Republic, Poland, Slovak Republic, Slovenia as well as Viet Nam, smaller change for India, New Zealand and so on.

(2) The dominant factor that causes the change of VSG share for most counties is the export dependency. This exactly reflects a dual relationship between the demand driven I-O based indicator (VS) and supply

Figure 4. Factor decomposition of the change in VSG share, 1995-2005: Absolute shares



driven I-O based indicator (VSG). In the change of VS share, import dependency plays an important role for most counties, naturally, the export dependency should also important in the change of VSG share, since a country's imports is just its partner countries' exports. On the other hand, the change of import structure also plays an important role in more than half countries. Especially in Greece, Hungary, Luxembourg and the Philippines, this factor has a dominant contribution to the whole change of VSG share. In addition, the change of domestic forward linkages gives a negative effect for more than half countries, especially for most European economies.

(3) Comparing the role of different factors across countries helps us understand how a country joins in the global production chain by what kind of way. For example, the United States, Ireland, United Kingdom and New Zealand have negative change of VSG share between 1995 and 2005. However, the change of import structure for Ireland contributes to the VSG change positively. This is very different from the other three countries. Another interesting example can be found for Luxembourg and Singapore. Both countries are small-open economies and have similar positive changing level of VSG share. However, the changes in import structure and domestic forward linkages play a dominant and positive role in Luxembourg, while negative role in Singapore.

3.2.3 Factor decomposition of the change in primary input contents of export

The change of primary contents of export (VSV share) can also be decomposed into three factors as shown in Figure 5. As mentioned before, the VSV measure indicates the value added or GDP induced by export demand. Figure 5, suggests that the absolute change of VSV share between 1995 and 2005 is negative for most economies. This implies that the induced value added by one unit export for 2005 is lower than the figure for 1995 for most countries. It's not so surprising, since the change in VS share (import contents of export) in most countries is positive. Namely for producing one unit export, most countries need much more inputs of intermediated imports. This means that the domestic or primary input rates may become relatively low. If much more domestic intermediate inputs are substituted by intermediate imports, the domestic backward linkage may play a negative role in the change of VSV share. On the other hand, if much more primary inputs are replaced by intermediate imports, the change of primary input dependency may affect the VSV change negatively. Figure 5 suggests that the change in primary input dependency gives a dominant and negative contribution to the change of VSV share for most countries, and the change of domestic backward linkages also contributed negatively for more than half countries.

The increase of VS share and the decline of VSV share reflect the impact of vertical specialisation on a country's production technology or cost function. Although, the induced value added by one unit export declined between 1995 and 2005 for most countries, this does not mean the decrease of absolute value added caused by exports. In order to explain the above fact in detail, we calculate the growth rate of real VSV and compare it with the real growth rate of value added[3] (see Figure 6 and 7). Obviously, the gain of value added by exports at constant prices increased much faster than real value added for most countries between 1995 and 2005. One reasonable explanation is that the fall of cross-board trade cost stimulus the vertical specialisation or fragmentation production, and then cheaper intermediate imports substitute primary inputs to some extent in long term. This makes the production system more efficient and causes much more demand and supply of foreign intermediates. As a result, the value added induced by one unit export declines, but the total volume of export increases much faster, then the absolute value of value added by total exports increases.

[3] For the calculation of real VSV, the most preferable data should be the national I-O table at constant prices. However, just for few countries, this data is available for us at present. For simplicity, we calculate the VSV using the I-O table at current prices, and then convert the results to constant prices with GDP deflator estimated from World Bank database.

Figure 5. Factor decomposition of the change in VSV share, 1995-2005: Absolute shares

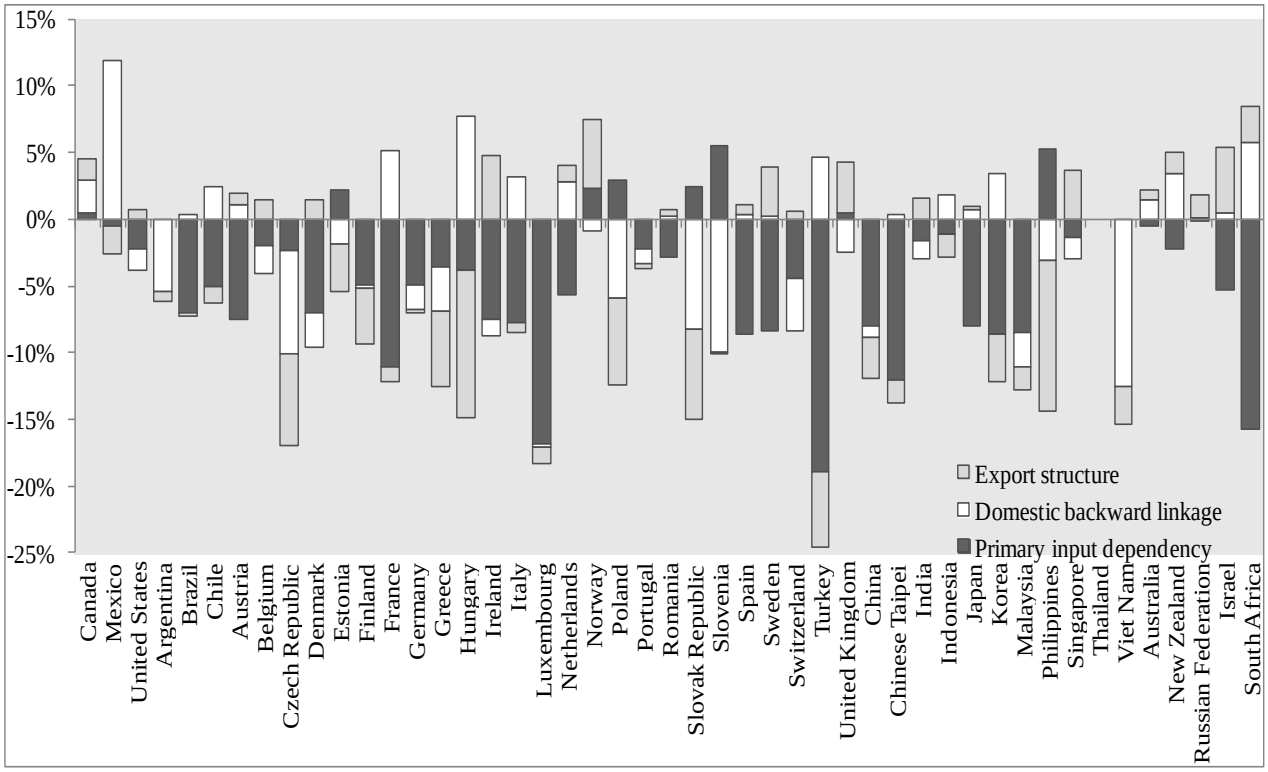


Figure 6. The growth rate of real VSV and real value added

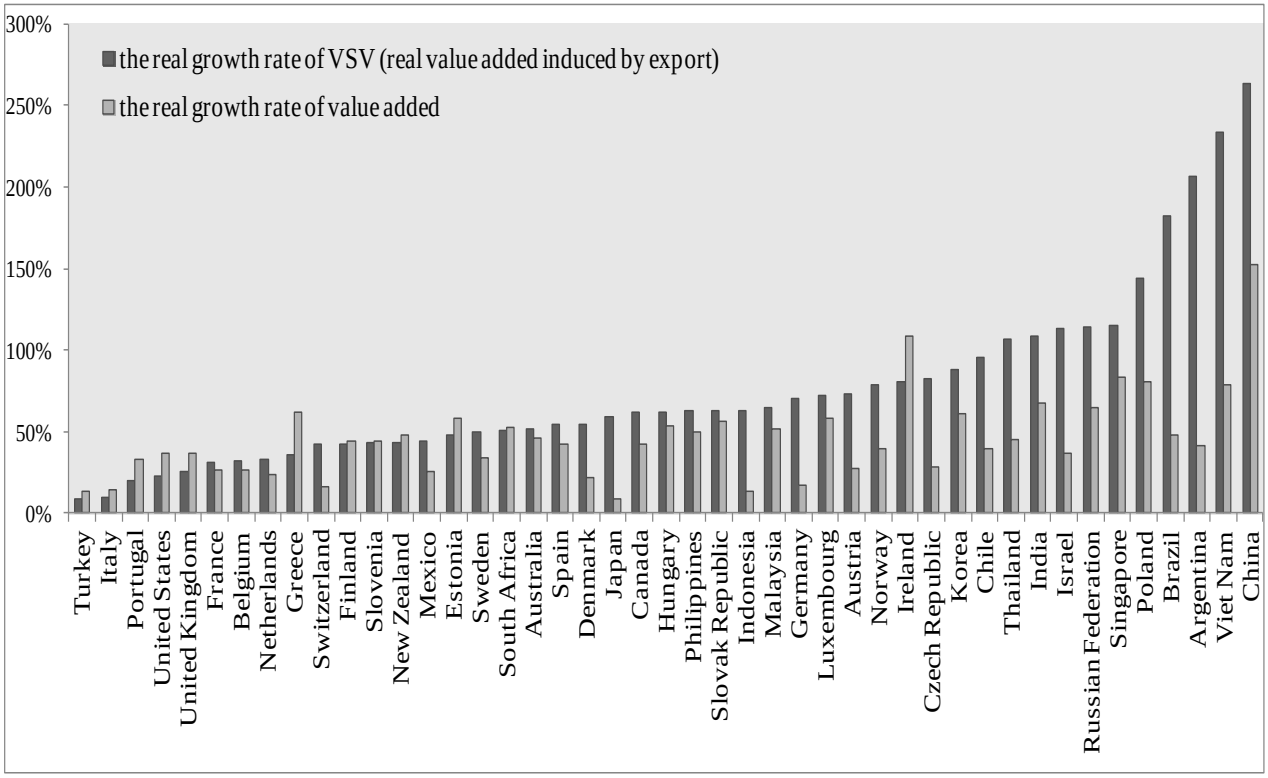
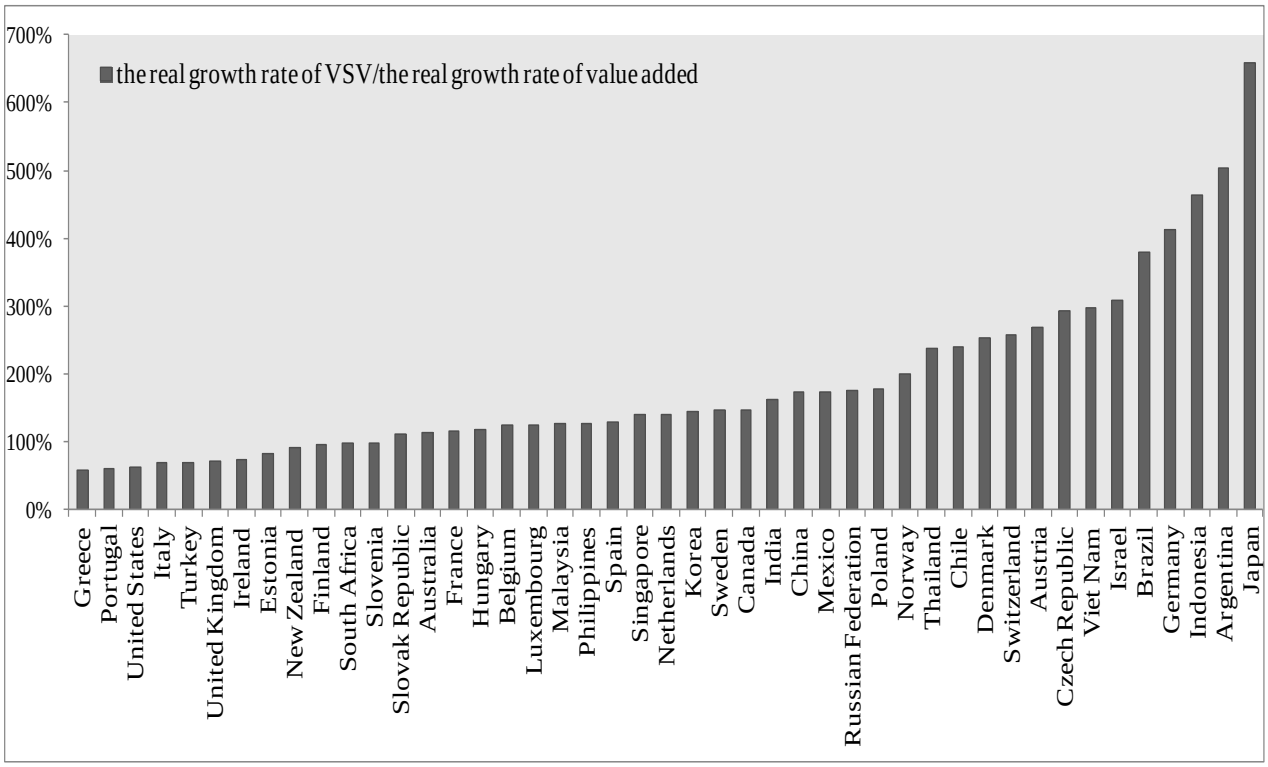


Figure 7. The growth rate of real VSV as a share of the growth rate of real value added



4. Conclusions

Vertical specialization has been considered one of the most important sources of the rapid increase of world trade during recent decades. In order to investigate the structure of vertical specialisation and its changing pattern, this paper has presented two kinds of methods for structural analysis. One is to decompose the national total VS measure into individual VS linkages at detailed product-to-product level. The advantage of this decomposition is that the key individual VS linkage can be easily identified. This helps us understand which country specializes in what kind of particular stage of a good's production in global supply chain. In addition, with the aggregation of individual VS linkages for specific exporting sector and importing product, the average contribution level of leading-sector or key-product of VS trade can also be understood.

The second structural analysis method is an Input-Output based factor decomposition technique. Using this technique, the change of conventional VS share (import contents of export) can be decomposed into three individual factors, the change of import dependency, the change of domestic backward linkages and the change of export structure. We also applied this technique to the alternative VS measures, namely the VSG share (re-exported intermediate imports) and VSV share (induced value added by exports). The former can be decomposed into the change of import structure, the change of domestic forward linkages and the change of export dependency; the latter can be decomposed into the change of primary dependency, the change of domestic backward linkages and the change of export structure.

Applying the decomposition techniques to the OECD non-competitive type harmonized input-output database for 1995 and 2005, notable findings include:

(1) most countries have one or two key VS linkages which play a very important role in their national total VS trade. This fact clearly reflects that vertical specialisation occurs when countries specialize in particular stages of a good's production sequence rather than in producing the entire good;

(2) the leading exporting sector in VS trade varies across country groups and changes over time. For example , *Textiles* was an important key exporting sector for most Asian economies in 1995, but by 2005, its leading position in VS trade had been replaced by the *Office, accounting & computing machinery* and *Chemicals* sectors. Meanwhile in NAFTA and Europe, the *Motor vehicles* and *Chemicals* sectors maintained or enhanced their leading positions for most countries. On the other hand, the key importing products (*Chemicals* and *Basic metals*) in VS trade across countries remains relatively stable;

(3) the changes in VS, VSG and VSV shares are mainly due to the change of import dependency, export dependency and primary input dependency respectively. For most countries, the substitution between intermediate imports and domestic intermediate inputs makes the domestic backward linkages play a negative role in the change of VS and VSV shares. Similarly, the substitution between exports and domestic supply of intermediates also makes the domestic forward linkages play a negative role in the VSG change for most countries. The change of foreign trade (import and export) structure mainly shows a positive contribution to the increase of VS and VSG shares for more than half economies;

(4) we also found that the primary inputs may be substituted by intermediate imports to some extent in the increasing vertical specialisation trade. That's why the value-added increases by unit exports have declined for most economies between 1995 and 2005, while during the same period, the VS and VSG shares show an increasing tendency. The decline of VSV share just reflects the relative change of production input structure, it does not mean the gain from trade decreases since the total market size and the scale of international trade have been expanding greatly due to the increasing vertical specialisation.

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Appendix 1a The contribution rate of exporting sector in national VS

1995

Region	Country	Agriculture, hunting, forestry and fishing	Food products, beverages and tobacco	Textiles, textile products, leather and footwear	Wood and products of wood and cork	Pulp, paper, paper products, printing and publishing	Coke, refined petroleum products and nuclear fuel	Chemicals	Rubber & plastics products	Other non-metallic mineral products	Basic metals	Fabricated metal products, except machinery & equipment	Machinery & equipment, nec	Office, accounting & computing machinery	Electrical machinery & apparatus, nec	Radio, television & communication equipment	Medical, precision & optical instruments	Motor vehicles, trailers & semi-trailers	Other transport equipment	Manufacturing nec; recycling (include Furniture)	Construction	Wholesale & retail trade; repairs	Hotels & restaurants	Transport and storage	Post & telecommunications	Finance & insurance	Other services	Total
NAFTA	Canada	2%	3%	2%	3%	6%	1%	5%	3%	0%	5%	2%	4%	3%	7%	0%	0%	44%	3%	1%	0%	1%	1%	3%	0%	1%	1%	100%
	Mexico	2%	2%	7%	0%	1%	0%	4%	3%	1%	4%	2%	3%	19%	9%	0%	0%	31%	0%	4%	0%	6%	0%	2%	0%	0%	0%	100%
	United Stat	2%	4%	3%	1%	2%	1%	7%	1%	0%	3%	2%	10%	13%	11%	3%	4%	14%	6%	1%	0%	3%	0%	4%	0%	1%	2%	100%
South America	Argentina	7%	19%	10%	0%	3%	2%	17%	1%	0%	5%	2%	4%	1%	1%	1%	1%	18%	1%	1%	0%	1%	0%	3%	1%	0%	0%	100%
	Brazil	1%	15%	9%	1%	5%	1%	9%	2%	1%	14%	1%	4%	1%	3%	3%	0%	12%	2%	1%	0%	1%	1%	12%	0%	0%	1%	100%
	Chile	9%	22%	3%	4%	9%	0%	5%	3%	0%	2%	2%	3%	0%	1%	0%	0%	4%	0%	1%	0%	7%	0%	23%	1%	1%	1%	100%
Europe	Austria	0%	2%	8%	2%	6%	0%	8%	4%	1%	8%	4%	13%	0%	4%	7%	1%	17%	1%	3%	1%	3%	0%	3%	0%	0%	2%	100%
	Belgium	1%	9%	6%	1%	2%	2%	13%	3%	1%	10%	3%	4%	0%	2%	2%	0%	21%	0%	2%	0%	7%	0%	5%	0%	0%	3%	100%
	Czech Repu	2%	5%	8%	2%	3%	1%	5%	3%	3%	13%	6%	7%	1%	9%	2%	1%	7%	2%	3%	2%	2%	3%	4%	1%	0%	7%	100%
	Denmark	2%	18%	4%	2%	2%	0%	9%	4%	1%	3%	3%	12%	0%	3%	3%	3%	1%	2%	6%	0%	3%	0%	18%	0%	0%	1%	100%
	Estonia	2%	9%	17%	5%	1%	0%	5%	1%	1%	0%	4%	2%	0%	2%	16%	1%	0%	1%	4%	2%	5%	0%	17%	0%	0%	3%	100%
	Finland	0%	2%	2%	5%	15%	1%	5%	2%	1%	7%	4%	16%	3%	6%	15%	2%	2%	4%	2%	0%	0%	0%	3%	0%	0%	1%	100%
	France	3%	6%	4%	0%	3%	0%	12%	3%	1%	7%	2%	8%	6%	4%	4%	2%	14%	10%	2%	0%	3%	0%	2%	0%	0%	2%	100%
	Germany	1%	4%	4%	0%	3%	1%	13%	4%	1%	8%	3%	14%	1%	5%	3%	2%	21%	5%	2%	0%	2%	0%	3%	0%	0%	1%	100%
	Greece	4%	11%	10%	0%	2%	1%	5%	2%	2%	13%	2%	3%	0%	2%	1%	1%	1%	2%	1%	4%	7%	19%	5%	0%	0%	1%	100%
	Hungary	5%	13%	6%	2%	2%	1%	6%	3%	2%	9%	6%	5%	1%	4%	8%	2%	13%	1%	1%	2%	4%	0%	2%	0%	1%	2%	100%
	Ireland	1%	19%	3%	0%	10%	0%	14%	2%	1%	1%	1%	3%	25%	5%	5%	3%	0%	0%	1%	0%	0%	1%	1%	0%	1%	2%	100%
	Italy	0%	3%	14%	1%	2%	0%	11%	5%	2%	5%	5%	17%	2%	4%	3%	2%	9%	2%	6%	0%	4%	0%	3%	0%	0%	1%	100%
	Luxembour	0%	1%	2%	0%	0%	0%	1%	5%	1%	9%	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	4%	1%	62%	7%	100%
	Netherlands	3%	21%	3%	0%	4%	1%	19%	3%	1%	3%	3%	4%	2%	2%	5%	1%	4%	3%	1%	0%	5%	0%	7%	0%	0%	3%	100%
	Norway	1%	5%	1%	1%	5%	1%	7%	1%	0%	19%	1%	5%	1%	1%	1%	1%	1%	6%	1%	0%	6%	0%	31%	0%	0%	2%	100%
	Poland	3%	7%	7%	3%	2%	2%	6%	2%	2%	8%	3%	4%	4%	0%	0%	0%	11%	0%	3%	11%	8%	1%	6%	1%	5%	3%	100%
	Portugal	0%	5%	29%	3%	4%	1%	5%	2%	2%	1%	3%	5%	0%	7%	9%	1%	16%	1%	2%	0%	0%	0%	2%	0%	0%	1%	100%
	Romania	1%	1%	34%	3%	1%	2%	9%	1%	1%	8%	3%	3%	1%	6%	1%	0%	2%	4%	5%	0%	6%	0%	3%	0%	0%	3%	100%
	Slovak Rep	2%	2%	3%	1%	5%	2%	9%	5%	3%	16%	3%	7%	0%	4%	1%	1%	9%	3%	2%	2%	7%	0%	6%	1%	1%	4%	100%
	Slovenia	1%	3%	12%	3%	3%	0%	9%	4%	1%	7%	4%	12%	0%	5%	3%	3%	17%	0%	4%	1%	2%	0%	4%	0%	0%	1%	100%
	Spain	3%	5%	6%	1%	3%	0%	9%	4%	1%	4%	2%	5%	2%	3%	3%	1%	39%	2%	2%	0%	1%	0%	3%	0%	0%	1%	100%
	Sweden	0%	2%	2%	3%	7%	1%	8%	3%	1%	8%	3%	12%	1%	3%	11%	3%	18%	3%	2%	0%	3%	0%	4%	0%	0%	3%	100%
	Switzerland	0%	4%	3%	0%	2%	0%	19%	2%	1%	1%	4%	18%	7%	0%	1%	12%	0%	1%	2%	0%	3%	3%	4%	1%	8%	2%	100%
	Turkey	4%	8%	29%	0%	1%	0%	7%	3%	1%	9%	2%	3%	0%	3%	2%	0%	4%	1%	2%	0%	3%	4%	12%	0%	0%	1%	100%
	United King	1%	5%	4%	0%	3%	1%	13%	2%	1%	4%	2%	9%	9%	3%	7%	3%	10%	6%	2%	0%	4%	0%	3%	0%	2%	5%	100%
Asia	China	1%	3%	28%	0%	0%	0%	4%	4%	2%	5%	2%	10%	6%	4%	9%	1%	3%	2%	9%	0%	1%	0%	2%	0%	0%	3%	100%
	Chinese Ta	0%	1%	10%	1%	1%	0%	6%	5%	0%	3%	4%	6%	21%	4%	21%	2%	2%	2%	3%	0%	1%	0%	4%	0%	0%	1%	100%
	India	2%	3%	14%	0%	1%	0%	11%	3%	6%	4%	2%	4%	0%	3%	3%	0%	3%	0%	13%	0%	9%	1%	13%	0%	0%	5%	100%
	Indonesia	1%	3%	26%	6%	4%	1%	6%	8%	0%	2%	3%	8%	0%	2%	8%	1%	1%	2%	3%	0%	5%	3%	5%	0%	2%	2%	100%
	Japan	0%	0%	2%	0%	1%	1%	7%	2%	0%	6%	1%	9%	14%	8%	17%	4%	12%	3%	1%	0%	2%	1%	6%	0%	1%	1%	100%
	Korea	0%	1%	17%	0%	1%	2%	6%	2%	0%	6%	3%	4%	5%	20%	7%	1%	6%	5%	2%	0%	1%	0%	8%	0%	0%	3%	100%
	Malaysia	2%	2%	5%	3%	1%	1%	4%	2%	1%	2%	2%	2%	0%	7%	56%	0%	1%	2%	5%	0%	2%	0%	0%	0%	0%	0%	100%
	Philippines	1%	2%	30%	2%	1%	0%	2%	1%	0%	7%	0%	2%	0%	2%	26%	0%	1%	0%	3%	0%	6%	0%	5%	1%	1%	5%	100%
	Singapore	0%	1%	1%	0%	1%	16%	3%	1%	0%	1%	2%	2%	30%	17%	10%	1%	0%	1%	1%	0%	4%	0%	5%	0%	1%	2%	100%
	Thailand	1%	7%	13%	1%	2%	0%	2%	4%	1%	2%	2%	2%	0%	5%	39%	2%	2%	2%	8%	0%	1%	0%	4%	0%	0%	2%	100%
	Viet Nam	20%	0%	43%	2%	0%	0%	1%	0%	1%	0%	0%	2%	0%	2%	1%	0%	0%	0%	3%	0%	10%	5%	5%	1%	2%	2%	100%
others	Australia	7%	14%	7%	1%	1%	1%	7%	1%	0%	12%	1%	4%	5%	1%	0%	2%	4%	3%	1%	0%	7%	2%	12%	1%	0%	5%	100%
	New Zealan	6%	30%	6%	2%	4%	0%	4%	3%	0%	4%	2%	2%	0%	3%	0%	0%	1%	1%	1%	0%	9%	3%	11%	1%	0%	4%	100%
	Russia	0%	5%	3%	6%	0%	9%	12%	0%	0%	24%	0%	16%	0%	0%	0%	0%	0%	0%	1%	0%	14%	0%	9%	0%	0%	0%	100%
	Israel	2%	3%	7%	0%	1%	1%	8%	4%	1%	1%	2%	4%	0%	2%	12%	13%	0%	5%	7%	0%	2%	0%	18%	2%	1%	4%	100%
	South Afric	5%	8%	5%	1%	6%	1%	12%	2%	1%	21%	1%	4%	0%	1%	1%	0%	8%	2%	3%	0%	7%	2%	6%	1%	1%	1%	100%

2005

Region	Country	Agriculture, hunting, forestry and fishing	Food products, beverages and tobacco	Textiles, textile products, leather and footwear	Wood and products of wood and cork	Pulp, paper, paper products, printing and publishing	Coke, refined petroleum products and nuclear fuel	Chemicals	Rubber & plastics products	Other non-metallic mineral products	Basic metals	Fabricated metal products, except machinery & equipment	Machinery & equipment, nec	Office, accounting & computing machinery	Electrical machinery & apparatus, nec	Radio, television & communication equipment	Medical, precision & optical instruments	Motor vehicles, trailers & semi-trailers	Other transport equipment	Manufacturing nec; recycling (include Furniture)	Construction	Wholesale & retail trade; repairs	Hotels & restaurants	Transport and storage	Post & telecommunications	Finance & insurance	Other services	Total
NAFTA	Canada	2%	3%	2%	3%	4%	1%	6%	4%	0%	7%	2%	5%	2%	2%	5%	0%	38%	5%	2%	0%	1%	1%	3%	0%	0%	2%	100%
	Mexico	1%	1%	6%	0%	1%	0%	2%	3%	0%	2%	3%	3%	33%	9%	0%	0%	29%	0%	4%	0%	3%	0%	1%	0%	0%	0%	100%
	United Stat	2%	2%	2%	1%	2%	1%	10%	2%	0%	4%	3%	12%	3%	2%	10%	4%	16%	9%	3%	0%	3%	0%	4%	0%	1%	4%	100%
South America	Argentina	6%	16%	4%	0%	2%	9%	19%	2%	0%	7%	1%	3%	0%	1%	0%	1%	22%	0%	1%	0%	1%	0%	3%	1%	0%	0%	100%
	Brazil	3%	10%	3%	1%	3%	2%	9%	2%	1%	10%	1%	7%	1%	2%	7%	1%	20%	8%	1%	0%	1%	1%	2%	0%	0%	2%	100%
	Chile	8%	16%	1%	5%	8%	1%	6%	3%	0%	4%	2%	3%	0%	0%	0%	0%	1%	0%	0%	0%	10%	0%	27%	1%	1%	3%	100%
Europe	Austria	0%	4%	3%	3%	5%	0%	6%	3%	1%	9%	4%	12%	0%	5%	4%	1%	22%	2%	3%	1%	3%	1%	3%	1%	1%	3%	100%
	Belgium	0%	8%	4%	1%	2%	5%	16%	3%	1%	9%	3%	4%	0%	1%	1%	0%	19%	1%	2%	1%	8%	1%	5%	1%	1%	4%	100%
	Czech Repu	1%	2%	5%	1%	2%	0%	4%	5%	2%	5%	5%	11%	10%	8%	8%	2%	19%	1%	3%	0%	1%	1%	2%	0%	0%	2%	100%
	Denmark	1%	12%	2%	1%	1%	1%	8%	2%	1%	1%	1%	7%	0%	5%	1%	2%	1%	1%	3%	0%	8%	1%	38%	1%	0%	2%	100%
	Estonia	1%	4%	9%	8%	1%	0%	4%	2%	1%	0%	7%	3%	0%	5%	27%	1%	2%	2%	4%	1%	2%	0%	12%	1%	0%	2%	100%
	Finland	0%	1%	1%	3%	10%	1%	7%	2%	1%	9%	2%	13%	0%	4%	33%	2%	4%	1%	1%	0%	1%	0%	2%	0%	0%	2%	100%
	France	2%	4%	3%	0%	2%	1%	15%	3%	1%	5%	1%	8%	1%	4%	4%	2%	21%	10%	2%	0%	3%	0%	4%	0%	0%	2%	100%
	Germany	0%	3%	2%	1%	3%	1%	11%	4%	1%	8%	3%	13%	1%	5%	4%	2%	26%	3%	1%	0%	2%	0%	3%	0%	0%	1%	100%
	Greece	2%	4%	4%	0%	0%	2%	6%	1%	1%	9%	2%	2%	0%	1%	0%	0%	1%	1%	0%	1%	4%	0%	55%	0%	0%	1%	100%
	Hungary	1%	2%	3%	0%	1%	2%	5%	3%	1%	3%	2%	5%	7%	8%	30%	1%	21%	0%	1%	0%	1%	0%	2%	0%	0%	1%	100%
	Ireland	0%	10%	0%	0%	12%	0%	27%	0%	0%	0%	0%	1%	18%	1%	3%	4%	0%	0%	0%	0%	1%	1%	1%	0%	9%	9%	100%
	Italy	0%	4%	11%	0%	1%	1%	15%	5%	2%	7%	5%	16%	1%	4%	2%	3%	8%	3%	4%	0%	3%	0%	2%	0%	0%	2%	100%
	Luxembour	0%	1%	1%	0%	1%	0%	0%	2%	0%	3%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	4%	1%	77%	7%	100%
	Netherlands	3%	14%	1%	0%	2%	2%	20%	2%	0%	3%	2%	6%	1%	1%	6%	1%	6%	2%	1%	1%	7%	0%	9%	1%	3%	5%	100%
	Norway	2%	9%	0%	0%	2%	0%	7%	1%	0%	18%	1%	5%	0%	1%	1%	1%	1%	4%	1%	0%	4%	0%	36%	0%	0%	4%	100%
	Poland	1%	4%	5%	3%	2%	1%	5%	5%	1%	5%	5%	6%	0%	5%	6%	1%	23%	2%	5%	1%	8%	0%	3%	0%	0%	1%	100%
	Portugal	1%	4%	14%	3%	3%	1%	6%	4%	2%	4%	4%	5%	0%	5%	13%	1%	20%	1%	3%	0%	2%	1%	3%	1%	0%	1%	100%
	Romania	1%	1%	21%	2%	1%	3%	7%	3%	1%	8%	3%	7%	0%	9%	1%	1%	4%	3%	4%	1%	3%	1%	6%	1%	0%	5%	100%
	Slovak Rep	1%	2%	4%	1%	3%	2%	3%	5%	1%	6%	4%	7%	0%	8%	11%	0%	28%	1%	2%	1%	5%	0%	3%	0%	0%	2%	100%
	Slovenia	0%	1%	8%	2%	3%	0%	10%	7%	1%	7%	8%	13%	0%	6%	2%	2%	17%	1%	4%	1%	1%	0%	5%	0%	0%	1%	100%
	Spain	2%	5%	4%	1%	2%	1%	14%	3%	1%	4%	2%	4%	1%	4%	4%	1%	31%	4%	1%	0%	2%	0%	5%	0%	0%	3%	100%
	Sweden	0%	2%	1%	2%	7%	1%	8%	2%	1%	8%	2%	12%	1%	14%	0%	2%	18%	2%	2%	0%	4%	0%	6%	1%	1%	5%	100%
	Switzerland	0%	3%	2%	0%	2%	0%	25%	2%	0%	2%	4%	14%	3%	0%	2%	14%	0%	1%	2%	0%	4%	3%	4%	1%	9%	2%	100%
	Turkey	1%	2%	22%	0%	1%	1%	3%	4%	2%	12%	4%	6%	0%	3%	7%	0%	19%	2%	4%	1%	3%	0%	4%	0%	0%	0%	100%
	United King	1%	3%	2%	0%	2%	1%	16%	2%	0%	4%	2%	9%	2%	3%	4%	3%	7%	9%	1%	0%	6%	2%	3%	1%	5%	9%	100%
Asia	China	0%	1%	11%	2%	2%	0%	6%	1%	0%	2%	3%	6%	24%	14%	9%	4%	1%	1%	3%	0%	3%	0%	2%	0%	0%	2%	100%
	Chinese Ta	0%	0%	3%	0%	0%	0%	12%	3%	0%	6%	3%	6%	3%	3%	47%	2%	1%	2%	2%	0%	2%	0%	4%	0%	0%	0%	100%
	India	1%	3%	15%	0%	1%	1%	12%	3%	1%	9%	3%	6%	16%	4%	3%	0%	3%	0%	0%	0%	2%	1%	7%	0%	0%	9%	100%
	Indonesia	1%	4%	17%	3%	4%	1%	5%	9%	1%	4%	2%	9%	0%	4%	11%	0%	3%	2%	3%	0%	4%	1%	7%	0%	0%	4%	100%
	Japan	0%	0%	1%	0%	0%	0%	10%	3%	1%	6%	1%	12%	7%	22%	5%	2%	17%	5%	1%	0%	1%	1%	5%	0%	0%	0%	100%
	Korea	0%	1%	4%	0%	1%	1%	10%	2%	0%	6%	1%	5%	2%	2%	40%	1%	10%	8%	1%	0%	1%	0%	6%	0%	0%	1%	100%
	Malaysia	1%	3%	1%	2%	0%	1%	4%	3%	0%	3%	1%	35%	0%	5%	31%	1%	1%	1%	0%	0%	1%	0%	3%	0%	0%	1%	100%
	Philippines	1%	1%	4%	0%	0%	1%	1%	1%	1%	1%	1%	2%	4%	2%	54%	9%	4%	0%	0%	0%	4%	1%	4%	0%	1%	1%	100%
	Singapore	0%	1%	0%	0%	0%	21%	13%	1%	0%	0%	2%	4%	13%	0%	18%	1%	0%	2%	0%	0%	6%	0%	9%	0%	2%	4%	100%
	Thailand	0%	5%	6%	0%	1%	0%	5%	4%	0%	2%	2%	4%	18%	5%	23%	1%	9%	1%	6%	0%	2%	1%	2%	0%	0%	1%	100%
	Viet Nam	9%	9%	36%	2%	0%	0%	1%	1%	1%	2%	1%	2%	0%	3%	1%	0%	0%	1%	5%	0%	11%	6%	5%	1%	2%	2%	100%
others	Australia	5%	13%	4%	1%	2%	1%	6%	1%	0%	12%	1%	3%	0%	3%	0%	2%	6%	2%	1%	0%	8%	3%	17%	1%	0%	6%	100%
	New Zealan	9%	28%	3%	3%	4%	0%	1%	6%	0%	2%	3%	10%	0%	0%	0%	0%	3%	0%	1%	0%	10%	4%	7%	1%	0%	4%	100%
	Russia	1%	3%	2%	5%	0%	20%	9%	0%	0%	20%	0%	10%	0%	0%	0%	0%	0%	0%	2%	0%	21%	0%	7%	0%	0%	0%	100%
	Israel	1%	2%	2%	0%	1%	1%	9%	3%	1%	1%	2%	3%	0%	1%	10%	7%	0%	4%	30%	0%	4%	1%	8%	0%	2%	6%	100%
	South Afric	4%	4%	1%	4%	0%	10%	0%	1%	0%	25%	0%	0%	0%	1%	1%	0%	21%	0%	3%	0%	7%	3%	11%	3%	1%	2%	100%

Appendix 1b The contribution rate of importing products in national VS

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Region	Country	Agriculture, hunting, forestry and fishing	Food products, beverages and tobacco	Textiles, textile products, leather and footwear	Wood and products of wood and cork	Pulp, paper, paper products, printing and publishing	Coke, refined petroleum products and nuclear fuel	Chemicals	Rubber & plastics products	Other non-metallic mineral products	Basic metals	Fabricated metal products, except machinery & equipment	Machinery & equipment, nec	Office, accounting & computing machinery	Electrical machinery & apparatus, nec	Radio, television & communication equipment	Medical, precision & optical instruments	Motor vehicles, trailers & semi-trailers	Other transport equipment	Manufacturing nec; recycling (include Furniture)	Construction	Wholesale & retail trade; repairs	Hotels & restaurants	Transport and storage	Post & telecommunications	Finance & insurance	Other services	Total
NAFTA	Canada	1%	2%	2%	1%	3%	1%	8%	4%	1%	5%	6%	5%	2%	10%	0%	0%	34%	3%	0%	0%	0%	1%	2%	0%	1%	17%	100%
	Mexico	2%	0%	8%	1%	3%	1%	9%	9%	1%	11%	7%	7%	15%	18%	0%	0%	9%	0%	1%	0%	0%	0%	0%	0%	0%	1%	100%
	United Stat	2%	1%	3%	2%	4%	1%	10%	3%	1%	13%	4%	7%	9%	24%	1%	1%	7%	3%	1%	0%	0%	0%	2%	0%	0%	1%	100%
South America	Argentina	4%	2%	4%	0%	5%	5%	34%	3%	1%	9%	3%	4%	1%	5%	1%	1%	9%	1%	1%	2%	0%	0%	1%	0%	1%	2%	100%
	Brazil	5%	3%	6%	0%	4%	11%	19%	3%	1%	10%	2%	5%	1%	2%	3%	1%	3%	5%	0%	0%	2%	1%	7%	0%	1%	7%	100%
	Chile	6%	7%	3%	1%	6%	6%	19%	4%	1%	5%	2%	6%	0%	4%	0%	0%	7%	0%	1%	0%	4%	0%	11%	2%	2%	7%	100%
Europe	Austria	2%	1%	7%	1%	5%	1%	14%	5%	1%	12%	5%	9%	0%	5%	5%	2%	10%	1%	1%	0%	2%	2%	2%	0%	1%	8%	100%
	Belgium	3%	4%	5%	1%	3%	3%	18%	4%	1%	12%	3%	3%	0%	3%	2%	0%	15%	0%	1%	0%	3%	1%	6%	0%	1%	10%	100%
	Czech Repu	3%	2%	6%	1%	4%	2%	12%	4%	1%	19%	3%	9%	1%	8%	5%	2%	3%	1%	1%	0%	0%	1%	4%	1%	1%	12%	100%
	Denmark	4%	9%	3%	3%	5%	3%	15%	4%	1%	10%	3%	7%	1%	3%	4%	1%	2%	0%	1%	0%	0%	0%	18%	0%	0%	4%	100%
	Estonia	4%	4%	11%	2%	4%	7%	9%	4%	2%	6%	4%	3%	6%	6%	9%	1%	3%	0%	1%	0%	0%	1%	7%	0%	1%	9%	100%
	Finland	2%	2%	2%	2%	3%	1%	15%	2%	1%	15%	3%	7%	2%	6%	12%	1%	3%	0%	0%	0%	3%	1%	3%	0%	0%	19%	100%
	France	2%	2%	4%	1%	5%	2%	14%	5%	1%	15%	3%	5%	7%	3%	5%	4%	7%	5%	1%	0%	2%	0%	2%	0%	1%	11%	100%
	Germany	3%	2%	4%	1%	5%	2%	16%	3%	2%	17%	3%	7%	2%	4%	5%	1%	8%	4%	1%	0%	1%	0%	3%	1%	1%	8%	100%
	Greece	6%	12%	6%	1%	7%	5%	18%	3%	1%	14%	3%	4%	0%	3%	1%	0%	5%	2%	2%	0%	0%	0%	1%	1%	0%	6%	100%
	Hungary	3%	4%	4%	2%	4%	3%	9%	4%	2%	14%	4%	8%	1%	5%	6%	1%	6%	0%	0%	0%	0%	0%	0%	0%	2%	29%	100%
	Ireland	2%	5%	3%	1%	4%	0%	12%	2%	0%	4%	1%	3%	23%	5%	8%	1%	0%	1%	1%	0%	0%	0%	3%	0%	2%	41%	100%
	Italy	3%	3%	8%	2%	4%	2%	19%	3%	1%	18%	2%	7%	1%	3%	4%	2%	3%	1%	1%	0%	3%	1%	2%	0%	2%	10%	100%
	Luxembour	1%	0%	0%	0%	2%	1%	7%	0%	1%	9%	1%	2%	0%	1%	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	56%	29%	100%
	Netherlands	9%	8%	2%	1%	6%	3%	17%	4%	1%	6%	3%	4%	2%	3%	5%	1%	3%	7%	0%	0%	3%	2%	3%	0%	1%	14%	100%
	Norway	2%	1%	2%	1%	3%	7%	8%	2%	1%	20%	3%	5%	2%	4%	2%	1%	1%	4%	1%	0%	1%	4%	19%	0%	1%	9%	100%
	Poland	4%	2%	4%	1%	6%	3%	19%	7%	3%	7%	4%	14%	1%	4%	2%	2%	3%	0%	1%	0%	1%	0%	3%	1%	4%	8%	100%
	Portugal	7%	3%	18%	1%	4%	2%	13%	4%	1%	10%	1%	4%	0%	6%	8%	1%	11%	1%	1%	0%	0%	1%	1%	1%	1%	6%	100%
	Romania	1%	3%	35%	1%	2%	3%	14%	4%	1%	5%	3%	2%	1%	11%	1%	1%	0%	1%	0%	0%	0%	1%	1%	1%	1%	14%	100%
	Slovak Rep	2%	2%	3%	1%	5%	2%	16%	4%	2%	14%	3%	9%	1%	5%	2%	1%	9%	1%	1%	1%	0%	0%	5%	1%	4%	16%	100%
	Slovenia	2%	2%	11%	2%	4%	5%	14%	4%	1%	16%	3%	5%	0%	6%	2%	1%	13%	0%	0%	0%	1%	0%	2%	0%	0%	5%	100%
	Spain	3%	2%	3%	1%	4%	2%	16%	5%	1%	12%	2%	5%	1%	4%	3%	0%	24%	1%	0%	0%	1%	0%	3%	0%	0%	12%	100%
	Sweden	2%	1%	2%	1%	3%	3%	12%	4%	1%	13%	3%	9%	1%	5%	7%	2%	10%	2%	1%	0%	2%	0%	5%	0%	1%	14%	100%
	Switzerland	2%	3%	5%	2%	7%	0%	14%	6%	2%	10%	7%	3%	6%	0%	3%	1%	1%	1%	2%	0%	0%	3%	5%	2%	11%	5%	100%
	Turkey	6%	5%	10%	0%	3%	5%	28%	1%	0%	16%	0%	5%	1%	2%	2%	0%	4%	2%	1%	0%	1%	2%	4%	1%	0%	2%	100%
	United King	2%	3%	4%	1%	5%	1%	17%	3%	1%	10%	2%	5%	7%	5%	10%	1%	7%	2%	1%	0%	0%	1%	1%	1%	1%	14%	100%
Asia	China	3%	2%	20%	1%	3%	2%	20%	2%	0%	11%	1%	4%	3%	4%	14%	1%	2%	1%	2%	0%	0%	0%	0%	0%	0%	3%	100%
	Chinese Ta	3%	1%	4%	1%	2%	2%	19%	1%	1%	14%	1%	2%	1%	3%	31%	1%	1%	1%	1%	0%	1%	1%	2%	0%	0%	10%	100%
	India	1%	0%	2%	0%	3%	12%	22%	0%	3%	14%	0%	7%	0%	3%	1%	0%	0%	0%	12%	0%	0%	0%	2%	0%	1%	33%	100%
	Indonesia	1%	1%	13%	0%	3%	3%	26%	0%	0%	4%	3%	15%	0%	1%	7%	2%	3%	3%	0%	0%	0%	2%	5%	1%	3%	9%	100%
	Japan	2%	1%	2%	1%	2%	4%	10%	2%	1%	20%	1%	3%	6%	6%	19%	2%	1%	2%	1%	0%	0%	0%	6%	0%	2%	14%	100%
	Korea	4%	2%	8%	1%	2%	8%	11%	1%	1%	15%	1%	7%	2%	20%	1%	1%	2%	1%	0%	0%	0%	1%	3%	0%	0%	9%	100%
	Malaysia	2%	1%	3%	1%	2%	2%	10%	2%	2%	12%	3%	4%	0%	11%	29%	1%	4%	1%	4%	0%	7%	0%	1%	0%	0%	0%	100%
	Philippines	1%	1%	22%	0%	2%	1%	15%	1%	0%	10%	1%	4%	0%	0%	21%	0%	4%	1%	4%	0%	5%	0%	4%	0%	0%	1%	100%
	Singapore	0%	1%	1%	0%	3%	18%	6%	1%	1%	4%	2%	3%	11%	30%	6%	1%	0%	1%	0%	0%	0%	0%	3%	1%	1%	12%	100%
	Thailand	4%	3%	4%	1%	2%	4%	15%	3%	1%	10%	2%	3%	0%	3%	30%	1%	1%	2%	3%	0%	5%	0%	1%	0%	0%	2%	100%
	Viet Nam	2%	0%	19%	0%	0%	6%	6%	9%	2%	2%	2%	2%	0%	1%	1%	0%	0%	0%	11%	0%	24%	1%	4%	0%	6%	2%	100%
others	Australia	2%	3%	7%	1%	4%	4%	16%	5%	1%	6%	2%	9%	8%	4%	0%	2%	6%	3%	1%	0%	0%	1%	9%	1%	2%	8%	100%
	New Zealan	7%	6%	5%	0%	6%	7%	13%	10%	1%	6%	7%	3%	0%	7%	0%	1%	3%	1%	1%	0%	1%	0%	4%	1%	1%	18%	100%
	Russia	1%	6%	6%	4%	0%	6%	15%	0%	1%	20%	0%	26%	0%	0%	0%	0%	0%	0%	1%	3%	4%	0%	5%	0%	1%	3%	100%
	Israel	1%	2%	5%	1%	2%	4%	12%	4%	1%	2%	4%	3%	0%	6%	16%	3%	1%	4%	3%	0%	1%	1%	14%	2%	3%	10%	100%
	South Afric	4%	2%	4%	1%	8%	3%	21%	2%	1%	8%	4%	15%	0%	2%	2%	1%	6%	3%	0%	0%	0%	1%	6%	2%	1%	5%	100%

2005

Region	Country	Agriculture, hunting, forestry and fishing	Food products, beverages and tobacco	Textiles, textile products, leather and footwear	Wood and products of wood and cork	Pulp, paper, paper products, printing and publishing	Coke, refined petroleum products and nuclear fuel	Chemicals	Rubber & plastics products	Other non-metallic mineral products	Basic metals	Fabricated metal products, except machinery & equipment	Machinery & equipment, nec	Office, accounting & computing machinery	Electrical machinery & apparatus, nec	Radio, television & communication equipment	Medical, precision & optical instruments	Motor vehicles, trailers & semi-trailers	Other transport equipment	Manufacturing nec; recycling (include Furniture)	Construction	Wholesale & retail trade; repairs	Hotels & restaurants	Transport and storage	Post & telecommunications	Finance & insurance	Other services	Total
NAFTA	Canada	1%	2%	2%	1%	3%	2%	12%	4%	1%	11%	6%	5%	2%	3%	5%	0%	26%	3%	1%	0%	3%	1%	1%	0%	1%	5%	100%
	Mexico	1%	0%	6%	1%	2%	1%	8%	8%	1%	10%	5%	3%	27%	13%	0%	0%	13%	0%	1%	0%	0%	0%	0%	0%	1%	0%	100%
	United Stat	2%	0%	1%	1%	2%	6%	15%	2%	1%	17%	4%	7%	3%	4%	17%	1%	9%	2%	1%	0%	0%	0%	1%	0%	1%	1%	100%
South America	Argentina	3%	1%	2%	0%	3%	7%	34%	2%	1%	9%	2%	5%	1%	4%	1%	1%	16%	0%	0%	2%	0%	0%	1%	0%	1%	1%	100%
	Brazil	3%	1%	1%	0%	1%	8%	23%	4%	1%	8%	2%	6%	1%	3%	8%	0%	10%	5%	0%	0%	1%	0%	0%	2%	2%	9%	100%
	Chile	2%	5%	2%	1%	3%	15%	15%	4%	1%	4%	2%	8%	0%	4%	0%	0%	3%	0%	0%	0%	6%	0%	17%	1%	4%	4%	100%
Europe	Austria	2%	2%	3%	1%	4%	4%	10%	4%	1%	12%	4%	9%	1%	5%	3%	1%	15%	1%	1%	0%	1%	3%	4%	1%	1%	7%	100%
	Belgium	2%	4%	2%	1%	3%	5%	17%	3%	1%	11%	3%	3%	0%	3%	2%	1%	13%	0%	1%	0%	1%	2%	8%	1%	2%	9%	100%
	Czech Repu	1%	1%	6%	1%	3%	2%	10%	7%	1%	12%	6%	6%	6%	9%	10%	2%	8%	1%	1%	0%	0%	0%	2%	0%	1%	3%	100%
	Denmark	2%	6%	1%	1%	2%	7%	9%	2%	1%	6%	2%	4%	1%	3%	2%	1%	1%	1%	1%	0%	1%	0%	34%	1%	1%	10%	100%
	Estonia	3%	2%	7%	3%	2%	5%	7%	4%	1%	9%	5%	3%	1%	12%	18%	1%	2%	0%	1%	0%	0%	0%	7%	1%	1%	5%	100%
	Finland	3%	1%	1%	1%	2%	4%	12%	2%	1%	12%	2%	7%	2%	7%	17%	2%	4%	0%	1%	0%	1%	0%	2%	1%	0%	18%	100%
	France	1%	2%	3%	1%	3%	4%	19%	4%	1%	11%	3%	7%	2%	4%	5%	3%	9%	6%	1%	0%	1%	0%	4%	0%	1%	5%	100%
	Germany	1%	1%	2%	1%	3%	5%	13%	4%	1%	16%	3%	7%	2%	5%	6%	1%	11%	2%	1%	0%	1%	1%	5%	1%	1%	6%	100%
	Greece	2%	1%	3%	1%	3%	6%	13%	1%	0%	13%	1%	3%	0%	1%	1%	0%	1%	4%	0%	0%	0%	0%	41%	1%	2%	3%	100%
	Hungary	1%	1%	3%	0%	2%	6%	6%	4%	1%	5%	4%	5%	4%	11%	24%	2%	12%	0%	1%	0%	2%	0%	1%	0%	0%	6%	100%
	Ireland	1%	3%	0%	0%	1%	0%	7%	1%	0%	1%	1%	1%	9%	2%	3%	2%	0%	0%	1%	0%	11%	1%	1%	1%	9%	46%	100%
	Italy	2%	3%	7%	1%	2%	2%	19%	3%	1%	15%	5%	7%	1%	4%	2%	2%	4%	1%	1%	0%	5%	1%	3%	1%	1%	7%	100%
	Luxembour	0%	0%	0%	0%	1%	1%	3%	0%	0%	2%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	3%	70%	14%	100%
	Netherlands	5%	6%	1%	1%	3%	7%	17%	3%	1%	6%	3%	4%	2%	2%	2%	2%	4%	1%	0%	0%	2%	2%	5%	1%	7%	13%	100%
	Norway	2%	3%	2%	1%	2%	0%	13%	3%	1%	19%	2%	5%	1%	3%	2%	1%	1%	3%	1%	0%	1%	5%	24%	0%	1%	6%	100%
	Poland	2%	2%	5%	2%	4%	3%	15%	7%	2%	14%	7%	5%	1%	5%	7%	0%	12%	0%	1%	0%	0%	0%	3%	0%	0%	3%	100%
	Portugal	3%	2%	10%	2%	3%	3%	13%	4%	1%	13%	2%	4%	1%	5%	11%	1%	14%	1%	1%	0%	1%	0%	2%	0%	1%	2%	100%
	Romania	1%	3%	18%	1%	2%	3%	15%	8%	2%	7%	4%	6%	2%	11%	2%	1%	0%	1%	0%	0%	0%	1%	1%	1%	1%	7%	100%
	Slovak Rep	1%	1%	5%	1%	3%	2%	6%	6%	1%	11%	5%	4%	0%	7%	9%	2%	23%	1%	0%	0%	1%	0%	3%	0%	1%	5%	100%
	Slovenia	1%	1%	8%	2%	3%	4%	13%	7%	2%	21%	6%	5%	1%	5%	3%	1%	8%	0%	1%	0%	0%	0%	2%	0%	0%	4%	100%
	Spain	2%	1%	3%	1%	2%	5%	15%	5%	1%	10%	3%	5%	1%	4%	4%	1%	18%	2%	1%	0%	1%	1%	4%	0%	1%	9%	100%
	Sweden	1%	1%	1%	1%	2%	4%	10%	4%	1%	11%	2%	7%	1%	11%	0%	1%	11%	2%	1%	0%	1%	0%	8%	1%	1%	16%	100%
	Switzerland	2%	2%	3%	1%	4%	0%	21%	4%	1%	16%	5%	3%	4%	0%	3%	2%	1%	1%	2%	0%	0%	3%	5%	2%	12%	3%	100%
	Turkey	3%	2%	7%	0%	2%	4%	17%	1%	1%	29%	1%	4%	0%	2%	6%	0%	13%	1%	0%	0%	0%	0%	3%	0%	1%	1%	100%
	United King	1%	3%	2%	1%	3%	3%	17%	3%	1%	8%	2%	7%	2%	4%	7%	2%	4%	6%	1%	0%	0%	1%	4%	1%	2%	13%	100%
Asia	China	2%	1%	5%	0%	2%	3%	16%	0%	0%	7%	1%	5%	5%	40%	1%	4%	1%	1%	2%	0%	0%	1%	1%	0%	0%	3%	100%
	Chinese Ta	1%	0%	1%	0%	1%	5%	20%	2%	1%	14%	1%	4%	1%	2%	35%	1%	1%	1%	2%	0%	1%	1%	2%	0%	0%	4%	100%
	India	1%	1%	3%	0%	2%	7%	21%	1%	0%	21%	1%	5%	21%	1%	6%	0%	0%	1%	0%	0%	0%	0%	0%	0%	2%	3%	100%
	Indonesia	5%	1%	9%	0%	4%	9%	19%	1%	0%	8%	1%	11%	0%	2%	5%	1%	3%	3%	0%	0%	0%	1%	6%	0%	1%	9%	100%
	Japan	1%	1%	2%	1%	1%	8%	11%	3%	1%	17%	1%	4%	2%	26%	1%	1%	4%	3%	2%	0%	1%	0%	6%	0%	0%	3%	100%
	Korea	1%	1%	2%	0%	1%	6%	13%	2%	1%	15%	1%	5%	1%	4%	28%	4%	2%	1%	0%	0%	1%	0%	5%	0%	1%	5%	100%
	Malaysia	2%	1%	1%	0%	1%	5%	9%	2%	0%	10%	2%	7%	0%	6%	44%	1%	1%	0%	0%	1%	0%	0%	3%	1%	1%	3%	100%
	Philippines	1%	1%	2%	0%	1%	6%	4%	1%	0%	5%	1%	0%	6%	0%	55%	6%	0%	0%	1%	0%	4%	0%	1%	0%	2%	3%	100%
	Singapore	0%	1%	1%	0%	1%	30%	6%	1%	1%	3%	1%	6%	6%	1%	16%	1%	0%	1%	0%	0%	0%	0%	7%	0%	1%	16%	100%
	Thailand	2%	3%	3%	0%	1%	2%	14%	3%	0%	17%	3%	4%	10%	4%	25%	1%	4%	1%	3%	0%	0%	0%	0%	0%	0%	0%	100%
	Viet Nam	1%	1%	15%	0%	1%	13%	8%	7%	2%	6%	1%	3%	0%	1%	3%	0%	1%	1%	6%	0%	20%	1%	3%	0%	5%	1%	100%
others	Australia	1%	4%	4%	1%	4%	7%	18%	5%	1%	9%	3%	6%	0%	12%	0%	2%	9%	2%	1%	0%	0%	1%	3%	1%	1%	7%	100%
	New Zealan	4%	7%	4%	0%	5%	0%	10%	15%	4%	5%	7%	11%	0%	0%	0%	0%	6%	0%	1%	0%	1%	0%	7%	2%	2%	10%	100%
	Russia	1%	3%	5%	6%	0%	5%	15%	0%	1%	15%	0%	29%	0%	0%	0%	0%	0%	0%	1%	2%	10%	0%	5%	0%	1%	2%	100%
	Israel	1%	1%	2%	1%	2%	7%	9%	2%	1%	6%	2%	5%	0%	3%	7%	2%	1%	2%	26%	0%	2%	0%	6%	0%	8%	2%	100%
	South Afric	1%	1%	3%	4%	0%	19%	0%	1%	0%	27%	0%	0%	0%	3%	5%	0%	21%	0%	1%	0%	0%	1%	4%	2%	1%	5%	100%

Appendix 2 Sector classification

	Sectors	ISIC Rev.3
1	Agriculture, hunting, forestry and fishing	01+02+05
2	Mining and quarrying	10+11+12+13+14
3	Food products, beverages and tobacco	15+16
4	Textiles, textile products, leather and footwear	17+18+19
5	Wood and products of wood and cork	20
6	Pulp, paper, paper products, printing and publishing	21+22
7	Coke, refined petroleum products and nuclear fuel	23
8	Chemicals	24
9	Rubber and plastics products	25
10	Other non-metallic mineral products	26
11	Basic metals	27
12	Fabricated metal products, except machinery and equipment	28
13	Machinery and equipment, nec	29
14	Office, accounting and computing machinery	30
15	Electrical machinery and apparatus, nec	31
16	Radio, television and communication equipment	32
17	Medical, precision and optical instruments	33
18	Motor vehicles, trailers and semi-trailers	34
19	Other transport equipment	35
20	Manufacturing nec; recycling (include Furniture)	36+37
21	Utility	40+41
22	Construction	45
23	Wholesale and retail trade; repairs	50-52
24	Hotels and restaurants	55
25	Transport and storage	60-63
26	Post and telecommunications	64
27	Finance and insurance	65-67
28	Real estate activities	70
29	Renting of machinery and equipment	71
30	Computer and related activities	72
31	Research and development	73
32	Other Business Activities	74
33	Public admin. and defence; compulsory social security	75
34	Education	80
35	Health and social work	85
36	Other community, social and personal services	90-93
37	Private households with employed persons	95-99