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COMPARATIVE ADVANTAGE PATTERNS AND DOMESTIC DETERMINANTS IN EMERGING COUNTRIES: AN ANALYSIS WITH A FOCUS ON TECHNOLOGY

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Abstract

During the last two decades a number of emerging economies have become deeply engaged in technology-intensive production. This has been reflected in a shift in their international trade specialization from labor-intensive towards capital-intensive goods and in rapid productivity gains across all manufacturing activities. The paper draws on a sample of sixteen emerging countries to investigate the linkages between the pattern of revealed comparative advantages (RCAs), captured by a modified version of the Lafay index of international trade specialization, and the competitiveness structure of the domestic manufacturing sector, measured by a set of industry and country-specific variables. Positive and large RCAs are found to be associated with low unit labor costs in both low-technology (labor-intensive) and medium-or-high tech sectors; on the other hand, domestic accumulation of physical capital is associated with positive and large RCAs in medium-or-high tech sectors. The international disadvantage (negative RCAs) in technology-intensive production tends to increase for countries with low human capital, whereas it diminishes for countries that have large domestic markets and import technology through foreign capital goods.

JEL Classification: F14, O10.
Keywords: revealed comparative advantages, technological up-grading.

Contents

* Bank of Italy, Economics and International Relations.

1. Introduction

Over the last two decades a number of emerging economies have improved their technical capabilities and engaged in more technology-intensive productions which had previously been confined only to producers in advanced countries. Accumulation of physical capital, learning processes, access to foreign technology and to international networks of production are likely to have all played some role in explaining this process of technological catching-up.

This new feature of international competition has been reflected in changes in the structure of international trade by emerging countries. Their tendency to shift international specialization off labor-intensive productions and to diversify into more capital-and-technology-intensive activities has been confirmed in a number of empirical studies, most of which have adopted an approach à la Balassa and looked at the evolution of normalized export shares over the last quarter of a century (see, for example, Basili et al. (2000), Lall (2000), Mayer et al. (2003), Rolli and Zaghini (2003)).

Evidence of improved international competition by emerging countries has also been borne by their achieving large long-term gains in labor productivity across all manufacturing activities, with some indications of faster catching-up in the more technology-intensive industries (see Landesmann and Stehrer (2001) and Strehrer and Wörz (2003)).

Albeit quite interrelated, those two aspects of international competition – the one captured by the pattern of international trade specialization and the other by the cost competitiveness structure of the domestic manufacturing sector - have not been analyzed jointly very often in the literature, in particular as regards empirical research focused on emerging countries.[1]

This paper tries to fill in this gap by investigating, for a group of emerging countries with large and diversified manufacturing sectors the empirical linkages

[1] In Leamer (1997) and Montobbio (2003) these interrelations are tentatively analyzed for the advanced countries.

between the pattern of international trade specialization and, as a major driving factor the competitiveness structure of the domestic productive sector. The main question addressed in the paper is: what are the characteristics of the domestic manufacturing sector, in terms of cost structure and technical capabilities, that are more conducive to the development of internationally viable productions in the technology-intensive sectors?

Another area where the paper tries to improve over previous contributions is in measuring more precisely the pattern of international trade specialization in emerging countries and its changes over the last two decades. Available analyses are mostly based on the pattern of (normalized) export shares and they may be biased in presence of internationally fragmented production chains. Instead, we have used a modified version of the Lafay index, which is based on net trade flows. Due to a dramatic reduction in telecommunication (and, to a less degree, transport) costs and to financial liberalization worldwide, international fragmentation of production has become a dominant feature in manufacturing, leading to a growing share of intermediate goods (such as parts and components) on emerging countries' imports. As imported inputs are assembled into final goods and then re-exported, the actual value added realized by the domestic sector should be computed by netting export values of the imported inputs.[2]

The growing integration of emerging economies in world trade has spurred a revival of theoretical trade models along the lines of international specialization based on cost advantages. The literature on trade and growth has emphasized the dynamic and endogenous nature of Ricardian absolute and comparative advantages (e.g. Grossman and Helpman (1991); Krugman (1986 and 1987); Young (1991)). Endogenous technological innovation can either lead to persistence or mobility of international specialization depending on the scope of technological spillovers. If technical change, learning by doing and knowledge spillovers are sector and/or country specific we would observe persistence and agglomeration, whereas if

[2] As an alternative to the Lafay index, we could have used an indicator of international specialization based on (normalized) domestic value added shares. However, detailed and internationally comparable statistics on domestic value added are not easily available for emerging countries.

knowledge dissemination takes place, to some extent, across industries and countries, then specialization could (but not necessarily will) exhibit mobility over time.

The so called “new economic geography” literature has build around the idea that the size of a country and its geographic characteristics, by shaping the scope of its “spatial interactions” in labor and product markets, might have important effects on its specialization and convergence/divergence patterns (Venables (2006)). The possibility to operate in large labor markets and to easily access to sizeable product markets might enhance the country productivity, by reducing searching and transaction costs, by facilitating knowledge spillovers and the exploitation of economies of scale; large labor and product markets also allow greater diversification of production (Krugman 1980, Krugman 1991, Grossman and Helpman 1991).

Traditional trade theory has not only ignored agglomeration factors and economies of scales, but it has also dealt with final products. The more recent contributions, by drawing from increasing evidence, have brought into the mainstream models that incorporate trade in intermediate goods. The international fragmentation of production, by locating the various stages of production where costs are lowest, tends to reinforce and amplify the scope of Ricardian comparative and absolute advantage (Arndt and Kierzkowski (2001)). And, indeed, if each production stage has a different factor intensity, then, by having for instance the most labor-intensive phases relocated towards labor-abundant countries, the Heckshers-Ohlin type of argument could be reinforced as well. In presence of increasing returns to scale in production, the economic incentives towards the international fragmentation of production stretch further, as argued by Jones and Kierzkowski (2004).

Table 1

Major manufacture exporters among emerging countries

Countries	Percentage share on world exports of manufactures in 2001	Annual percentage change of manufacture exports (current dollars) in 1985-2001	Percentage share of manufactures on exports of goods		Per capita income	
			1985	2001	PPP dollars in 2001	Annual percentage change (constant dollars) in 1986-2001
China	5.2	21.9	41.5	88.8	4,649	8.2
South Korea	3.0	10.4	91.3	90.7	16,046	6.0
Mexico	3.0	17.2	39.8	85.2	8,991	1.0
Taiwan	2.6	9.4	90.3	94.7	21,966	5.7
Singapore	2.3	14.6	55.0	88.0	23,218	4.5
Malaysia	1.6	19.3	27.2	80.9	8,912	3.8
Thailand	1.1	19.7	38.6	76.8	6,410	4.8
India	0.7	12.1	58.2	77.0	2,537	3.6
Indonesia	0.7	18.6	11.0	56.4	3,525	3.2
Brazil	0.7	6.6	44.1	54.9	7,541	0.8
Philippines	0.6	16.3	56.7	91.2	4,022	1.2
Poland	0.6	9.1	63.9	80.8	10,384	2.6
Israel	0.6	10.9	83.4	94.6	21,308	2.0
Hungary	0.6	9.9	68.0	87.0	13,601	1.3
Turkey	0.6	11.0	61.1	82.1	6,134	2.0
South Africa	0.4	11.7	42.4	72.3	10,065	-0.1
Memorandum item:						
Industrial countries	69.7	7.9	75.5	83.0	28,213	2.2
Emerging countries	30.3	11.4	38.6	66.5	4,341	2.9

Source: elaborations based on IMF and WTO data.

Our sample includes sixteen large manufacture exporters among emerging countries (Table 1). Each of them holds a share of world manufacture exports above 0.4 per cent and their overall weight on world trade is about 25 per cent. Manufactures account for a relatively large share of their total exports of goods (between 54 and 95 per cent). The included countries are located in different regions, albeit those in East Asia (eight out of sixteen) clearly outnumber the others. Our sample is also quite variegated as regards both the stage of economic development (per capita annual incomes are between $2,500 and $24,000) and the economic growth achieved in the sample period (average annual rates between –0.1 and +8.2 per cent in 1986-2001). Since our sample covers about 80 per cent of trade flows by emerging countries, it provides valuable insights on the pattern of international competition by the latter countries.

The paper is organized as follows. In Section II we analyze the pattern of international trade specialization for our sample countries across the 1985-2001 period. Revealed comparative advantages (RCAs) are computed by a modified version of the Lafay index over 182 manufacture products and then aggregated over large sectors. In Section III we set up our empirical specification, where RCAs in international trade are determined by a set of industry and country-specific competitiveness factors. We then test the model and run a panel-data econometric exercise covering twenty-eight broad manufacturing activities in years 1985-2000 across our sample countries. In order to discriminate statistically between activities with different technological requirements, traded goods and manufacturing industries are classified as either low or medium-and-high technology-intensive, according to the broad characteristics of the production processes and the importance of R&D activities carried out by U.S. firms. In Section IV we draw our conclusions.

2. International trade specialization

2.1 Methodology

- *International trade classification by technology-intensity*. Starting from export and import values disaggregated at 3-digit codes (SITC - Rev. 2 classification), we have excluded the non-manufactures and also those products classified as residuals.[3] The resulting 182 products have been clustered into the following three large groups, according to the taxonomy in Lall (2000), which is based on factor-intensity, technical complexity and other characteristics of the production process:[4]

1. Resource-based and low-technology (LT): agro-based and other resource-based, textiles, garment & footwear and other labor-intensive manufactures.
2. Medium-technology (MT): automotive, process and engineering manufactures.

[3] "Residuals" collect flows which have not been assigned to any specific product category and are therefore not easily associated with a whatsoever technological content. For some years and countries (such as Hungary and China) residuals account for a significant share of trade and therefore their exclusion may potentially impinge negatively on the reliability of our analysis (see Appendix 1).

[4] See Appendix 2 for a full list of the 3-digit SITC codes included in each product group.

3. High technology (HT): electronic & electrical and other technology-intensive manufactures.

The above groups are ranked by increasing technological intensity, from low-tech to medium and high-tech products.[5] In the following analysis we also gather products belonging to the second and third groups into a single large class encompassing all medium-and-high-technology products (MHT).

- *The Lafay index of international trade specialization.* As vertical fragmentation of production has become a dominant feature of manufacturing activities around the world, it is appropriate to use an indicator of RCAs which is able to control to some extent for the import-intensity of exports. Cheap-labor emerging economies, in fact, tend to import technologically-sophisticated components, perform low value-added assembling activities and subsequently re-export valuable final goods to which they have indeed scarcely contributed. Contrary to the traditional Balassa (1966) index, which takes into account only export shares, the Lafay (1992) index is based on net trade flows and is therefore more suitable to deal with the problem of fragmented production.

In the paper we use a modified version of the Lafay (1992) index taken from Bugamelli (2001):

$$LA_i^c = \left[\frac{x_i^c - m_i^c}{m_i^c + x_i^c} - \frac{\sum_{i=1}^{n} x_i^c - \sum_{i=1}^{n} m_i^c}{\sum_{i=1}^{n} x_i^c + \sum_{i=1}^{n} m_i^c} \right] * \frac{m_i^c + x_i^c}{\sum_{i=1}^{n} x_i^c + \sum_{i=1}^{n} m_i^c} * 100$$

where x_i^c and m_i^c are total exports and imports of product *i* by country *c* and the sums over the *n* products are total manufacture exports and imports.

[5] It is quite possible that trade flows of rather different technical complexity be however recorded under the same technological product group, a problem which tends to be larger when starting from a low degree of basic product disaggregation. As regards our analysis, a finer (than 3-digit) product classification was not available for all sample countries and for a reasonable number of years.

The Lafay index is a measure of the contribution of each product *i* to the overall trade balance of country *c* (the trade surplus/deficit in product *i* is adjusted for the overall trade balance of country *c* and then weighted by the share of product *i* on overall two-way trade of country *c*). Therefore, it sums up to zero across all products, regardless of any global imbalance between country *c*'s total exports and imports:

$$\sum_{i=1}^{n} LA_i^c = 0$$

If the Lafay index LA_i^c is positive (negative), then country *c* has a revealed comparative advantage (disadvantage) in product *i*. The absolute value of the index measures the intensity of the advantage (disadvantage) of country *c* in product *i*. One additional desirable property of the Lafay index is that it can vary between −50 (full despecialization) and +50 (full specialization); those limit-values can only be reached if the overall trade balance is nil.[6]

Based on the elementary indexes LA_i^c, we have computed three synthetic indicators of a country's pattern of trade.

- *Trade technological intensity*. In order to measure the intensity of a country RCA in a given product group *J* (where *J = LT, MT, HT, MHT*), we take the arithmetic sum of the elementary Lafay indexes overall the n_J products included in class *J*:

$$LAFAY_C(J) = \sum_{i=1}^{n_J} LA_i^c$$

Being it an arithmetic sum, such measure may subtend either a uniform advantage/disadvantage overall the products belonging to class *J* or a highly dispersed structure across the individual products, with positive and negative elementary LA_i^c

[6] It may be worth to note that the Lafay index is *neutral* with respect to the degree of basic product disaggregation of the underlying trade flows (in fact the sum of the Lafay indexes is equal to the Lafay index of the sum of the trade flows). That is obvious from the following (equivalent) formulation, where LA_i^c is shown to be linear on x_i and m_i:

$$LA_i^c = 2\frac{x_i^c \sum_{i=1} m_i^c - m_i^c \sum_{i=1}^{n} x_i^c}{\left(\sum_{i=1}^{n} x_i^c + \sum_{i=1}^{n} m_i^c\right)^2} * 100$$

averaging out. The higher the value of the indicator *$LAFAY_C(MHT)$*, the higher a country *average* RCA in medium-and-high-tech products and the higher its position in the technological ladder.[7]

- *Trade polarization and dissimilarity with respect to G7 countries' trade*. When analyzing a country trade structure, it is also important to consider the *dispersion* of its RCAs across products or sectors. That provides in fact a synthetic measure of a country overall degree of trade specialization. Intuitively, the more a country production structure tends to be concentrated in few sectors, the larger and dispersed are its sectoral trade imbalances.

To capture this feature of a country trade structure we compute two indicators. The first one is a "polarization" index, which is calculated by summing up the positive values of the elementary Lafay indexes across all products:

$$P_C = \sum_{i=1}^{n} LA_i^c$$

where: $LA_i^c = LA_i^c$ *if* $LA_i^c > 0$ and $LA_i^c = 0$ *otherwise.*

The higher the value of the above sum, the higher the degree of polarization (note that: $0 \leq P_C \leq 50$). [8]

The second one is a "dissimilarity" index, where we take the G7 trade specialization pattern as benchmark and we compute the distance between a country trade structure and that for the G7 countries' aggregate:

$$D_C = \sum_{i=1}^{n} | LA_i^c - LA_i^{G7} |$$

Note that: $0 \leq D_C \leq 100$.

[7] You may notice that the *$LAFAY_C(J)$* index, being a linear transformation of the elementary Lafay index, is also neutral with respect to the degree of basic product disaggregation of the underlying trade flows.

[8] You may notice that also the value of the index P_C is neutral with respect to the degree of basic product disaggregation. Alternative measures of dispersion (such as those based on quadratic forms) do not share the same property.

2.2 Results

- *Trade technological intensity*. As described in the previous paragraph, the index $LAFAY_C$ *(MHT)* measures a country *average* RCA in medium-and-high-tech products and is therefore taken as a synthetic indicator of trade technological intensity. In Table 2 we rank our sample countries on the basis of their RCAs in MHT, MT and HT sectors. For the sake of analysis, we also split the HT sector into sub-sectors HT1 (electronic and electrical products) and HT2 (other high-tech products).[9] Based on the more recent figures (average of the 1999-2001 trade flows), only four countries (Mexico, followed by the Philippines, Hungary and South Korea) show a positive value of the $LAFAY_C$ *(MHT)* index, which means that they are not anymore at an international disadvantage in the medium-and-high-tech productions. On the other hand, the large majority of the sample countries still show a comparative disadvantage (a negative LAFAY index) in the MHT sector, quite wide in the case of South Africa, Turkey, Brazil and India.

As regards sample countries at the bottom of Table 2, it turns out that Brazil and South Africa are still highly specialized in natural resource-intensive products, while India and Turkey tend to specialize in low-tech labor-intensive goods (see Appendix 3).

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[9] More detailed (nine) classes are also proposed in Appendix 3, as follows (J codes are displayed in brackets):

Low-tech manufactures (LT)
- Resource based
  - Agro-based (RB1)
  - Other (RB2)
- Labor-intensive
  - Textiles, garment & footwear (LT1)
  - Other (LT2)

Medium-tech manufactures (MT)
- Automotive (MT1)
- Process (MT2)
- Engineering (MT3)

High-tech manufactures (HT):
- Electronic and electrical (HT1)
- Other (HT2)

Table 2

Emerging countries ranked by their revealed comparative advantage in medium-high tech products

(values of the $LAFAY_C$ (J) indexes in 1999-2001 and corresponding country rankings "R")

Country Code	Country	Technological product group "J"								Memorandum items:	
		J=MHT	*R*	J=MT	*R*	J=HT1	*R*	J=HT2	*R*	Dc	Pc
MEX	Mexico	3.4	*1*	0.8	*2*	2.9	*6*	-0.4	*2*	*48.0*	*18.4*
PHL	Philippines	2.9	*2*	-7.3	*13*	11.4	*1*	-1.2	*7*	*52.4*	*23.5*
HUN	Hungary	0.7	*3*	-0.7	*3*	2.4	*8*	-1.0	*3*	*45.0*	*17.1*
KOR	South Korea	0.2	*4*	3.0	*1*	0.3	*10*	-3.2	*14*	*47.1*	*18.9*
SGP	Singapore	0.0	*5*	-4.4	*6*	6.0	*2*	-1.6	*10*	*31.5*	*11.1*
TWN	Taiwan	-2.0	*6*	-2.7	*4*	4.7	*3*	-4.0	*16*	*46.3*	*21.6*
MYS	Malaysia	-3.0	*7*	-4.8	*7*	2.9	*7*	-1.1	*6*	*50.6*	*19.0*
ISR	Israel	-3.6	*8*	-6.3	*10*	2.9	*5*	-0.3	*1*	*41.7*	*17.9*
THA	Thailandia	-6.5	*9*	-5.4	*8*	0.9	*9*	-2.0	*11*	*53.7*	*21.4*
POL	Poland	-8.5	*10*	-3.4	*5*	-2.6	*11*	-2.5	*12*	*47.0*	*19.5*
IDN	Indonesia	-11.0	*11*	-13.7	*16*	3.8	*4*	-1.0	*4*	*66.2*	*33.6*
CHN	China	-11.6	*12*	-7.6	*14*	-2.6	*12*	-1.3	*9*	*61.7*	*25.7*
IND	India	-13.5	*13*	-7.0	*12*	-5.2	*14*	-1.2	*8*	*61.6*	*26.6*
BRA	Brazil	-13.6	*14*	-5.4	*9*	-7.1	*15*	-1.1	*5*	*56.0*	*25.0*
TUR	Turkey	-17.2	*15*	-9.7	*15*	-4.8	*13*	-2.7	*13*	*44.0*	*28.3*
ZAF	South Africa	-17.4	*16*	-6.6	*11*	-7.1	*16*	-3.7	*15*	*61.1*	*28.3*
Memorandum item:											
	G7 countries	4.4	-	4.0	-	-0.8	-	1.2	-	*0.0*	*7.4*
of which:	United States	5.1	-	0.8	-	1.0	-	3.3	-	*20.5*	*14.2*
	Japan	13.2	-	13.0	-	0.7	-	-0.5	-	*32.4*	*20.6*
	Germany	6.0	-	8.2	-	-3.0	-	0.9	-	*14.9*	*11.0*

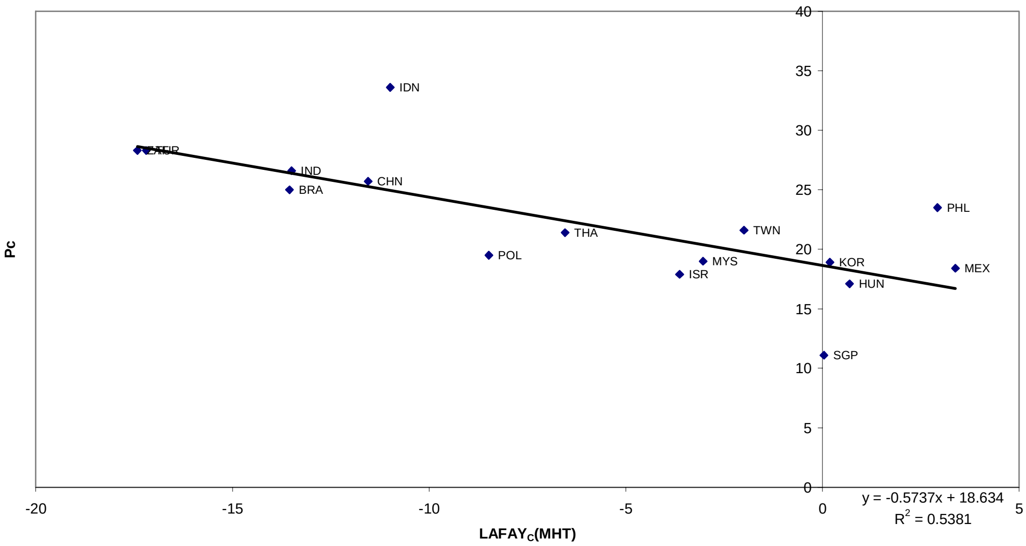
Source: Elaboration on WTA data.

On top of the table, five of the eight best-placed countries (top-half of the sample) are located in East Asia and the relatively high technological intensity of their trade partly reflects strong specialization in electronic and electrical goods (HT1 product group). As a matter of fact, the HT1 column in Table 2 shows a higher frequency (ten out of sixteen cases) of positive values for the LAFAY index than the other product-group columns, and this occurs in most cases for countries located in East Asia; China is the only sample country in the region with a negative value for $LAFAY_C(HT1)$. On the other hand, only two countries (South Korea and Mexico) display a positive LAFAY index in medium-tech intensive (MT) goods, which in both cases results from specialization in the automotive sector (see subgroup MT1 in Appendix 3). The fact that quite a significant number of heavy-weight exporters among emerging countries have specialized in tech-intensive electronic goods has brought about a parallel despecialization away from the latter sector in G7 countries' overall trade structure, as shown by the negative values of their $LAFAY_C(HT1)$ in Table 2.

It is a quite established empirical fact that countries at an early stage of industrialization tend to concentrate their export capabilities in a few productions with very simple technological requirements and, only as their economies mature they usually manage to diversify into a wider array of manufactures requiring more complex technologies. As this pattern tends also to emerge across countries at different stages of economic development, we have investigated the empirical linkages between different indicators of trade structure using our sample of emerging countries. The latter is quite suitable as across-countries differences in per capita income ─ a good proxy of the development stage ─ are quite wide (see Table 1).

We find a significant negative linear correlation between our indicator of trade technological intensity ($LAFAY_C$ *(MHT)*) and the index of trade polarization P_C (see Figure 1). This result may be explained on the basis of our previous finding, that the majority of emerging countries in our sample still have their RCAs quite concentrated in low-tech intensive goods.[10] We also trace a negative, albeit less strong, linear correlation between our indicator of trade technological intensity and the index of trade dissimilarity *Dc*, which is inversely proportional to the extent of product overlapping with the G7 countries' trade structure (see Figure 2).[11]

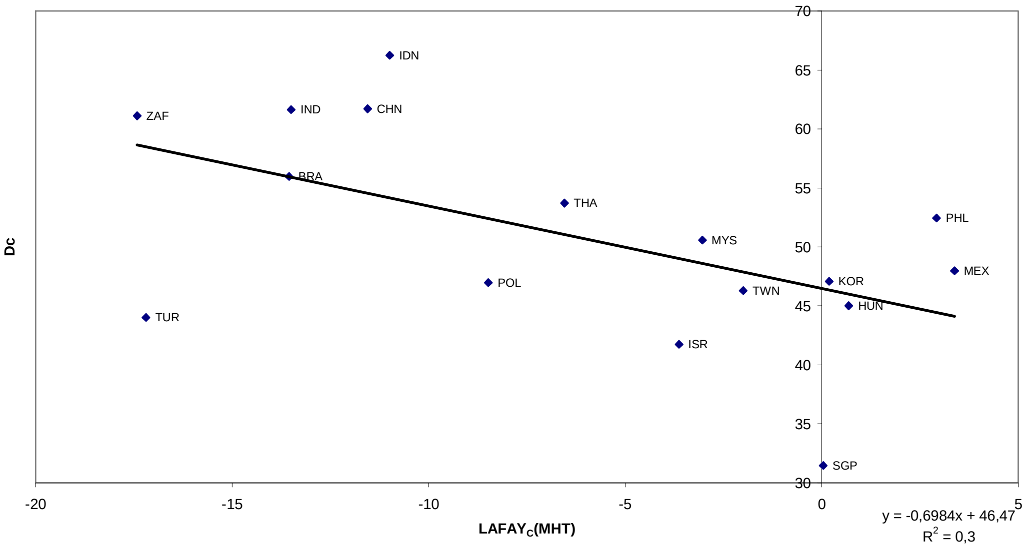
Figure 1. Linear correlation between trade technological intensity ($LAFAY_C$(MHT) and trade polarization (Pc) (1999-2001 period)



[10] The Philippines, Indonesia and Singapore appear to be outliers in Figure 1. Notice, in particular, the Philippines' relatively high specialization in HT1 trade and Singapore's (Indonesia) low (high) degree of trade polarization.

[11] In Fig. 2 Turkey is a clear outlier, as its degree of product overlapping with G7 trade is relatively high given the low tech-intensity of its trade.

Figure 2. Linear correlation between trade technological intensity ($LAFAY_C(MHT)$) and trade dissimilarity with respect to G7countries (Dc) (1999-2001 period)



This result is quite consistent with Table 2, where G7 countries overall trade structure is shown to be more diversified and at the same time relatively skewed towards the medium-and-high-tech productions.

- *Trade technological intensity from a dynamic perspective.* The pattern of international trade specialization we have drawn in Table 2 may reflect the different stages of economic development of the sample countries and it does not provide any information on its dynamics. In order to evaluate long-term technological changes, we have computed the following difference index:

$$Delta\_LAFAY_C(J) = LAFAY_C(J)_{(1999\text{-}2001)} - LAFAY_C(J)_{(1985\text{-}1987)}$$

where *J* refers as before to a given product class and the subscripts in brackets stand for years to which average trade flows belong.

We now rank our sample countries by their long-term gains in trade technological intensity, as measured by the values of the $Delta\_LAFAY_C$ indexes in MHT, MT, HT1 and HT2 sectors (see Table 3). It is worth noting that trade technological upgrading has been a rather widespread tendency among our sample countries over the last two decades, albeit with varying intensity. All countries but Poland display in fact a positive value of the index $Delta\_LAFAY_C(MHT)$. At the same time, the outcome is very skewed in favor of East Asia, which accounts for seven among the eight best performer countries (top-half of the table). Among the non-Asian countries, Mexico is the only one retaining a distinguished (third) position. Looking into more detailed product groups, technological improvement has frequently reflected positive developments in MT and HT1 sectors, whereas the HT2 sector is confirmed as the most difficult one for emerging countries to compete in. As regards the latter sector, there has been a further retrocession in six out of sixteen countries, as shown by negative values for *Delta_LAFAY* $_C$ *(HT2)*.

Table 3

Emerging countries ranked by their long-term gains in revealed comparative advantage in medium-high tech products

(values of the Delta_LAFAY $_C$ *(J) indexes and corresponding country rankings "R")*

Country Code	Country	Technological product group "J"								Memorandum items: LAFAY$_C$(MHT)			
		J=MHT	*R*	J=MT	*R*	J=HT1	*R*	J=HT2	*R*	1985-87	1999-2001	Delta_D$_c$	Delta_ P$_c$
PHL	Philippines	19.6	*1*	7.0	*7*	11.3	*1*	1.3	*4*	-16.6	2.9	-30.5	-16.7
IDN	Indonesia	17.0	*2*	8.1	*2*	7.5	*3*	1.3	*3*	-28.0	-11.0	-25.5	-5.8
MEX	Mexico	11.9	*3*	2.0	*13*	8.3	*2*	1.6	*2*	-8.5	3.4	-17.2	-8.6
THA	Thailandia	11.2	*4*	6.4	*9*	3.5	*7*	1.3	*5*	-17.7	-6.5	-26.0	-14.2
MYS	Malaysia	11.1	*5*	7.2	*5*	3.2	*8*	0.7	*7*	-14.1	-3.0	-13.4	-8.7
TWN	Taiwan	9.7	*6*	5.2	*10*	6.5	*4*	-2.0	*13*	-11.7	-2.0	-15.7	-4.1
CHN	China	8.8	*7*	7.1	*6*	1.7	*10*	0.0	*9*	-20.4	-11.6	-11.0	-4.9
KOR	South Korea	8.4	*8*	7.6	*4*	1.3	*11*	-0.6	*12*	-8.2	0.2	-19.6	-9.5
HUN	Hungary	7.1	*9*	9.6	*1*	2.3	*9*	-4.7	*16*	-6.5	0.7	-10.8	-6.0
IND	India	6.1	*10*	6.9	*8*	-1.8	*15*	1.1	*6*	-19.6	-13.5	-16.0	-6.8
ISR	Israel	5.4	*11*	2.0	*12*	3.8	*6*	-0.4	*11*	-9.0	-3.6	-11.6	-4.9
SGP	Singapore	5.1	*12*	0.4	*15*	4.6	*5*	0.1	*8*	-5.1	0.0	-13.1	-5.9
ZAF	South Africa	4.1	*13*	8.1	*3*	-0.8	*13*	-3.1	*15*	-21.5	-17.4	-23.1	-8.1
TUR	Turkey	4.0	*14*	3.6	*11*	0.4	*12*	0.0	*10*	-21.2	-17.2	-16.0	-3.5
BRA	Brazil	0.7	*15*	-0.8	*16*	-0.9	*14*	2.4	*1*	-14.3	-13.6	-10.3	-2.3
POL	Poland	-6.1	*16*	0.7	*14*	-4.4	*16*	-2.3	*14*	-2.4	-8.5	1.1	-1.2

Source: Elaboration on WTA data.

Finally, you may notice that the value of the index *Delta_LAFAY (MHT)* is always of the opposite sign to that of the changes (over the same period) in both the "trade polarization" index (P_C) and the "trade dissimilarity" index (D_C), a result which complements the cross-country regularities displayed in Figures 1 and 2.[12]

As a further matter for investigation, we use our sample countries to investigate whether an initial technological disadvantage provides a boost (or, on the opposite, is

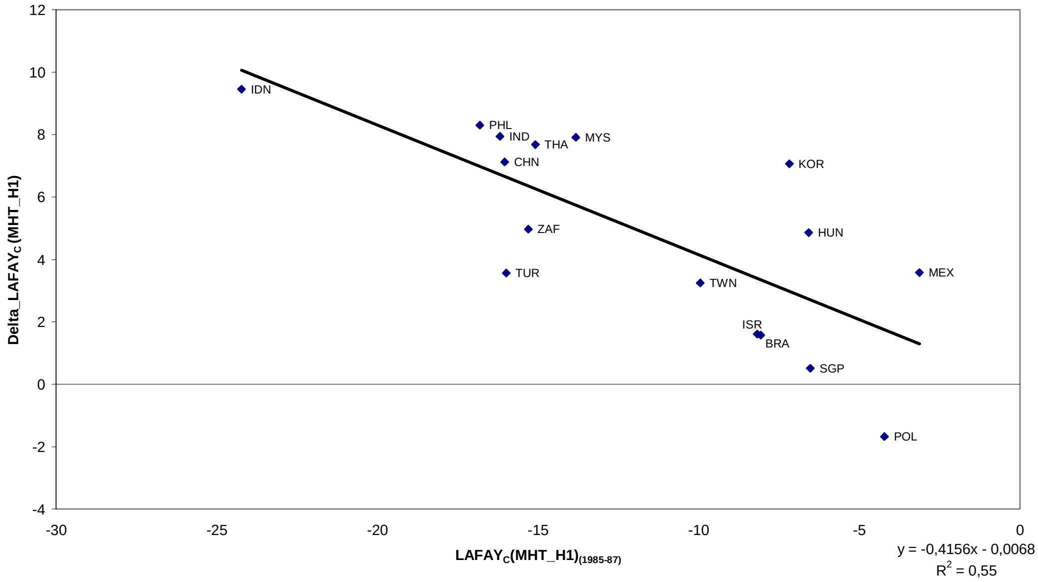
[12] Refer to the last two columns to the right in Table 3, where figures are computed as:

$$Delta\_D_C = D_{C\,(1999\text{-}2001)} - D_{C\,(1985\text{-}1987)}$$

$$Delta\_P_C = P_{C\,(1999\text{-}2001)} - P_{C\,(1985\text{-}1987)}$$

detrimental) to a country subsequent trade upgrading. It turns out that a discernible pattern emerges when results for the HT1 sector are kept separated from the bulk of other medium-and-high-tech products. In particular, as shown in Figure 3, the negative correlation between the degree of trade technological intensity in the initial period *excluding* the electronics and electrical sector (index $LAFAY_C(MHT\_H1)_{(1985\text{-}1987)}$ on the horizontal axis) and its subsequent change (as measured by index $Delta\_LAFAY_C(MHT\_H1)$ on the vertical axis) suggests a catching-up phenomenon by lagging countries. In the HT1 sector, instead, no clear pattern emerges (see Figure 4), although some weak evidence seems to indicate that specialization in electronics may be a cumulative process, where lagging countries may be left further behind.

Figure 3. Trade technological upgrading by emerging countries *excluding* electronics and other high-tech electrical goods (MHT_H1 product group)



The above evidence seems to support overall the notion that technological upgrading has been quite widespread among our sample countries, although with a large variance. This also emerges when comparing the frequency distributions of the $LAFAY_C(MHT)$ indexes in the initial and final periods (see Fig. 5).

As a matter of fact, not only the frequency distribution has shifted to the right overtime, toward more positive values of the index, but also its shape has changed and it has become more negatively asymmetric (a longer tail to the left). Since our sample is not fully representative of the variegated and also poorest parts of the developing world, these findings however do not allow to draw any inference on out-of-sample countries and their chances of not being left technologically behind.

Figure 4. Trade technological upgrading by emerging countries in electronics and other high-tech electrical goods (HT1 product group)

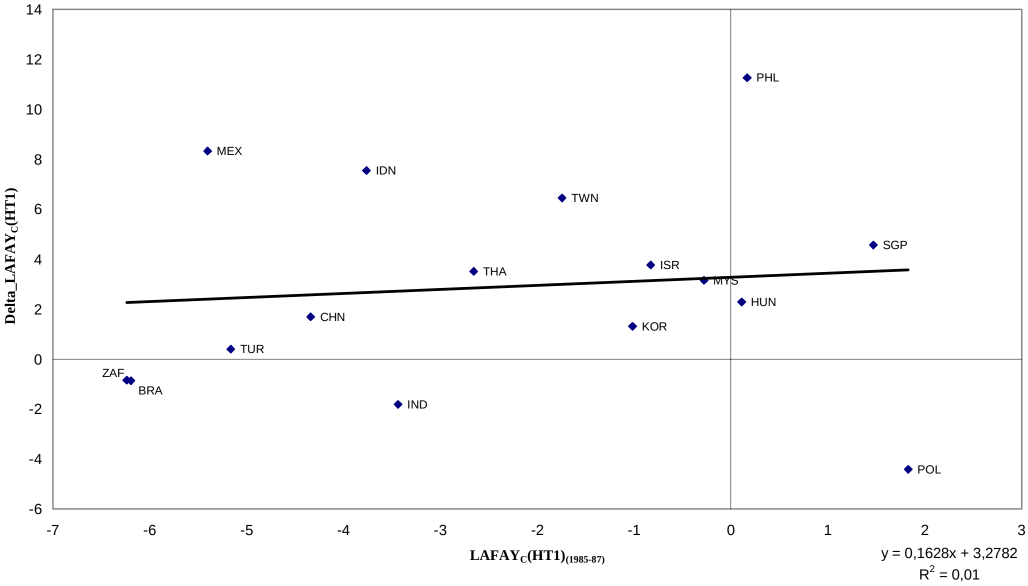
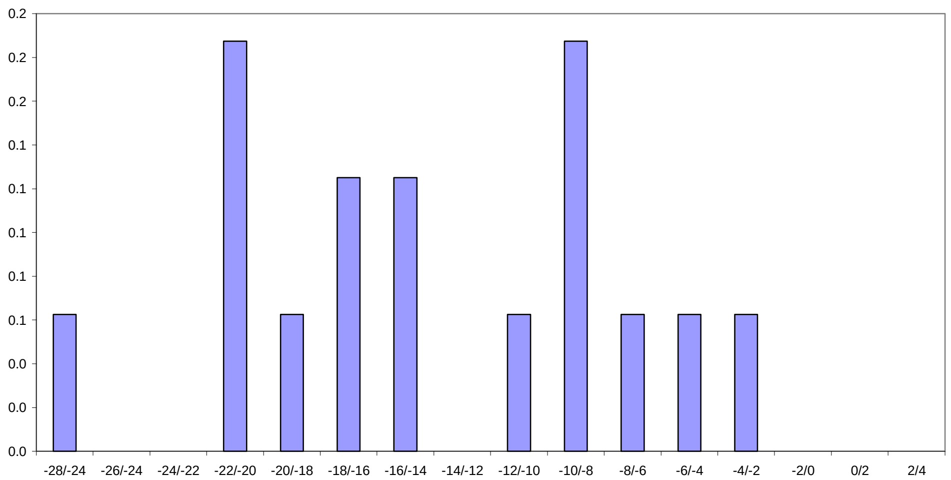
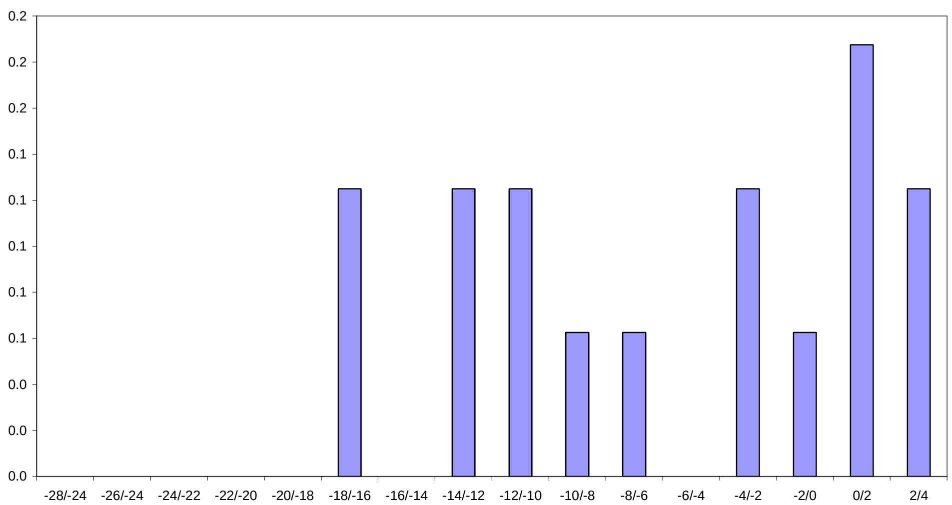


Figure 5. Frequency distributions of LAFAY$_C$ (MHT) indexes in the initial and final periods

1985-1987



1999-2001



Our evidence in support of an overall superior technological performance by trading economies in East Asia tends to confirm broadly previous results by Lall (2000) and UNCTAD (2003), who have taken as indicators of dynamism in RCAs the evolution of normalized export shares across broad sectors over the last two decades. On the other hand, whereas those studies suggest that they were especially the advanced countries in the region to perform the best, our results tells a story of more widespread success (see, for example, the superior performance of the Philippines, Indonesia, and, to a less extent, China).

In either case, our analysis tends to confirm previous evidence that, with the important exception of Mexico, countries in other emerging regions have suffered from less dynamic trade structures and, in a few cases, from further despecialization in technology-intensive productions over the last two decades.

3. The domestic determinants

3.1 Model and methodology

- *The empirical specification*. In the previous section we have analyzed the changing pattern of RCAs in international trade for our sample countries and found that their technological performance has been quite diversified. In this section we try to explain such variance by looking at a set of industry-and-country specific competitiveness factors. Besides cost competitiveness, we have considered a list of determinants which ─ according to a variety of theoretical models ─ should enhance a country ability to compete in technology intensive sectors: the accumulation of physical capital, the availability of skilled human resources, and the acquisition of foreign technology via imports of capital goods. We also control for the influence of agglomeration factors and increasing returns to scale, by looking at the size of the domestic product markets and the proximity to a large regional market pivoted upon a major advanced economy.

We set up an empirical model in which the revealed comparative advantage in international trade for country *c* in sector *i* at time *t* (RCA_{cit}) is determined as follows:

$$RCA_{cit} = \beta_{1,S} ulc_{cit} + \beta_{2,S} inv_{cit} + \beta_{3,S} HK_{ct} + \beta_{4,S} M7_{ct} + \beta_{5,S} GDP_{ct} +$$
$$+ \beta_{6,S} US\_close + \beta_{7,S} JP\_close + \beta_{8,S} EU\_close + \varepsilon_{cit}$$

Variables' subscripts refer to country *c*, industry *i* and time *t*. Regression variable *ulc* is the industry-specific unit labor costs; *inv* is the industry-specific investment rate; *HK* is the economy-wide human capital stock, *M7* is the economy-wide import penetration in capital goods, *GDP* is the market size and, *US_close*, *JP_close* and *EU_close* are a set of dummy variables capturing a country proximity to the US, Japanese and EU market, respectively. Parameters' subscript $S = [LT, MHT]$ is to discriminate between observations belonging to either a low-tech (*LT*) or a medium-and-high-tech (*MHT*) industry; therefore, beta coefficients $\beta_{1,S}$, …… ,$\beta_{8,S}$ are allowed to vary between the LT and the MHT sectors, which is the same as to allow for two separate models, one for the observations belonging to the low-tech industry sub-sample (S=LT) and the other for the complementary sub-set (S=MHT).

We expect that:

$\beta_{1,LT} \leq \beta_{1,MHT} \leq 0$
$\beta_{2,MHT} \geq \beta_{2,LT} \geq 0$
$\beta_{3,LT} \leq 0$ and $\beta_{3,MHT} \geq 0$
$\beta_{4,LT} \leq 0$ and $\beta_{4,MHT} \geq 0$
$\beta_{5,LT} \leq 0$ and $\beta_{5,MHT} \geq 0$

Unit labor costs (*ulc*) capture production comparative advantages à la Ricardo and should be negatively correlated with the dependent variable; moreover, as price competition should be more intense in low-tech than in technology-intensive industries, we expect that the elasticity to production costs be larger in the former sectors (therefore we predict: $\beta_{1,LT} \leq \beta_{1,MHT} \leq 0$). The rate of investment (*inv*) should capture the technological advantage provided by domestic accumulation in physical capital, which we expect being a crucial requirement especially for internationally viable high-tech productions (therefore we predict: $\beta_{2,MHT} \geq \beta_{2,LT} \geq 0$). As regards the country-specific factors, we expect that as countries increase their human capital stock (*HK*) they should shift their specialization pattern away from low-tech and towards medium-and-high-tech productions, reflecting the accumulation of basic technical knowledge needed to apply and master modern technology (therefore: $\beta_{3,LT} \leq 0$ and $\beta_{3,MHT} \geq 0$).[13] We also expect that countries where foreign equipment is increasingly available through imports (*M7*) tend to be more familiar with and adopt modern technology from abroad, and therefore they are better equipped to compete in technology-intensive industries (therefore: $\beta_{4,LT} \leq 0$ and $\beta_{4,MHT} \geq 0$). Moreover, as increasing returns to scale is a feature more often found in medium or high tech-intensive industries, domestic market size should exert a positive influence on a country ability to export in such sectors (therefore: $\beta_{5,LT} \leq 0$ and $\beta_{5,MHT} \geq 0$). Finally, as regards the "advanced market proximity" dummies, their effect is likely to depend on the intensity of knowledge spill-over effects across international borders and different industries; in particular, closeness to the US and Japan ─ the world leading markets in technological innovation ─ is expected to improve a country performance in technology-intensive sectors only as long as international and between-industry knowledge externalities are strong enough to prevail. Another complicating factor is that regional trade agreements entered into force at the beginning of the nineties (NAFTA, EU Association Agreements) have affected the international specialization of participating countries via changes in the pattern of tariff and non-tariff barriers. All considered, the influence of the "advanced market proximity" dummies is therefore left to the data to be determined.

- *The dataset and the regression variables.* In building our cross-country panel dataset we worked out the following four problems:

a) Matching different statistical sources. In particular, while data for the dependent variable are derived from international trade statistics based on 3-digit SITC (Rev. 2) classification, industry-level data (on the right-hand side) are derived from UNIDO industrial statistics codified under the 3-digit ISIC (Rev. 2) classification. In order to integrate these two sources, we compiled the concordances reported in Appendix 2 and regrouped the 182 traded products of the 3-digit SITC (Rev. 2) classification into 28 manufacturing industry categories, each labeled by a 3-digit code of the ISIC classification. Based on the resulting, more aggregate export and import trade flows,

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[13] Per capita GDP could also be used in place of the *HK* variable, as they are both proxys for those intangible resources contributing to an economic environment favorable to technology diffusion.

we computed measures of international revealed comparative advantage for each industry *i* based on the Lafay indexes (LA_i^c; see Section II) (see description for dependent variable *indlaf(c,i,t)* in Table 4).[14]

Table 4

Regression variables

Name	**Description**
indlaf(c,i,t)	Lafay index computed over export and import flows in industry i, country c at time t (see Section II for the formulation and properties of the Lafay index LA_i^c)
[w(c,i,t-1)]	wage rate in industry i, country c, at time t-1 (current prices, US$).
[lp(c,i,t-1)]	labor productivity in industry i, country c at time t-1 (constant prices, 1991=100, PPP).
ulc(c,i,t-1)	unit labor cost in industry i, country c at time t-1: ulc(c,i,t-1) = w(c,i,t-1) / lp(c,i,t-1).
ulc_n(c,i,t-1)	"normalized" unit labor cost in industry i, country c at time t-1, that is the ratio of the unit labor cost in industry i [ulc(c,i,t-1)] to the average unit labor cost across all industries (i=1,..,28) in country c at time t-1.
inv(c,i,t-1)	ratio of gross fixed capital formation to value added (both at current prices, national currency) in industry i, country c at time t-1.
inv_n(c,i,t-1)	"normalized" investment rate in industry i, country c at time t-1, that is the ratio of the investment rate in industry i [inv(c,i,t-1)] to the average investment rate across all industries (i=1,..,28) in country c at time t-1.
HK(c,t-1)	country's average years of schooling in country c at time t-1
M7(c,t-1)	ratio of machinery imports to GDP (both in current US$) in country c at time t-1
GDP(c,t-1)	GDP (billions of constant PPP dollars) in country c at time t-1
MHT	dummy variable, MHT=1 if industry i belongs to medium-and-high-tech industry group
US_close	dummy variable, =1 for Mexico from 1990 to 2001, =0 otherwise
JP_close	dummy variable, =1 for China, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan and Thailand, =0 otherwise
EU_close	dummy variable, =1 for Hungary and Poland from 1989 to 2001, =0 otherwise

b) Estimating labor productivity for each sector, in order to compute industry-level unit labor costs. While nominal labor productivity in local currency was easy to get, it was more difficult to measure real labor productivity in internationally comparable

[14] As shown in footnote 6, this is equivalent to compute LA_i^c for each of the 182 traded products, and then sum up the elementary LA_i^c within each industry. In both cases one obtains the same values for the dependent variable (*indlaf(c,i,t).*

currency. Starting from statistics on nominal value added and production price indexes (in national currency) contained in the UNIDO database, we deflated the former by the latter, thereby obtaining real value-added; then we converted real value-added in international dollars, to make them internationally comparable (at the purchasing power parity exchange rates of the base year; see variable *lp(c,i,t-1)* in Table 4).[15] Unit labor costs (see variable *ulc(c,i,t-1)* in Table 4) were then computed as the ratios of total wages (in dollars at the current market exchange rate) on real value-added (at constant international dollars).

c) Building a technology dummy, in order to attach the appropriate subscript *S = [LT, MHT]* to each industry *i*. The technology dummy *MHT* (see Table 4) has been obtained from our elaborations on a public database on R&D intensity in US manufacturing firms (based on the number of scientists and the amount of R&D expenditures; see Table 5). The information provided should be robust, as shown by previous research findings that the pattern of R&D intensity tends to be quite stable across countries and time (see Montobbio, 2003). Six industries (chemicals, electrical and non-electrical machinery, professional and scientific equipment and transport equipment, denoted by ISIC codes 351-52, 382-85) were identified as the most R&D intensive and therefore labeled with subscript *S = MHT*.[16]

d) Building the "advanced market proximity" dummies. Whereas it was relatively straightforward to select the sample countries potentially to be included based on their geographical proximity to each of the three major advanced markets, we also had to take into account temporal shifts in the trade regime due to the signing of regional free trade agreements. In order to pick up the year since which the signing of NAFTA in North America and of the Association Agreements in Europe have started to have economic effects, we have analyzed the growth in bilateral trade flows between Mexico and the United States and between Hungary, Poland and the EU old member countries (see the description of *US_close* and *EU_close* dummy variables in Table 4).

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[15] We should have used industry-specific purchasing power parity (PPP) exchange rates, but unfortunately only GDP-wide measures of PPPs were available.

[16] By looking at the Concordance tables in Appendix 2, one may also infer that the set of 3-digit SITC (Rev 2) codes combined in product group *MHT* of Section II, to a very large extent overlaps with the set of associated to ISIC codes 351-52 and 382-85. This ensures the coherence between the analyses carried out in Section II and III.

As regards the *JP_close* dummy variable, the decision to leave out India was reinforced after looking at the low intensity of India-Japan bilateral trade along the entire sample period.

As regards the other regression variables, you may refer to descriptions in Table 4.

Table 5

Index of R&D intensity in US manufacturing industries

ISIC - Rev.2 Industry Classification	US_SIC_1987 Classification	Industry description	Normalized index of R&D funds in % of domestic net sales in 1997-98	Normalized index of scientists and engineers in % of employees in 1997-98 (1)	Normalized Index	*Ranking by Decreasing Normalized Index*
			(a)	(b)	[(a) + (b)] / 2	
300	-	Total Manufacturing				
311	20	Food Products (2)	-0.754	-0.834	-0.794	*21*
313	20	Beverages (2)	-0.616	-0.281	-0.449	*12*
314	21	Tobacco (2)	-0.616	-0.281	-0.449	*12*
321	22	Textiles	-0.569	-0.776	-0.672	*18*
322	23	Wearing apparel, except footwear	-0.380	-0.776	-0.578	*16*
323	31	Leather products	-0.574	-0.776	-0.675	*19*
324	31	Footwear, except rubber or plastic	-0.574	-0.776	-0.675	*19*
331	24	Wood products, except furniture	-0.455	-0.644	-0.550	*15*
332	25	Furniture, except metal	-0.487	-0.644	-0.566	*16*
341	26	Paper and products	-0.482	-0.477	-0.480	*13*
342	27	Printing and publishing (3)	-0.613	-0.477	-0.545	*14*
351	281-82,286	Industrial chemicals	0.795	1.413	1.104	*6*
352	283,284-285, 287-289	Other chemicals	1.802	2.144	1.973	*3*
353	13,29	Petroleum refineries	-0.627	-0.055	-0.341	*10*
354	13,29	Misc.petroleum and coal products	-0.627	-0.055	-0.341	*10*
355	30	Rubber products	-0.212	-0.396	-0.304	*8*
356	30	Plastic products	-0.212	-0.396	-0.304	*8*
361	32	Pottery, china, earthenware	-0.205	-0.410	-0.307	*9*
362	32	Glass and products	-0.205	-0.410	-0.307	*9*
369	32	Other non-metallic mineral products	-0.205	-0.410	-0.307	*9*
371	331-32,3398-99	Iron and steel	-0.689	-0.769	-0.729	*20*
372	333-336	Non-ferrous metals	-0.639	-0.523	-0.581	*17*
381	34	Fabricated metal products	-0.292	-0.549	-0.420	*11*
382	35	Machinery, except electrical	1.237	1.428	1.333	*4*
383	36	Machinery, electric	1.668	2.283	1.975	*2*
384	37	Transport equipment	1.059	1.495	1.277	*5*
385	38	Professional & scientific equipment	3.495	2.089	2.792	*1*
390	39	Other manufactured products (3)	-0.024	-0.136	-0.080	*7*

Source: National Science Foundation, IRIS Database.
(1) R&D scientists and engineeers are measured in full-time equivalent units.
(2) 1999 figures.
(3) As regards column (b), 1999 figures.

- *The regression methodology*. Our cross-country panel covers sixteen countries, twenty-eight manufacturing industries and sixteen years (1985-2000). We estimate with industry fixed effects and robust standard errors. Independent variables are lagged one period, in order to reduce reverse causality problems.

Because of incomplete matrices for some countries (across time or industry dimensions), and also because of the loss of observations due to lagged independent variables, our (maximum) number of observations is 3,677, of which 870 belonging to the sub-sample of the medium-and-high-technology intensive industries (subscript *S=MHT*) and a significantly larger number of observations to the low-tech sub-sample. Since variable $HK_{c,t-1}$ is not available for all countries (in particular, not for Hungary and Poland), when it is included total observations reduce to about 3,000.

In order to discriminate the statistical effects between the low-tech and the medium-and-high-tech sub-samples, we could either run separate regressions for each sub-sample or we could operate on the full sample and introduce interaction terms between each regressor and the technology dummy (variable *MHT*). In the latter case, although the regressions are run on the full sample of observations, this procedure yields the same coefficient values as if running two separate sets of regressions, one for each sub-sample. We have preferred the latter procedure as it allows us to test for the statistical differences of the regression coefficients between the two sub-samples.

In devising our regression methodology we have also taken into account the fact that the dependent variable *indlaf(c,i,t)* ─ not differently from other more standard indexes of trade specialization ─ is subject to a strict constraint, as by construction it is bounded to sum up to zero across industries.[17] This constraint imposed on the dependent variable is a source of potential difficulties when dealing with both the economy-wide and the industry-specific determinants. In fact, when the regression is run on the full sample of observations, the inclusion of the economy-wide determinants (such as HK_{ct}, $M7_{ct}$ and GDP_{ct}) makes no statistical sense, as the mean value of the dependent variable is bound to be fixed across industries at each time *t* and for each country *c*. In such a setting, it is nevertheless possible to capture the effect of economy-wide regressors on the pattern of the dependent variable, by separating the observation sample along whatsoever industry line, as we do by means of the technology dummy *MHT*.

Secondly, in order to treat the industry-specific regressors in the most appropriate way given the dependent variable constraint problem, we have applied two alternative methodologies. Based on the first procedure, we include country and time fixed-effect

[17] Since we compute RCAs by means of Lafay indexes, the constraint is that the dependent variable for each country *c* and time *t* sums up to zero across industries (see the Lafay index properties explained in Section II). Using a Balassa index instead, it would have summed up to 1.

dummies among the regression variables, which is equivalent to shifting the industry-specific regressors (*ulc(c,i,t-1)* and *inv(c,i,t-1)*) to the origin. As a second alternative method, industry-specific regressors are normalized by taking the ratio to the average value across industries (for each *c* and *t*), so that the resulting variables (*ulc_n(c,i,t-1)* and *inv_n(c,i,t-1)*) are bound to sum up to a constant number across industries (see also descriptions in Table 4).

In Table 6 shown in the next paragraph, columns (1) and (2) report the results from applying the first methodology to the industry-specific regressors, whereas columns (3) to (9) are obtained by applying the alternative procedure. Both methodologies yield quite consistent results as regards the influence of the industry-specific variables. However, the first procedure does not work well with respect to the country-specific determinants in the regression, as their effect tends to be already captured by the country dummies.[18]

3.2 Regression results

In Tables 6 results are reported for a set of 9 regressions (columns (1) to (9)). The number of observations for each regression is less than the total sample's, as the inclusion of some independent variables makes some observations to drop out, due to data-coverage limitations (for example, each time the country-specific variable *HK(c,t-1)* is included, the observations for Poland and Hungary are excluded from the regressions due to data unavailability).

In columns (1) and (3) only industry-specific determinants are included; in columns (4) to (9) country-specific determinants are (gradually) introduced.

All the independent variables enter the regressions with interaction terms, computed as the product between each variable and the technology dummy (*MHT*). This procedure allows us to compare the coefficients between the two sub-samples (*S*

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[18] Therefore, regression results shown under column (2) in Table 6, will not be discussed further in paragraph III.2.

= *[LT, MHT]*), and find their statistical difference. As a result, the beta coefficients as such capture the statistical influence on the low-tech sub-sample only; the sum of the beta coefficients of the regressors and the interaction terms measure the effects on the medium-and-high-tech sub-sample only.

Results in Table 6 tend to support our empirical model. The regressors' coefficients have the predicted signs and are statistically significant. In column (1), where the model includes industry-specific variables only (but for country and time fixed effect dummies), the unit labor cost variable (*ulc(c,i,t-1)*) has always a robust negative effect. The physical capital accumulation variable (*inv(c,i,t-1)*) has a positive and robust coefficient only when the sample is restricted to the medium-and-high-technology intensive sectors (the coefficient of the interaction term is indeed statistically significant at 1 per cent significance level).

In columns (4) to (7) we introduce the country-specific determinants, first one at a time, then all simultaneously. When introduced in isolation, explanatory variables *HK(c, t-1)* and *M7(c, t-1)* both exhibit a positive influence when associated with MHT observations (as shown by the positive sign of their interaction terms' coefficients) and a negative one otherwise. That supports our prediction that capital goods' imports and human capital accumulation both boost RCAs in medium-and-high technology-intensive sectors. On the other hand, results for the variable *GDP(c, t-1)* apparently show a negative influence by the market size; this, however, is probably due to a statistical problem from omitted variables, as regressors *GDP(c, t-1)* and *M7(c, t-1)* are negatively correlated, as you might expect from large markets being relatively closed to foreign trade. As a matter of fact, when in regression (7) the influence of the country-specific determinants is considered simultaneously, the associated beta coefficients and those of the interaction terms turn out with the predicted signs. Moreover, you may notice that the pattern of influence of the industry-specific determinants is fully consistent with results already obtained in regression (1) with a different procedure: in regression (7) we find a robust negative coefficient for the "normalized" unit labor cost variable (*ulc_n(c,i,t-1)*), a positive and statistically significant coefficient for the "normalized" physical capital accumulation variable (*inv_n(c,i,t-1)*) only when the sample is restricted to MHT observations.

As regards the "advanced market proximity" dummy variables, results reported under columns (8) and (9) are somewhat more difficult to interpret. Closeness to the US market is found to boost technology-intensive productions in Mexico by far more than predicted on the basis of its industry and country-specific characteristics. A similar pattern is also found in the case of Poland and Hungary, although the coefficients associated with dummy variable *EU_close* carry less statistical significance. Finally, proximity to the Far East market *per se* does not seem to boost RCAs in medium-and-high tech productions, once you have accounted for the influence of the other explanatory variables.

Table 6

Regression results

Dependent variable = indlaf(c,i,t)
c (country) = 16; i (industry) = 28; t (time) = 15

LSDV regression with robust standard errors

Regressors	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ulc(c,i, t-1)	-0.222***	-0.262***							
ulc(c,i, t-1)*MHT	-0.195	0.002							
inv(c,i,t-1)	0.018	0.005							
inv(c,i,t-1)*MHT	1.920***	2.216***							
ulc_n(c,i, t-1)			-0.160***	-0.158***	-0.141***	-0.165***	-0.149***	-0.153***	-0.154***
ulc_n(c,i, t-1)*MHT			-0.479***	-0.342***	-0.367***	-0.418***	-0.199	-0.166	-0.300**
inv_n(c,i,t-1)			0.096***	0.033	0.087**	0.094***	0.036	0.037	0.090***
inv_n(c,i,t-1)*MHT			0.462***	0.386***	0.478***	0.466***	0.474***	0.573***	0.565***
HK(c,t-1)		-0.213		-0.156***			-0.156***	-0.163***	
HK(c,t-1)*MHT		1.283		0.666***			0.691***	0.737***	
M7(c,t-1)		0.118			-1.353***		-1.392***	-1.556***	-1.302***
M7(c,t-1)*MHT		0.081			4.530***		5.004***	5.955***	4.781***
GDP(c,t-1)		0.000				0.000***	-0.000**	-0.000	0.000
GDP(c,t-1)*MHT		-0.000				-0.001***	0.001***	0.000**	-0.001***
US_close dummy		-0.015						-0.465***	-0.711***
US_close dummy*MHT		0.290						1.984***	3.075***
JP_close dummy		0.321						0.238**	0.035
JP_close dummy*MHT		0.361						-1.385***	-0.484*
EU_close dummy									-0.171
EU_close dummy*MHT									0.748**
constant	-0.875***	-0.903	-0.052	-0.073	-0.009	-0.064	-0.084	-0.055	0.024
industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
time dummies	Yes	Yes	No	No	No	No	No	No	No
country dummies	Yes	Yes	No	No	No	No	No	No	No
Adj. R-squared	0.46	0.48	0.37	0.43	0.40	0.40	0.46	0.48	0.43
Observations	3536	2863	3536	3120	3313	3450	2863	2863	3227

***,** and * indicate that coefficient is statistically different from zero at 1%, 5% and 10% significance level, respectively.

We may conclude that positive and large RCAs in international trade tend to be associated with low unit labor costs in the corresponding domestic activities and that this relationship holds for both low-technology productions and for medium-and-high tech ones; on the other hand, high domestic accumulation of physical capital tends to be associated with stronger RCAs only in medium-and-high technology productions. The above results are reinforced when we control for economy-wide factors enhancing the exposure to and the absorption of foreign technology by the domestic producers. In particular, the international advantage (a positive RCA) in technology-intensive productions tends to strengthen for countries with a relatively high human capital endowment *HK*, for those receiving more technology incorporated in foreign goods (as measured by the penetration of capital good imports, *M7*), and for those able to exploit returns to scale and agglomeration factors associated with market size (as measured by *GDP*). Finally, although in Section II we have shown that sample countries located in East Asia tend to exhibit larger RCAs in medium-and-high tech sectors than countries in other regions, we find no evidence of a pure "geographic factor" driving this specialization pattern, after controlling for the influence of other explanatory variables.

4. Conclusions

We have investigated, for a sample of sixteen emerging countries over the period 1985-2000 the empirical linkages between the pattern of international trade specialization (measured by a modified version of the Lafay index) and, as a major driving factor, the competitiveness structure of the domestic manufacturing sector.

We have found that the trade structures of our sample countries have become less polarized over time, as their international specialization in labor-intensive manufactures has diminished and, conversely, they have improved over their initial disadvantage in capital and technology-intensive goods; at the same time, their trade structures have become more similar to those of the advanced economies (G7 countries), which have highly diversified trade and whose comparative advantages are skewed towards technology-intensive productions.

Despite somewhat widespread improvements, our synthetic indicator of technological trade intensity shows the persistence of a quite high variance across the sample countries. In particular, countries located in East Asia tend to outperform the others as regards their international pattern of production, especially on a dynamic basis, and their better performance partly results from high and increasing international specialization in electric and electronic products. That may require a caveat, however, since we may have overestimated the technological content of developing countries' trade. That bias may derive from having classified their trade in some commodity groups as technology-intensive, whereas it is not; we should keep in mind that production in a number of manufacturing sectors has become highly fragmented vertically and cheap-labor developing countries often carry out stages of production indeed quite poor in technology. We have, however, tried to minimize this problem by using, as an indicator of international trade RCAs, a modified version of the Lafay index, which is based on net trade flows and therefore traces more precisely the actual value added contributed to exports by the domestic sector.

In our empirical model the pattern of RCAs in international trade is linked to the competitiveness structure of the domestic sector, captured through a set of industry and country-specific variables. Besides cost competitiveness, we consider a list of determinants which ─ according to a variety of theoretical models ─ should enhance a country ability to compete in technology intensive sectors: the accumulation of physical capital, the availability of skillful human resources, and the acquisition of foreign technology via imports of capital goods; we also control for the influence of agglomeration factors and increasing returns to scale, by looking at the overall size of the domestic market and the proximity to a large regional market pivoted upon a major advanced economy.

The econometric exercise linking the pattern of RCAs in international trade to the competitiveness structure of the domestic sector has confirmed the validity of our assumption: the determinants of RCAs do indeed differ across manufacture industries, depending on their degree of technology-intensity. We have tested this assumption by means of a cross-country panel, including twenty-eight broad manufacturing activities over sixteen years (from 1985 to 2000) for sixteen emerging countries (same sample as before), running separate regressions over two sub-samples, obtained by splitting the observations between those belonging to high-and-medium technology intensive sectors and those belonging to low-tech ones.

We find that positive and large RCAs in international trade tend to be associated with low unit labor costs in the corresponding domestic activities both in low-technology productions and in medium-and-high tech ones; on the other hand, high domestic accumulation of physical capital is shown to be associated with stronger RCAs only in medium-and-high technology productions. The above results also hold when we control for economy-wide factors enhancing the exposure to and the absorption of foreign technology by domestic producers. In particular, the international advantage in technology-intensive productions tends to strengthen for countries with a relatively high human capital endowment, receiving more technology incorporated in foreign goods (as measured by the penetration of capital good imports), and with access to larger product markets. Finally, we find no support for the role of a pure “geographic location” factor driving the specialization pattern of East Asian countries towards medium-and-high technology-intensive sectors, after controlling for the influence of industry and country-specific explanatory variables.

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Appendix 1

Residual (not classified) trade in manufactures

	China		South Korea		Mexico		Taiwan		Singapore		Malaysia		Thailand		Indonesia	
	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP
	as percentage of total trade in manufactures															
1985	13.5	5.8	.2	.2	.2	.5	.1	.2	.4	.3	.1	.4	.1	.2	.0	.2
1986	14.6	7.8	.2	.2	.3	.7	.1	.2	.5	.4	.1	.7	.1	.2	.0	.3
1987	13.3	6.1	.2	.2	.2	.6	.1	.2	.6	.4	.1	.4	.2	.2	.0	.2
1988	.4	.4	.2	.2	.5	.5	.3	.3	.5	.4	.1	.4	.1	.2	.1	.3
1989	.4	.4	.2	.2	.5	.5	.2	.3	.5	.4	.1	.4	.1	.2	.0	.3
1990	.2	.4	.3	.2	.6	.6	.3	.5	.6	.4	.1	.4	.1	.1	.0	.2
1991	.2	.4	.3	.2	.6	.6	.2	.5	.6	.4	.1	.3	.1	.2	.0	.2
1992	.2	.5	.2	.2	.5	.9	.3	.6	.7	.3	.1	.3	.1	.2	.0	.2
1993	.2	.4	.2	.2	.5	1.0	.3	.6	.5	.4	.1	.3	.1	.2	.0	.2
1994	.3	.3	.2	.2	.4	1.1	.3	.7	.5	.3	.1	.3	.2	.2	.0	.1
1995	.4	.3	.2	.2	.4	.9	.2	.3	.5	.3	.1	.2	.3	.2	.0	.1
1996	.3	.3	.2	.2	.3	.8	.2	.5	.5	.3	.1	.2	.1	.2	.0	.1
1997	.5	.4	.2	.2	.3	.7	.2	.3	.5	.3	.1	.2	.1	.2	.0	.1
1998	.5	.3	.2	.2	.3	.7	.2	.2	.5	.3	.1	.2	.1	.2	.0	.1
1999	.5	.3	.2	.2	.2	.7	.2	.2	.5	.3	.1	.2	.1	.2	.1	.2
2000	.4	.3	.2	.1	.2	.6	.1	.2	.4	.3	.1	.2	.1	.2	.0	.1
2001	.5	.3	.2	.2	.2	.7	.1	.3	.6	.3	.1	.3	.1	.2	.1	.1

	Brazil		Philippines		India		Poland		Hungary		Turkey		Israel		South Africa	
	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP
	as percentage of total trade in manufactures															
1985	.1	.3	.0	.4	1.6	.3	1.0	.9	49.7	36.6	.1	.1	.6	.5	1.0	1.0
1986	.1	.5	.0	.3	1.7	.4	.9	1.0	48.6	37.7	.1	.1	.6	.5	.1	1.5
1987	.1	.5	1.2	.3	.2	.4	.8	1.3	47.3	36.1	.1	.1	.7	.4	.1	1.8
1988	.1	.5	.0	.3	.2	.6	.7	1.4	44.4	38.0	.1	.3	.7	.4	.1	2.0
1989	.0	.5	.2	.6	.8	3.0	.8	.9	33.3	30.6	.0	.2	.5	.5	.1	1.8
1990	.1	.4	.1	.2	.1	.4	.8	.6	26.8	28.7	.1	.2	.6	.5	.1	1.7
1991	.1	.5	.1	.3	.1	.3	.9	.9	18.7	18.9	.1	.2	.6	.4	.2	1.2
1992	.1	.4	.1	.4	.2	.4	1.0	1.3	20.1	18.4	.1	.2	.5	.5	.1	.9
1993	.4	.4	.1	.3	.1	.4	.2	1.2	19.3	19.3	.1	.5	.5	.4	.1	1.2
1994	.1	.3	.1	.3	.1	.4	.7	1.0	12.9	12.2	.1	.4	.4	.4	.3	1.1
1995	.1	.6	.1	.4	.2	.3	.7	1.0	13.5	11.5	.1	.2	.3	.4	.3	.8
1996	.1	.7	.1	.3	.2	.3	1.1	.9	1.2	1.2	.2	.2	.3	.4	.5	.8
1997	.1	.7	.1	.3	.2	.4	1.6	.9	.6	.7	.2	.4	.3	.4	.2	.7
1998	.1	.6	.1	.3	.2	.6	.8	.8	.6	.7	.2	.4	.3	.4	.3	.7
1999	.1	.5	.0	.2	.2	.5	1.0	.7	.6	.7	.1	.4	.3	.3	.2	.8
2000	.1	.6	.0	.3	.2	.5	.6	.6	.4	.7	.2	.5	.2	.3	.6	1.0
2001	.1	.6	.0	.3	.2	.8	.6	.7	.4	.8	.2	1.0	.3	.4	.7	1.4

Source: Elaborations on WTA data.

Appendix 2

Lall's technological classification of exports and Concordances between the standard international trade classification (SITC 3-digit, revision2) and the international standard industrial classification (ISIC 3-digit, revision 2) (*)

Resource Based Manufactures				**Low Technology Manufactures**			
RB1: Agro-Based		**RB2: Other**		**LT1: Textiles, Garment and Footwear**		**LT2: Other products**	
SITC Code	ISIC Code	SITC Code	ISIC Code	SITC Code	ISIC Code	SITC Code	ISIC Code
012	311	281	371	611	323	642	341
014	311	282	371	612	323	665	362
023	311	286	372	613	323	666	361
024	311	287	372	651	321	673	371
035	311	288	372	652	321	674	371
037	311	289	390	654	321	675	371
046	311	323	354	655	321	676	371
047	311	334	353	656	321	677	381
048	311	335	353	657	321	679	371
056	311	411	311	658	321	691	381
058	311	511	351	659	321	692	381
061	311	514	351	831	323	693	381
062	311	515	351	842	322	694	381
073	311	516	351	843	322	695	381
098	312	522	351	844	322	696	381
111	313	523	351	845	322	697	381
112	313	531	351	846	321	699	381
122	314	532	351	847	322	821	332
233	351	551	352	848	322	893	356
247	331	592	352	851	324	894	390
248	331	661	369			895	390
251	341	662	369			897	390
264	321	663	369			898	390
265	321	664	362			899	390
269	321	667	369				
423	311	688	372				
424	311	689	372				
431	311						
621	355						
625	355						
628	355						
633	331						
634	331						
635	331						
641	341						

(*) As the 3-digit SITC (rev. 2) disaggregation does not allow a perfect concordance with the 3-digit ISIC (rev. 2) classification, the shown concordances bear inevitable approximations.

Appendix 2 continue

Lall's technological classification of exports and Concordances between the standard international trade classification (SITC 3-digit, revision2) and the international standard industrial classification (ISIC 3-digit, revision 2) (*)

Medium Technology Manufactures						**High Technology**			
MT1: Automotive		**MT2: Process**		**MT3: Engineering**		**HT1: Electronic & Electrical**		**HT2: Other**	
SITC Code	ISIC Code	SITC Code	ISIC Code	SITC Code	ISIC Code	SITC Code	ISIC Code	SITC Code	ISIC Code
781	384			711	381	716	383	524	351
782	384	266	321	713	384	718	381/382	541	352
783	384	267	321	714	384	751	382	712	382
784	384	512	351	721	382	752	382	792	384
785	384	513	351	722	382	759	382	871	385
		533	352	723	382	761	383	874	385
		553	352	724	382	764	383	881	385
		554	352	725	382	771	383		
		562	351	726	382	774	383		
		572	352	727	382	776	383		
		582	351	728	382	778	383		
		583	351	736	382				
		584	351	737	382				
		585	351	741	382				
		591	351	742	382				
		598	352	743	382				
		653	321	744	382				
		671	371	745	382				
		672	371	749	382				
		678	371	762	383				
		786	384	763	383				
		791	384	772	383				
		882	352	773	383				
				775	383				
				793	384				
				812	381				
				872	385				
				873	385				
				884	385				
				885	385				
				951	382				

(*) As the 3-digit SITC (rev. 2) disaggregation does not allow a perfect concordance with the 3-digit ISIC (rev. 2) classification, the shown concordances bear inevitable approximations.

Appendix 3

LAFAY(J)$_C$ Indexes, Dissimilarity Index (D_c) and Polarization Index (P_c) for 16 emerging countries and G7 countries

Countries	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
China																	
Product group J																	
RB1	1.5	1.5	-0.1	-1.4	0.0	-1.2	-0.9	-0.2	0.6	-0.5	-0.9	-0.7	-1.3	-1.6	-1.3	-0.8	-0.6
RB2	6.3	3.2	3.2	1.4	1.5	0.9	0.1	-0.4	-0.6	-0.4	-0.4	-0.8	-1.5	-1.1	-1.0	-1.4	-1.4
LT1	13.4	16.8	17.8	16.1	16.7	13.4	12.7	15.3	15.7	14.6	11.7	10.9	10.8	9.8	9.5	8.9	8.7
LT2	-1.2	-0.7	-0.5	0.5	0.3	2.1	3.0	4.4	2.0	3.8	4.6	4.1	4.7	5.1	5.0	4.7	4.5
MT1	-3.2	-2.0	-1.3	1.1	-1.2	2.0	1.9	-2.5	-3.4	-2.3	-1.0	-0.7	-0.6	-0.3	-0.1	0.0	-0.2
MT2	-3.7	-3.5	-4.3	-6.8	-5.0	-6.7	-7.7	-6.3	-4.4	-4.8	-5.2	-5.3	-5.3	-5.2	-5.5	-4.8	-4.7
MT3	-7.2	-10.1	-8.7	-5.6	-7.4	-5.4	-3.9	-5.7	-6.6	-6.4	-6.0	-5.8	-3.8	-2.7	-2.8	-2.5	-2.5
HT1	-4.7	-3.6	-4.7	-4.5	-3.9	-3.6	-3.6	-2.6	-2.0	-2.6	-2.2	-1.1	-1.9	-2.4	-2.7	-3.0	-2.2
HT2	-1.1	-1.4	-1.5	-0.9	-1.0	-1.5	-1.7	-1.9	-1.3	-1.4	-0.4	-0.6	-1.1	-1.7	-1.1	-1.1	-1.7
MT	-14.1	-15.6	-14.3	-11.2	-13.7	-10.1	-9.7	-14.6	-14.3	-13.5	-12.3	-11.7	-9.7	-8.1	-8.3	-7.3	-7.3
HT	-5.8	-5.0	-6.2	-5.4	-4.9	-5.2	-5.3	-4.5	-3.4	-4.0	-2.6	-1.7	-3.0	-4.1	-3.8	-4.1	-3.9
MHT	-20.0	-20.7	-20.5	-16.6	-18.6	-15.3	-14.9	-19.1	-17.7	-17.5	-14.9	-13.5	-12.7	-12.3	-12.1	-11.4	-11.2
D_c	*70.2*	*73.3*	*74.7*	*72.2*	*69.3*	*66.4*	*65.6*	*70.6*	*73.0*	*71.4*	*67.0*	*67.0*	*66.2*	*65.0*	*62.5*	*61.0*	*61.6*
P_c	*29.1*	*31.1*	*31.6*	*31.2*	*29.4*	*28.5*	*28.3*	*30.3*	*30.6*	*30.0*	*28.2*	*28.2*	*28.0*	*27.6*	*26.3*	*25.4*	*25.4*
South Korea																	
Product group J																	
RB1	-1.8	-1.4	-1.5	-1.8	-1.9	-1.7	-1.9	-2.0	-2.7	-2.1	-2.3	-1.5	-1.6	-0.9	-1.1	-1.0	-1.1
RB2	-4.7	-4.6	-5.3	-5.4	-5.5	-6.5	-5.1	-4.6	-4.3	-3.8	-4.1	-3.1	-2.5	-1.6	-2.1	-1.6	-2.4
LT1	10.5	12.0	11.4	11.0	11.1	10.7	9.3	7.6	6.2	4.7	3.2	2.7	2.8	2.6	2.6	2.2	1.7
LT2	2.9	3.7	3.3	3.0	2.9	3.1	2.0	2.6	2.8	1.6	1.0	0.8	0.7	1.8	0.9	0.6	0.5
MT1	0.4	1.2	1.7	2.1	1.1	0.8	0.8	1.1	2.1	2.1	2.8	3.6	3.7	3.3	3.7	3.6	4.1
MT2	-0.9	-1.4	-1.6	-0.9	-0.4	0.0	0.5	1.0	0.6	0.7	1.1	1.0	0.8	-0.4	-0.4	-0.1	-0.2
MT3	-1.7	-5.6	-5.8	-5.3	-6.2	-5.9	-5.2	-4.6	-3.9	-4.1	-4.5	-4.1	-2.9	-0.8	-0.8	-1.3	0.5
HT1	-1.9	-1.2	0.1	0.5	2.0	2.3	3.1	2.5	2.9	4.6	6.4	4.4	2.5	-0.8	-0.5	1.0	0.4
HT2	-2.8	-2.5	-2.5	-3.2	-3.3	-2.9	-3.5	-3.6	-3.8	-3.6	-3.7	-3.8	-3.4	-3.2	-2.4	-3.4	-3.7
MT	-2.2	-5.9	-5.7	-4.1	-5.5	-5.1	-3.9	-2.4	-1.1	-1.3	-0.6	0.6	1.5	2.1	2.5	2.2	4.4
HT	-4.7	-3.7	-2.3	-2.7	-1.3	-0.6	-0.4	-1.2	-0.9	1.0	2.7	0.6	-1.0	-4.1	-2.9	-2.4	-3.3
MHT	-6.9	-9.6	-8.0	-6.8	-6.8	-5.6	-4.3	-3.6	-2.0	-0.3	2.1	1.2	0.6	-2.0	-0.3	-0.3	1.2
D_c	*65.7*	*67.4*	*67.0*	*64.7*	*63.6*	*61.0*	*60.7*	*57.1*	*56.6*	*55.4*	*54.7*	*51.9*	*47.9*	*45.9*	*46.1*	*46.6*	*48.5*
P_c	*27.5*	*28.8*	*29.0*	*28.2*	*27.6*	*27.0*	*26.5*	*24.7*	*24.3*	*23.9*	*23.7*	*22.0*	*20.1*	*18.6*	*18.5*	*18.5*	*19.7*
Mexico																	
Product group J																	
RB1	0.3	3.3	2.8	1.9	0.9	-0.3	0.1	-1.1	-1.4	-1.6	-1.2	-0.9	-0.9	-0.9	-1.0	-0.8	-1.1
RB2	5.4	5.7	2.1	1.0	1.0	2.3	1.1	-0.4	-0.6	-0.8	-1.3	-1.4	-1.7	-1.5	-1.5	-1.7	-1.7
LT1	1.2	0.9	1.3	0.8	0.3	0.1	0.0	0.7	0.5	0.2	0.5	0.8	1.3	1.2	1.2	1.1	0.8
LT2	0.6	1.4	0.5	0.7	-0.5	-1.0	-1.2	-0.8	-0.6	-1.8	-1.9	-2.0	-1.3	-1.7	-1.9	-1.9	-1.7
MT1	-1.3	2.3	4.8	4.8	3.1	4.7	5.9	0.9	1.3	2.7	4.6	5.7	4.2	4.4	4.6	3.8	4.1
MT2	-1.3	1.2	2.0	1.6	2.1	1.9	1.9	-0.3	-1.0	-1.0	-0.6	-1.3	-1.5	-1.7	-1.9	-1.6	-2.0
MT3	-1.9	-5.4	-3.7	-2.1	-1.8	-2.1	-2.4	0.4	1.1	0.4	-0.8	-1.5	-1.5	-2.0	-1.9	-1.3	-1.3
HT1	-1.4	-7.7	-7.2	-7.2	-4.5	-4.6	-3.8	2.5	2.1	2.9	1.1	1.2	1.9	2.5	2.7	2.9	3.2
HT2	-1.6	-1.8	-2.6	-1.5	-0.8	-1.1	-1.6	-1.7	-1.5	-1.2	-0.6	-0.6	-0.5	-0.3	-0.5	-0.4	-0.3
MT	-4.6	-1.9	3.1	4.3	3.5	4.5	5.4	0.9	1.5	2.2	3.3	2.9	1.2	0.7	0.8	0.8	0.8
HT	-2.9	-9.5	-9.8	-8.7	-5.2	-5.7	-5.4	0.7	0.7	1.7	0.6	0.6	1.5	2.2	2.2	2.5	2.9
MHT	-7.5	-11.4	-6.6	-4.4	-1.8	-1.2	0.0	1.7	2.2	4.0	3.8	3.5	2.7	2.9	3.0	3.4	3.7
D_c	*58.5*	*66.7*	*70.3*	*60.7*	*50.2*	*50.8*	*49.6*	*41.3*	*42.9*	*43.6*	*47.3*	*47.2*	*46.0*	*46.1*	*48.2*	*47.9*	*47.8*
P_c	*23.2*	*28.1*	*29.8*	*25.8*	*20.6*	*21.5*	*20.6*	*16.0*	*16.4*	*17.1*	*19.0*	*18.6*	*18.0*	*18.2*	*18.8*	*18.4*	*18.1*
Taiwan																	
Product group J																	
RB1	-0.8	-1.1	-1.6	-1.1	-1.4	-2.0	-2.3	-2.3	-1.8	-2.1	-2.0	-1.8	-1.9	-1.5	-1.2	-1.1	-1.3
RB2	-3.5	-4.3	-3.8	-3.8	-4.0	-4.2	-4.1	-3.8	-5.0	-3.7	-3.7	-3.4	-3.1	-2.9	-5.8	-3.0	-2.5
LT1	11.0	10.6	9.6	9.3	8.7	7.7	7.3	6.3	5.4	4.8	4.3	3.7	3.9	3.7	3.4	2.6	2.3
LT2	5.5	6.4	7.0	5.5	6.0	5.6	5.1	5.3	4.3	4.2	3.4	3.7	3.9	4.4	4.8	4.1	3.7
MT1	-0.2	-0.6	-1.1	-2.7	-2.9	-2.1	-1.5	-2.5	-1.8	-1.7	-1.2	-0.6	-0.5	-0.2	0.3	0.0	-0.1
MT2	-3.3	-3.6	-3.7	-2.7	-2.6	-1.5	-1.7	-1.4	-1.1	-0.4	0.1	-0.5	-0.7	-0.6	-0.7	-0.7	-0.3
MT3	-4.7	-3.2	-3.6	-3.3	-2.9	-2.6	-1.8	-1.3	-0.2	-0.9	-1.1	-1.3	-1.5	-2.8	-1.9	-2.9	-1.9
HT1	-1.2	-2.5	-1.6	0.1	0.7	0.9	1.3	2.0	2.8	2.5	2.9	3.0	3.5	4.2	5.2	5.0	3.9
HT2	-2.9	-1.8	-1.3	-1.2	-1.7	-1.7	-2.4	-2.3	-2.6	-2.6	-2.7	-2.8	-3.6	-4.4	-4.0	-4.1	-3.8
MT	-8.1	-7.4	-8.3	-8.7	-8.3	-6.2	-4.9	-5.2	-3.2	-3.0	-2.2	-2.4	-2.7	-3.6	-2.4	-3.6	-2.3
HT	-4.1	-4.3	-2.9	-1.1	-1.0	-0.8	-1.1	-0.3	0.3	-0.1	0.2	0.2	-0.1	-0.2	1.2	0.9	0.1
MHT	-12.2	-11.7	-11.2	-9.9	-9.3	-7.0	-6.0	-5.5	-2.9	-3.1	-2.0	-2.2	-2.8	-3.8	-1.1	-2.6	-2.2
D_c	*61.3*	*61.7*	*63.1*	*58.7*	*59.4*	*54.4*	*55.9*	*56.7*	*55.2*	*52.0*	*51.0*	*48.9*	*48.8*	*49.4*	*50.3*	*45.7*	*42.9*
P_c	*25.0*	*25.7*	*26.4*	*24.9*	*25.3*	*23.3*	*23.7*	*23.8*	*23.1*	*21.3*	*21.1*	*19.9*	*19.8*	*19.9*	*20.6*	*18.0*	*26.3*

Appendix 3 continue

LAFAY$(J)_C$ Indexes, Dissimilarity Index (D_c) and Polarization Index (P_c) for 16 emerging countries and G7 countries

Countries	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Singapore																	
Product group J																	
RB1	-0.3	-0.3	-0.3	-0.3	-0.3	-0.5	0.0	-0.2	-0.2	-0.3	-0.3	-0.4	-0.3	-0.3	-0.4	-0.4	-0.5
RB2	10.5	8.0	5.1	4.2	5.6	6.9	6.0	4.6	4.4	3.4	1.9	2.1	1.6	2.3	2.5	2.0	1.1
LT1	-0.4	-0.2	0.2	0.1	-0.1	-0.2	-0.2	-0.5	-0.5	-0.6	-0.4	-0.3	-0.2	0.0	-0.2	-0.2	-0.2
LT2	-2.6	-2.4	-2.1	-2.4	-2.5	-2.6	-2.6	-2.6	-2.8	-2.7	-2.6	-2.5	-2.5	-2.4	-1.7	-1.1	-1.0
MT1	-0.9	-0.6	-0.9	-0.9	-0.8	-1.0	-0.8	-0.6	-0.8	-0.7	-0.7	-0.6	-0.6	-0.4	-0.4	-0.7	-0.7
MT2	-1.7	-1.6	-1.4	-1.2	-1.2	-1.4	-1.3	-1.4	-1.2	-1.2	-1.3	-0.9	-0.9	-0.7	-0.6	-0.4	-0.2
MT3	-2.5	-2.5	-2.1	-2.2	-2.6	-3.7	-3.5	-3.0	-3.0	-2.7	-2.9	-3.4	-3.7	-3.8	-3.9	-3.5	-2.7
HT1	0.1	1.6	2.8	3.6	3.6	3.8	4.0	5.3	5.8	6.2	7.5	7.7	8.5	7.3	6.3	5.3	6.5
HT2	-2.1	-1.9	-1.3	-1.0	-1.6	-1.3	-1.7	-1.6	-1.8	-1.4	-1.1	-1.8	-2.0	-2.0	-1.5	-1.1	-2.3
MT	-5.1	-4.8	-4.4	-4.3	-4.7	-6.1	-5.5	-5.1	-5.0	-4.6	-4.9	-4.9	-5.1	-4.9	-4.9	-4.6	-3.6
HT	-2.0	-0.3	1.5	2.6	2.0	2.5	2.3	3.7	4.0	4.9	6.3	5.9	6.5	5.3	4.8	4.3	4.2
MHT	-7.1	-5.1	-2.9	-1.7	-2.7	-3.6	-3.2	-1.3	-0.9	0.2	1.4	1.0	1.4	0.4	-0.2	-0.3	0.6
D_c	*46.6*	*44.8*	*42.2*	*40.4*	*42.6*	*44.3*	*43.2*	*42.8*	*43.5*	*39.4*	*37.1*	*37.5*	*35.9*	*36.4*	*33.2*	*30.5*	*30.7*
P_c	*17.8*	*17.3*	*15.9*	*15.7*	*16.3*	*17.5*	*16.9*	*16.6*	*16.4*	*14.8*	*13.6*	*13.2*	*12.5*	*12.8*	*11.8*	*10.6*	*10.8*
Malaysia																	
Product group J																	
RB1	19.1	16.1	16.5	15.2	14.1	11.8	9.8	9.2	8.6	7.7	6.5	6.1	5.6	5.3	4.3	3.1	2.9
RB2	-0.3	-1.7	-1.7	-1.6	-1.6	-1.8	-1.9	-2.2	-2.2	-1.2	-1.2	-1.5	-1.6	-1.6	-1.2	-1.1	-1.0
LT1	1.0	1.1	1.0	1.4	1.4	1.9	1.7	1.6	1.5	1.2	1.2	1.4	1.3	1.5	1.0	0.9	0.9
LT2	-3.6	-2.8	-2.3	-2.6	-1.8	-1.2	-1.0	-1.0	-1.0	-0.8	-1.1	-0.8	-1.1	-0.2	-0.6	-0.3	0.0
MT1	-3.0	-1.7	-1.6	-1.8	-2.4	-2.4	-2.1	-1.4	-1.3	-1.1	-1.3	-1.9	-1.7	-0.1	-0.7	-0.8	-1.0
MT2	-3.5	-3.9	-3.8	-3.7	-3.5	-3.4	-2.8	-2.8	-2.4	-1.8	-1.3	-1.2	-1.0	-0.8	-1.3	-0.6	-0.7
MT3	-8.7	-5.4	-4.5	-5.4	-5.1	-5.5	-5.1	-5.4	-5.7	-5.7	-4.7	-4.2	-4.8	-2.9	-3.1	-3.5	-3.0
HT1	0.6	0.4	-1.8	-0.1	1.2	3.6	3.5	4.3	4.5	3.1	3.7	3.2	4.6	0.5	2.8	2.9	2.9
HT2	-1.6	-2.0	-1.7	-1.4	-2.4	-3.0	-2.1	-2.4	-2.0	-1.5	-1.7	-1.0	-1.3	-1.7	-1.3	-0.8	-1.1
MT	-15.3	-11.0	-9.9	-10.9	-10.9	-11.3	-10.0	-9.6	-9.4	-8.5	-7.4	-7.3	-7.4	-3.8	-5.0	-4.8	-4.7
HT	-1.0	-1.6	-3.5	-1.5	-1.2	0.6	1.5	1.9	2.5	1.6	2.0	2.1	3.3	-1.2	1.5	2.1	1.9
MHT	-16.3	-12.7	-13.4	-12.4	-12.1	-10.7	-8.6	-7.7	-6.9	-6.9	-5.4	-5.2	-4.2	-4.9	-3.6	-2.7	-2.8
D_c	*69.5*	*62.3*	*60.2*	*59.6*	*59.9*	*60.0*	*56.7*	*56.5*	*55.6*	*52.7*	*52.5*	*51.1*	*49.9*	*49.1*	*50.4*	*52.0*	*49.3*
P_c	*30.6*	*26.8*	*25.7*	*25.5*	*25.7*	*26.0*	*24.2*	*23.5*	*22.2*	*20.6*	*20.9*	*20.3*	*19.6*	*18.9*	*19.4*	*19.7*	*18.0*
Thailand																	
Product group J																	
RB1	9.8	9.7	7.9	7.3	6.8	5.6	4.9	4.3	3.3	3.4	3.3	4.0	4.0	4.1	4.0	3.3	3.8
RB2	-1.9	-1.9	-3.1	-2.1	-3.0	-3.4	-4.0	-2.4	-2.4	-2.0	-1.8	-1.4	-0.4	-1.1	-1.1	-0.7	-0.5
LT1	10.8	10.9	13.4	12.4	11.6	11.1	11.4	10.3	9.7	9.3	8.7	6.6	6.0	5.3	4.5	4.0	4.2
LT2	-2.0	-0.6	0.1	-0.6	0.1	0.2	0.0	-0.1	1.0	0.0	0.3	-0.6	-1.0	-0.9	-1.2	-0.4	-0.3
MT1	-2.8	-2.7	-3.3	-3.1	-3.4	-3.7	-2.7	-3.2	-3.9	-3.3	-3.6	-3.3	-1.3	0.5	0.3	0.2	0.5
MT2	-4.1	-4.4	-4.5	-3.7	-3.4	-2.7	-2.1	-3.0	-2.8	-3.0	-2.3	-2.4	-2.3	-2.7	-2.8	-1.9	-2.0
MT3	-3.7	-2.4	-7.6	-8.0	-8.2	-7.4	-8.2	-6.3	-6.4	-6.4	-6.6	-6.6	-6.6	-4.4	-3.1	-3.4	-3.8
HT1	-3.5	-5.1	0.6	0.5	1.1	2.8	2.8	3.1	2.6	2.9	3.3	4.5	3.4	2.4	2.0	0.4	0.1
HT2	-2.7	-3.6	-3.4	-2.6	-1.5	-2.5	-2.0	-2.7	-1.1	-0.9	-1.3	-0.8	-1.8	-3.2	-2.6	-1.5	-1.8
MT	-10.5	-9.5	-15.5	-14.9	-15.0	-13.8	-13.0	-12.6	-13.1	-12.7	-12.5	-12.3	-10.2	-6.6	-5.6	-5.2	-5.4
HT	-6.2	-8.7	-2.8	-2.1	-0.4	0.2	0.7	0.4	1.5	2.0	2.0	3.7	1.6	-0.7	-0.6	-1.1	-1.7
MHT	-16.7	-18.2	-18.3	-17.0	-15.4	-13.5	-12.3	-12.2	-11.6	-10.7	-10.4	-8.6	-8.6	-7.3	-6.3	-6.2	-7.1
D_c	*79.8*	*80.2*	*79.0*	*71.0*	*69.1*	*69.4*	*70.5*	*68.1*	*65.0*	*61.6*	*61.6*	*57.8*	*56.1*	*56.7*	*56.1*	*51.9*	*53.1*
P_c	*35.8*	*35.9*	*34.9*	*31.0*	*29.8*	*30.4*	*29.3*	*28.8*	*26.5*	*25.0*	*25.4*	*23.5*	*22.2*	*23.3*	*22.7*	*20.3*	*21.0*
Indonesia																	
Product group J																	
RB1	14.1	8.4	15.5	15.7	15.0	13.4	12.6	10.7	13.8	12.9	11.6	10.9	12.6	9.2	7.3	5.3	6.2
RB2	7.6	1.8	5.1	3.7	1.6	1.6	2.1	1.8	-0.2	-0.1	1.1	1.5	0.9	0.3	-3.3	-2.3	-2.6
LT1	9.0	10.3	10.1	9.5	9.6	12.1	12.9	13.3	11.5	10.0	9.5	9.1	7.6	6.1	6.5	6.3	6.9
LT2	-3.7	-2.2	-1.2	-0.6	0.8	0.0	-0.1	-0.2	0.4	1.3	0.7	1.1	0.7	1.9	1.1	0.6	1.1
MT1	-2.9	-4.2	-3.7	-3.2	-2.9	-3.5	-2.5	-2.0	-2.0	-3.4	-3.6	-3.1	-3.2	-1.3	-1.5	-3.5	-3.3
MT2	-5.1	-4.9	-5.8	-5.9	-5.0	-3.3	-2.2	-2.5	-3.3	-3.9	-3.6	-2.8	-2.4	-2.6	-3.3	-2.8	-2.8
MT3	-13.4	-12.0	-13.5	-13.9	-13.7	-14.7	-16.4	-14.5	-14.0	-14.7	-13.9	-14.1	-13.9	-12.5	-7.5	-7.8	-8.6
HT1	-3.1	-4.1	-4.1	-3.5	-3.4	-3.2	-3.5	-3.0	-2.6	-0.6	-0.3	-0.2	0.4	1.3	1.9	5.3	4.2
HT2	-2.4	-2.2	-2.6	-1.8	-1.9	-2.6	-3.0	-3.5	-3.5	-1.6	-1.5	-2.4	-2.6	-2.5	-1.2	-1.0	-0.9
MT	-21.4	-21.1	-23.0	-22.9	-21.6	-21.4	-21.1	-19.0	-19.3	-21.9	-21.1	-20.1	-19.5	-16.3	-12.3	-14.1	-14.8
HT	-5.6	-6.2	-6.7	-5.3	-5.4	-5.7	-6.5	-6.5	-6.2	-2.2	-1.8	-2.6	-2.2	-1.2	0.7	4.2	3.3
MHT	-27.0	-27.4	-29.6	-28.3	-27.0	-27.2	-27.6	-25.5	-25.5	-24.1	-22.9	-22.7	-21.7	-17.5	-11.6	-9.9	-11.5
D_c	*92.5*	*91.3*	*91.4*	*89.2*	*85.7*	*85.4*	*86.1*	*85.6*	*87.8*	*85.3*	*81.9*	*81.0*	*77.0*	*70.4*	*65.3*	*66.3*	*67.1*
P_c	*39.5*	*39.7*	*39.2*	*38.6*	*36.8*	*37.2*	*37.5*	*36.8*	*37.3*	*36.5*	*35.0*	*34.4*	*32.4*	*29.4*	*27.1*	*27.7*	*46.1*

Appendix 3 continue

LAFAY(J)$_C$ Indexes, Dissimilarity Index (D_c) and Polarization Index (P_c) for 16 emerging countries and G7 countries

Countries	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Brazil																	
Product group J																	
RB1	6.1	6.8	6.8	6.0	4.6	6.8	5.5	6.1	6.1	7.8	9.5	8.2	7.8	8.3	9.4	6.9	7.8
RB2	1.9	1.0	0.7	-0.4	0.8	2.7	1.6	0.2	0.1	1.0	0.2	2.0	2.2	2.8	2.2	1.9	1.2
LT1	3.5	4.6	4.6	4.0	3.5	3.7	3.9	4.1	4.4	3.7	2.8	2.9	2.6	2.3	2.6	2.7	3.0
LT2	2.1	2.5	2.0	3.1	2.4	2.3	3.4	3.6	3.5	2.9	1.7	1.1	0.7	0.7	1.1	1.0	0.9
MT1	1.0	0.4	2.4	2.0	1.9	1.1	0.9	1.5	-0.2	-1.9	-3.3	-1.0	-0.1	-0.1	0.7	0.6	0.8
MT2	-1.3	-1.3	-1.2	0.7	1.3	-0.1	0.6	0.3	0.2	-0.4	1.0	0.8	0.9	0.2	-0.6	-0.5	-0.8
MT3	-4.5	-4.4	-5.0	-4.8	-4.7	-5.8	-4.4	-4.6	-3.8	-3.7	-3.6	-4.0	-4.6	-5.4	-5.7	-4.8	-6.0
HT1	-5.2	-6.6	-6.7	-7.0	-5.7	-6.0	-5.1	-6.1	-6.5	-6.9	-6.0	-7.3	-7.1	-6.8	-7.3	-7.4	-6.4
HT2	-3.5	-3.3	-3.6	-3.7	-3.9	-4.7	-6.5	-5.1	-3.8	-2.7	-2.4	-2.5	-2.3	-2.1	-2.3	-0.3	-0.6
MT	-4.8	-5.2	-3.9	-2.0	-1.6	-4.8	-2.9	-2.8	-3.8	-6.0	-5.9	-4.3	-3.9	-5.3	-5.6	-4.7	-6.0
HT	-8.8	-9.9	-10.3	-10.7	-9.6	-10.8	-11.6	-11.2	-10.2	-9.6	-8.4	-9.9	-9.4	-8.9	-9.7	-7.7	-7.0
MHT	-13.5	-15.1	-14.1	-12.7	-11.2	-15.5	-14.5	-14.0	-14.0	-15.5	-14.3	-14.1	-13.3	-14.1	-15.3	-12.4	-12.9
D_c	*59.7*	*69.6*	*69.4*	*65.6*	*64.2*	*68.1*	*65.3*	*61.3*	*61.5*	*61.8*	*60.9*	*58.6*	*54.0*	*54.6*	*56.4*	*55.7*	*55.8*
P_c	*24.1*	*29.0*	*28.8*	*27.6*	*27.2*	*29.3*	*28.6*	*26.2*	*26.3*	*26.9*	*27.2*	*26.5*	*24.2*	*24.3*	*25.4*	*25.0*	*24.7*
Philippines																	
Product group J																	
RB1	17.3	13.7	7.2	10.8	6.2	8.1	7.4	6.4	4.8	2.9	3.3	0.2	0.4	0.2	-1.4	-1.2	-1.3
RB2	-0.2	0.6	-1.4	1.6	0.8	0.7	-0.1	-0.7	-1.8	-1.7	-1.1	-1.4	-1.3	-2.1	-1.8	-2.0	-2.3
LT1	3.3	2.7	6.6	4.1	8.6	5.9	5.4	5.9	5.7	5.4	5.0	5.6	4.3	3.2	1.9	2.1	2.5
LT2	0.4	0.1	-0.4	1.1	-0.2	2.0	1.7	1.5	2.2	1.9	0.9	-0.9	-1.2	-1.1	-1.8	-1.7	-1.9
MT1	-0.7	-0.7	-1.9	-2.0	-3.1	-2.8	-2.4	-2.3	-2.1	-1.5	-1.9	-2.2	-1.5	-0.5	-0.8	-0.9	-0.8
MT2	-6.8	-5.3	-7.2	-5.7	-4.8	-4.6	-4.2	-4.6	-3.3	-3.4	-4.0	-3.4	-3.4	-3.4	-3.5	-3.6	-3.4
MT3	-7.7	-7.1	-5.7	-6.9	-6.1	-6.5	-5.2	-4.8	-4.7	-5.3	-4.9	-5.5	-5.3	-4.3	-3.1	-2.9	-3.0
HT1	-3.2	-1.6	5.3	-0.8	1.2	0.0	0.2	1.3	2.5	3.6	4.8	9.8	10.7	9.9	11.8	11.5	11.0
HT2	-2.4	-2.4	-2.6	-2.3	-2.7	-2.9	-2.7	-2.6	-3.4	-1.9	-2.2	-2.2	-2.6	-1.9	-1.2	-1.4	-0.9
MT	-15.2	-13.1	-14.8	-14.6	-14.0	-13.9	-11.9	-11.7	-10.0	-10.3	-10.7	-11.2	-10.1	-8.2	-7.5	-7.3	-7.2
HT	-5.6	-4.0	2.8	-3.1	-1.5	-2.9	-2.5	-1.3	-0.8	1.7	2.6	7.7	8.0	8.0	10.5	10.1	10.1
MHT	-20.8	-17.1	-12.0	-17.7	-15.4	-16.8	-14.4	-13.0	-10.9	-8.6	-8.1	-3.6	-2.1	-0.2	3.0	2.8	3.0
D_c	*85.4*	*82.5*	*80.9*	*77.7*	*72.2*	*70.6*	*68.2*	*68.5*	*64.8*	*61.1*	*60.5*	*61.0*	*57.8*	*50.9*	*51.1*	*53.5*	*52.7*
P_c	*40.8*	*38.3*	*41.6*	*37.3*	*39.5*	*35.9*	*34.0*	*34.6*	*32.4*	*31.0*	*30.0*	*30.4*	*27.6*	*23.4*	*22.4*	*24.1*	*24.1*
India																	
Product group J																	
RB1	-4.1	-3.2	-5.1	-4.0	-1.6	-2.6	-1.8	-1.3	-0.9	-3.4	-1.9	-1.8	-3.1	-4.8	-4.7	-3.6	-2.9
RB2	5.0	7.7	6.1	5.0	8.1	1.3	-2.5	-3.2	0.4	-0.4	0.0	-1.6	-3.1	-2.6	-3.6	-1.7	1.9
LT1	18.1	19.0	21.3	18.0	17.5	19.4	19.4	19.5	17.9	18.8	18.0	18.3	18.2	18.7	17.4	15.7	15.4
LT2	-1.8	-1.8	-2.4	-2.4	-2.0	-1.1	-0.5	0.5	-0.5	0.5	0.8	1.5	1.7	2.6	2.6	2.4	1.6
MT1	-0.4	-0.4	-0.1	0.0	-0.3	0.3	0.7	0.9	0.9	1.0	0.7	0.2	0.5	0.6	0.2	0.3	-0.2
MT2	-6.1	-5.2	-3.8	-3.6	-4.6	-3.8	-4.9	-4.2	-2.6	-2.9	-3.4	-2.5	-2.1	-2.4	-1.9	-0.4	-1.2
MT3	-7.1	-10.0	-8.7	-7.4	-9.1	-7.7	-6.4	-7.2	-8.4	-7.6	-8.5	-8.7	-7.2	-6.5	-5.6	-5.8	-6.4
HT1	-2.2	-3.5	-4.6	-3.6	-4.0	-2.8	-2.5	-2.7	-2.4	-3.2	-3.7	-3.4	-3.7	-3.8	-4.0	-5.7	-6.1
HT2	-1.5	-2.6	-2.8	-2.0	-4.0	-3.0	-1.6	-2.3	-4.3	-2.8	-1.9	-2.1	-1.3	-1.7	-0.5	-1.1	-2.0
MT	-13.6	-15.6	-12.6	-11.0	-14.0	-11.1	-10.5	-10.5	-10.1	-9.6	-11.2	-10.9	-8.8	-8.3	-7.3	-6.0	-7.8
HT	-3.7	-6.1	-7.3	-5.6	-8.0	-5.8	-4.1	-4.9	-6.7	-5.9	-5.6	-5.5	-5.0	-5.5	-4.5	-6.8	-8.1
MHT	-17.3	-21.7	-19.9	-16.5	-22.1	-17.0	-14.6	-15.4	-16.9	-15.5	-16.9	-16.4	-13.8	-13.8	-11.8	-12.8	-15.9
D_c	*73.1*	*79.2*	*80.6*	*75.0*	*76.1*	*73.4*	*68.6*	*68.3*	*72.0*	*71.3*	*69.1*	*67.0*	*64.4*	*68.1*	*63.4*	*59.2*	*62.3*
P_c	*31.6*	*34.0*	*34.4*	*32.2*	*32.2*	*31.8*	*29.3*	*29.1*	*30.4*	*30.3*	*29.4*	*28.7*	*27.8*	*30.1*	*27.8*	*25.4*	*26.5*
Poland																	
Product group J																	
RB1	-0.4	0.4	1.0	0.2	0.5	1.0	2.0	3.0	3.1	3.9	3.2	3.4	4.3	3.4	2.9	2.7	2.2
RB2	-2.9	-2.1	-1.3	-0.8	0.2	0.0	2.3	1.7	0.3	0.0	-0.2	-0.5	-0.3	-0.2	-0.5	-0.4	-0.2
LT1	1.1	1.6	2.0	1.1	-0.9	-0.9	-0.5	0.5	3.8	3.0	2.7	3.0	2.9	2.6	2.4	1.5	0.7
LT2	1.8	3.0	3.0	3.2	3.4	4.7	5.4	3.6	4.2	4.6	5.3	5.5	5.8	5.0	4.9	4.6	4.5
MT1	-1.4	-1.3	-1.8	-0.9	-1.5	-0.7	-4.2	-1.2	-1.1	-0.9	-1.1	-1.9	-2.4	-1.6	-0.8	0.3	0.2
MT2	-4.2	-3.9	-3.9	-3.2	-2.3	1.2	1.1	-0.3	-2.9	-3.3	-3.2	-3.1	-2.3	-3.0	-3.0	-2.6	-3.0
MT3	3.5	0.6	0.1	-0.1	0.2	-2.5	-2.0	-2.5	-2.2	-2.4	-2.3	-2.6	-4.3	-2.5	-1.8	-0.3	0.7
HT1	2.4	1.7	1.3	1.2	1.3	-2.0	-4.2	-3.1	-3.3	-2.9	-2.5	-2.4	-1.9	-1.8	-2.2	-2.9	-2.6
HT2	0.2	-0.1	-0.5	-0.7	-0.9	-1.0	0.1	-1.8	-1.9	-2.1	-1.7	-1.5	-1.8	-1.8	-2.0	-2.7	-2.6
MT	-2.1	-4.5	-5.6	-4.2	-3.6	-1.9	-5.1	-3.9	-6.2	-6.6	-6.6	-7.6	-9.0	-7.1	-5.6	-2.6	-2.1
HT	2.6	1.7	0.9	0.5	0.4	-2.9	-4.1	-4.9	-5.2	-4.9	-4.2	-3.9	-3.7	-3.7	-4.3	-5.7	-5.2
MHT	0.5	-2.9	-4.8	-3.7	-3.2	-4.8	-9.2	-8.8	-11.4	-11.6	-10.9	-11.5	-12.7	-10.8	-9.9	-8.3	-7.3
D_c	*43.9*	*45.0*	*48.7*	*46.5*	*46.8*	*49.5*	*55.4*	*54.0*	*58.3*	*58.6*	*54.5*	*52.1*	*50.0*	*49.4*	*46.7*	*47.1*	*47.1*
P_c	*20.9*	*20.3*	*21.2*	*20.6*	*20.8*	*23.3*	*25.9*	*23.6*	*25.2*	*25.5*	*23.9*	*22.3*	*21.1*	*20.7*	*19.5*	*19.8*	*19.4*

Appendix 3 continue

LAFAY(J)$_C$ Indexes, Dissimilarity Index (D_c) and Polarization Index (P_c) for 16 emerging countries and G7 countries

Countries	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Hungary																	
Product group J																	
RB1	1.8	1.8	2.5	2.2	3.1	3.5	4.2	2.6	1.8	1.6	1.6	4.0	2.1	1.4	0.7	0.4	0.3
RB2	1.8	1.3	2.2	1.7	2.1	1.9	1.7	2.6	2.9	2.5	2.4	0.9	-0.1	0.1	-0.1	-0.2	0.0
LT1	2.1	2.3	2.8	2.0	1.7	0.6	1.8	5.9	4.2	4.1	2.6	2.4	0.5	0.6	0.5	0.3	0.1
LT2	-0.4	0.7	0.7	1.3	1.4	2.1	1.4	0.8	1.3	0.5	0.3	0.7	-1.3	-1.7	-1.6	-1.6	-0.9
MT1	-0.5	0.2	-0.9	0.8	-1.5	-0.6	-2.6	-2.7	-2.9	-2.8	-2.1	-1.6	-0.5	-1.0	-0.2	0.0	0.3
MT2	-3.0	-4.3	-3.5	-3.1	-2.5	-0.9	-1.3	-1.5	-1.5	-1.2	-1.5	-1.3	-1.7	-1.9	-1.6	-1.1	-1.2
MT3	-5.5	-5.9	-7.3	-5.9	-5.0	-6.2	-4.1	-3.8	-3.0	-2.9	-2.1	-2.6	-0.5	1.0	0.3	0.8	0.6
HT1	0.0	0.3	0.0	-1.2	-1.2	-2.1	-1.9	-2.7	-1.5	-1.2	-0.4	-1.6	2.3	2.8	3.2	2.4	1.6
HT2	3.7	3.7	3.6	2.3	1.9	1.8	0.8	-1.3	-1.1	-0.6	-0.8	-0.9	-0.9	-1.2	-1.2	-0.9	-0.9
MT	-9.0	-10.0	-11.7	-8.3	-9.0	-7.7	-8.1	-8.0	-7.5	-6.8	-5.7	-5.4	-2.6	-1.9	-1.5	-0.3	-0.2
HT	3.8	4.0	3.6	1.1	0.7	-0.3	-1.1	-4.0	-2.6	-1.8	-1.2	-2.6	1.4	1.6	2.0	1.4	0.7
MHT	-5.2	-6.0	-8.1	-7.2	-8.3	-8.0	-9.2	-12.0	-10.0	-8.6	-6.9	-8.0	-1.2	-0.3	0.5	1.1	0.5
D_c	*55.5*	*55.1*	*56.7*	*56.9*	*55.4*	*53.8*	*52.8*	*54.8*	*50.7*	*46.7*	*45.7*	*46.5*	*44.5*	*44.9*	*45.8*	*44.7*	*44.5*
P_c	*22.6*	*23.0*	*23.6*	*24.3*	*23.2*	*22.9*	*22.1*	*22.9*	*20.7*	*18.6*	*18.2*	*18.6*	*17.2*	*17.5*	*17.8*	*16.9*	*16.5*
Turkey																	
Product group J																	
RB1	2.1	2.5	1.2	0.5	-0.2	-1.2	1.1	1.7	1.6	2.6	2.0	2.2	2.6	1.5	1.1	0.9	1.2
RB2	-2.6	-2.7	-3.6	-2.9	-4.1	-2.2	-2.5	-2.0	-2.1	-3.3	-2.6	-2.5	-2.2	-2.2	-1.9	-2.4	-2.4
LT1	17.5	19.0	20.1	18.9	21.2	20.7	20.7	21.0	19.1	19.4	18.7	17.7	17.6	18.4	17.5	16.4	14.9
LT2	4.7	3.8	1.6	2.3	1.2	2.4	1.4	1.1	2.3	3.1	0.8	1.9	2.1	1.7	2.1	2.1	2.1
MT1	-3.0	-2.1	-2.0	-1.6	-1.1	-2.8	-2.4	-3.0	-3.4	-1.7	-1.4	-2.1	-4.0	-3.1	-1.4	-3.4	1.1
MT2	-2.4	-1.0	-3.3	0.0	-0.9	-1.0	-1.8	-2.3	-1.8	-3.0	-2.4	-2.4	-2.3	-2.3	-3.1	-2.5	-3.7
MT3	-8.4	-11.1	-6.5	-8.6	-9.2	-10.1	-9.9	-9.5	-8.8	-8.7	-8.2	-9.4	-8.5	-7.7	-5.8	-4.1	-6.3
HT1	-4.7	-5.7	-5.0	-4.9	-4.3	-3.4	-3.9	-3.4	-2.9	-3.8	-2.9	-2.8	-2.9	-3.2	-5.6	-5.1	-3.6
HT2	-3.0	-2.5	-2.5	-3.7	-2.6	-2.4	-2.7	-3.7	-4.0	-4.5	-3.9	-2.6	-2.4	-3.1	-3.0	-1.8	-3.2
MT	-13.9	-14.3	-11.7	-10.2	-11.2	-13.8	-14.2	-14.7	-14.0	-13.4	-12.0	-13.9	-14.8	-13.1	-10.3	-10.1	-8.9
HT	-7.7	-8.2	-7.6	-8.6	-6.9	-5.9	-6.5	-7.1	-6.8	-8.2	-6.8	-5.4	-5.3	-6.3	-8.6	-6.9	-6.9
MHT	-21.6	-22.5	-19.3	-18.8	-18.1	-19.7	-20.7	-21.8	-20.8	-21.7	-18.8	-19.3	-20.1	-19.4	-18.8	-17.0	-15.8
D_c	*74.8*	*51.8*	*53.4*	*53.9*	*52.1*	*50.1*	*48.8*	*52.0*	*48.2*	*44.4*	*43.3*	*43.5*	*42.4*	*43.4*	*44.7*	*43.8*	*43.5*
P_c	*31.9*	*32.4*	*31.2*	*32.9*	*31.5*	*32.1*	*32.4*	*33.0*	*31.6*	*33.9*	*32.1*	*30.5*	*30.1*	*29.9*	*28.8*	*27.8*	*28.3*
Israel																	
Product group J																	
RB1	0.1	-1.0	-0.5	-0.8	-1.1	-0.9	-1.7	-1.5	-1.6	-1.8	-2.3	-1.9	-2.3	-2.5	-2.2	-2.0	-2.0
RB2	4.9	5.8	6.5	4.5	4.5	5.5	7.0	6.5	5.7	6.0	7.7	7.1	6.1	6.3	6.2	5.4	6.4
LT1	1.0	0.9	1.2	1.3	0.9	1.2	1.6	1.6	0.7	0.7	0.6	0.4	0.0	0.0	0.2	-0.1	0.2
LT2	1.9	3.7	2.6	-1.1	-1.2	-1.4	-0.9	-0.4	-1.0	-0.7	-0.6	-0.3	-0.7	-0.7	-0.2	-0.4	-0.6
MT1	-3.4	-4.0	-5.0	-4.7	-3.3	-3.4	-4.5	-5.2	-5.3	-5.0	-4.6	-4.4	-3.9	-3.6	-3.3	-3.9	-3.8
MT2	1.7	0.2	1.0	0.5	0.1	0.0	0.0	0.0	0.2	0.5	0.1	-0.1	0.0	-0.2	0.1	0.1	-0.7
MT3	-5.6	-5.0	-4.9	0.1	-0.4	-1.9	-3.5	-1.1	-0.2	-0.4	-2.0	-2.8	-2.8	-1.9	-2.3	-2.5	-2.6
HT1	-1.6	-0.9	0.0	0.9	0.6	0.3	0.8	1.7	2.0	1.6	0.8	2.0	3.0	3.4	3.3	3.1	2.5
HT2	0.9	0.3	-0.8	-0.7	-0.2	0.6	1.1	-1.5	-0.6	-0.8	0.2	0.1	0.7	-0.8	-1.9	0.3	0.7
MT	-7.3	-8.8	-8.9	-4.1	-3.6	-5.3	-8.0	-6.4	-5.3	-5.0	-6.5	-7.3	-6.7	-5.7	-5.5	-6.3	-7.1
HT	-0.7	-0.6	-0.8	0.2	0.4	0.9	1.9	0.2	1.4	0.8	1.1	2.1	3.7	2.6	1.4	3.4	3.2
MHT	-7.9	-9.4	-9.7	-4.0	-3.1	-4.4	-6.0	-6.2	-3.9	-4.2	-5.4	-5.2	-3.1	-3.1	-4.1	-2.9	-4.0
D_c	*55.9*	*52.4*	*51.8*	*41.3*	*41.5*	*43.7*	*48.0*	*49.2*	*48.9*	*45.8*	*44.8*	*44.1*	*42.7*	*44.5*	*43.9*	*39.4*	*41.9*
P_c	*23.6*	*22.8*	*21.9*	*17.3*	*17.6*	*19.1*	*21.5*	*21.2*	*21.0*	*20.0*	*20.1*	*18.6*	*18.5*	*18.8*	*18.1*	*17.8*	*17.8*
South Africa																	
Product group J																	
RB1	2.7	3.9	5.5	4.7	4.7	5.1	5.3	5.4	4.9	2.5	3.2	4.9	2.5	4.6	2.8	1.7	0.9
RB2	17.1	14.4	12.6	15.4	17.0	15.0	13.5	6.5	5.6	13.9	13.6	6.0	13.6	9.1	10.0	17.1	21.4
LT1	1.0	0.8	0.8	1.0	0.6	0.9	0.8	0.5	0.5	-1.0	-1.1	-0.2	-1.0	-0.6	-1.3	-1.5	-1.6
LT2	1.5	2.5	2.0	0.9	-0.3	0.4	1.4	5.9	5.8	3.6	2.8	4.7	3.2	3.4	2.2	0.7	0.0
MT1	-5.2	-6.2	-7.1	-6.9	-7.1	-5.8	-4.9	-2.7	-3.1	-3.6	-4.5	-3.0	-2.6	-0.8	0.5	-1.6	-3.5
MT2	1.7	1.2	2.8	2.8	3.7	2.2	2.6	0.1	0.6	2.7	3.3	1.9	0.2	0.8	3.0	1.1	-0.1
MT3	-11.6	-10.0	-9.6	-10.8	-11.9	-11.1	-9.3	-7.7	-6.7	-9.4	-8.7	-7.1	-7.7	-5.7	-5.9	-6.7	-6.5
HT1	-6.2	-6.9	-5.7	-5.3	-4.8	-4.6	-4.6	-4.8	-4.5	-6.3	-6.1	-5.2	-6.1	-7.7	-7.6	-7.2	-6.5
HT2	-1.0	0.3	-1.2	-1.8	-2.0	-1.9	-4.8	-3.3	-3.1	-2.4	-2.5	-1.9	-2.1	-3.0	-3.5	-3.6	-4.1
MT	-15.1	-15.0	-13.9	-14.9	-15.3	-14.8	-11.7	-10.3	-9.1	-10.3	-9.9	-8.2	-10.1	-5.6	-2.5	-7.3	-10.1
HT	-7.2	-6.5	-6.9	-7.0	-6.7	-6.5	-9.3	-8.1	-7.7	-8.7	-8.6	-7.0	-8.2	-10.7	-11.1	-10.8	-10.6
MHT	-22.2	-21.6	-20.8	-21.9	-22.0	-21.3	-21.0	-18.4	-16.8	-19.0	-18.5	-15.2	-18.3	-16.4	-13.6	-18.0	-20.7
D_c	*87.8*	*84.3*	*80.4*	*81.1*	*84.1*	*78.0*	*73.8*	*61.7*	*58.6*	*69.0*	*67.1*	*54.4*	*59.2*	*53.9*	*58.4*	*60.7*	*64.2*
P_c	*37.9*	*36.7*	*34.6*	*34.8*	*36.4*	*33.7*	*31.9*	*27.2*	*25.5*	*30.9*	*30.1*	*24.0*	*26.8*	*25.0*	*27.2*	*28.2*	*29.4*

Appendix 3 continue

LAFAY(J)$_C$ Indexes, Dissimilarity Index (D_c) and Polarization Index (P_c) for 16 emerging countries and G7 countries

Countries		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
G7	Product group J																	
	RB1	-1.4	-1.5	-1.5	-1.4	-1.3	-1.2	-1.2	-1.2	-1.2	-1.0	-1.0	-0.9	-0.8	-0.6	-0.6	-0.5	-0.5
	RB2	-2.8	-1.8	-1.6	-1.3	-1.4	-1.3	-1.1	-0.9	-0.8	-0.7	-0.6	-0.7	-0.7	-0.7	-0.7	-0.9	-0.9
	LT1	-2.1	-2.3	-2.5	-2.4	-2.5	-2.3	-2.5	-2.7	-2.8	-2.7	-2.5	-2.4	-2.5	-2.5	-2.4	-2.4	-2.5
	LT2	0.0	-0.3	-0.4	-0.5	-0.4	-0.4	-0.5	-0.7	-0.7	-0.8	-0.7	-0.6	-0.7	-0.7	-0.6	-0.7	-0.6
	MT1	0.5	0.3	0.5	0.6	0.7	0.6	0.5	0.9	0.9	0.7	0.5	0.4	0.5	0.5	0.5	0.7	0.5
	MT2	1.2	1.1	1.0	1.0	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.9	1.0	0.9	1.0	1.0	1.1
	MT3	2.9	2.8	2.8	2.6	2.8	2.8	2.6	2.6	2.8	2.8	2.8	3.0	2.9	2.5	2.4	2.4	2.4
	HT1	0.7	0.6	0.6	0.6	0.4	0.3	0.2	0.0	-0.1	-0.2	-0.4	-0.7	-0.7	-0.8	-0.8	-0.8	-0.7
	HT2	1.1	1.0	1.0	0.8	0.9	0.9	1.2	1.2	1.2	1.0	1.0	1.1	1.0	1.3	1.2	1.2	1.2
	MT	4.6	4.2	4.4	4.2	4.2	4.1	3.9	4.2	4.5	4.3	4.1	4.3	4.3	3.9	3.9	4.1	4.1
	HT	1.8	1.7	1.6	1.4	1.3	1.2	1.4	1.2	1.1	0.9	0.6	0.4	0.3	0.6	0.4	0.4	0.5
	MHT	6.4	5.9	6.0	5.6	5.5	5.3	5.3	5.4	5.5	5.2	4.7	4.7	4.7	4.5	4.3	4.5	4.5
	D_c	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	P_c	*8.1*	*7.6*	*7.6*	*7.1*	*7.2*	*6.9*	*7.0*	*7.0*	*7.5*	*7.3*	*7.2*	*7.4*	*7.3*	*7.1*	*7.1*	*7.6*	*7.7*
United States	Product group J																	
	RB1	-0.9	-4.4	0.0	0.3	0.3	0.2	0.2	0.3	0.3	0.5	0.5	0.1	-0.1	-0.1	-0.3	-0.2	-0.3
	RB2	-0.5	0.4	0.3	0.1	0.2	0.3	-0.1	0.1	-0.1	0.0	0.4	-0.1	-0.2	-0.3	-0.3	-0.6	-0.6
	LT1	-3.7	-3.7	-3.9	-3.7	-4.1	-4.0	-4.0	-4.1	-3.9	-3.6	-3.4	-3.3	-3.3	-3.4	-3.2	-3.2	-3.4
	LT2	-2.7	-2.6	-2.5	-2.3	-1.8	-1.6	-1.4	-1.5	-1.3	-1.4	-1.2	-1.3	-1.4	-1.5	-1.2	-1.1	-1.0
	MT1	-5.1	-6.3	-5.8	-5.0	-4.6	-4.8	-4.4	-3.4	-3.1	-3.2	-3.1	-3.1	-3.1	-3.1	-3.8	-3.6	-3.9
	MT2	1.9	2.2	2.2	2.0	2.1	2.0	2.1	1.8	1.7	1.8	2.1	1.9	2.0	1.9	1.9	1.9	2.1
	MT3	3.8	3.2	2.6	2.5	2.6	2.3	2.4	2.1	2.2	2.1	2.0	2.3	2.5	2.2	2.4	2.6	2.7
	HT1	2.1	2.1	2.0	1.8	0.7	1.0	0.4	-0.2	0.0	0.1	0.1	0.3	0.4	0.4	0.7	1.1	1.3
	HT2	5.0	5.1	5.1	4.4	4.4	4.6	4.8	4.8	4.2	3.6	2.6	3.2	3.4	4.1	3.8	2.9	3.2
	MT	0.6	-0.9	-1.0	-0.5	0.2	-0.6	0.1	0.5	0.8	0.7	0.9	1.0	1.3	1.0	0.5	1.0	0.9
	HT	7.1	7.1	7.1	6.2	5.2	5.7	5.3	4.6	4.1	3.8	2.8	3.5	3.8	4.5	4.6	4.0	4.5
	MHT	7.7	6.2	6.1	5.7	5.4	5.1	5.3	5.1	5.0	4.5	3.7	4.5	5.1	5.4	5.0	5.0	5.4
	D_c	*34.8*	*33.3*	*32.2*	*30.3*	*27.8*	*28.0*	*26.0*	*24.3*	*22.6*	*22.5*	*20.8*	*20.5*	*20.4*	*20.5*	*21.0*	*20.2*	*20.3*
	P_c	*20.6*	*19.8*	*18.7*	*18.1*	*17.0*	*16.6*	*15.8*	*14.6*	*14.1*	*14.3*	*13.3*	*13.4*	*13.7*	*13.7*	*14.1*	*14.0*	*14.5*
Japan	Product group J																	
	RB1	-4.4	-4.8	-5.8	-5.9	-6.2	-5.3	-5.2	-5.5	-6.1	-5.8	-5.4	-5.3	-4.9	-4.3	-4.1	-3.8	-3.7
	RB2	-9.7	-7.9	-8.3	-7.6	-7.4	-7.8	-6.5	-5.3	-4.3	-3.8	-3.8	-3.7	-3.7	-3.3	-3.1	-3.5	-3.2
	LT1	-2.4	-2.7	-3.7	-4.5	-4.8	-4.4	-4.3	-5.0	-5.2	-5.8	-5.5	-5.8	-5.2	-5.0	-5.0	-4.9	-5.5
	LT2	1.6	0.8	0.4	0.0	-0.2	-0.3	-0.6	-0.7	-0.9	-1.1	-0.9	-0.9	-0.9	-0.7	-0.7	-0.9	-1.1
	MT1	7.9	8.0	8.5	7.8	7.7	7.4	7.2	7.5	7.1	6.3	5.4	5.6	6.4	7.1	7.1	6.8	7.8
	MT2	0.0	-0.4	-0.2	-0.3	-0.4	-0.1	-0.3	0.0	0.0	0.1	0.2	0.8	0.6	0.6	0.7	0.7	0.9
	MT3	4.6	4.1	4.7	5.1	5.6	5.4	5.2	5.1	5.7	6.4	6.8	6.8	5.9	4.9	4.9	5.3	4.7
	HT1	4.5	4.8	6.0	6.9	6.7	6.5	6.1	5.7	5.2	5.0	3.9	2.9	2.7	2.2	1.2	0.6	0.2
	HT2	-2.1	-2.1	-1.7	-1.5	-1.1	-1.5	-1.6	-1.9	-1.5	-1.3	-0.6	-0.3	-0.9	-1.5	-1.1	-0.2	-0.2
	MT	12.4	11.7	13.0	12.6	12.9	12.7	12.2	12.6	12.8	12.8	12.4	13.2	12.9	12.6	12.7	12.7	13.5
	HT	2.4	2.7	4.3	5.4	5.6	5.0	4.5	3.8	3.7	3.7	3.3	2.5	1.7	0.7	0.1	0.4	0.0
	MHT	14.8	14.5	17.3	17.9	18.5	17.7	16.7	16.4	16.5	16.6	15.6	15.7	14.7	13.3	12.9	13.1	13.5
	D_c	*37.5*	*36.1*	*39.8*	*39.9*	*40.2*	*39.7*	*37.4*	*36.7*	*35.6*	*36.2*	*34.9*	*34.7*	*33.8*	*33.8*	*32.3*	*31.5*	*33.3*
	P_c	*22.4*	*21.3*	*23.7*	*24.0*	*24.2*	*23.5*	*22.2*	*21.9*	*21.7*	*21.8*	*21.5*	*21.4*	*20.5*	*19.9*	*20.1*	*20.5*	*21.2*
Germany	Product group J																	
	RB1	-2.6	-2.8	-2.9	-2.9	-2.7	-2.6	-2.3	-2.4	-2.4	-2.4	-2.4	-2.1	-1.8	-1.6	-1.5	-1.2	-1.2
	RB2	-4.8	-3.0	-2.3	-1.8	-2.1	-1.7	-1.4	-1.2	-0.8	-0.8	-0.5	-0.9	-1.0	-1.1	-0.9	-1.4	-1.2
	LT1	-3.3	-3.7	-4.1	-3.6	-3.3	-3.3	-3.5	-3.5	-4.2	-3.8	-3.5	-3.6	-3.4	-3.0	-2.9	-2.7	-2.5
	LT2	0.7	0.2	0.2	0.0	0.1	0.1	0.0	-0.4	-0.7	-0.8	-1.0	-1.0	-0.9	-0.9	-0.9	-0.9	-0.8
	MT1	5.0	4.6	4.6	4.3	4.3	3.7	2.1	2.7	3.0	3.4	3.0	2.9	3.2	3.1	3.2	3.8	3.9
	MT2	1.7	1.6	1.6	1.4	1.1	1.3	1.7	1.6	1.7	1.8	1.7	1.7	1.8	1.5	1.5	1.5	1.3
	MT3	4.8	4.9	4.7	4.5	4.3	4.5	4.6	4.3	4.6	4.3	4.2	4.6	4.1	3.8	3.4	3.1	2.9
	HT1	-1.4	-1.3	-1.6	-1.8	-2.0	-2.0	-1.8	-1.8	-2.0	-2.2	-2.3	-2.4	-2.7	-2.6	-2.8	-3.2	-3.1
	HT2	0.0	-0.5	-0.2	0.0	0.2	0.0	0.6	0.5	0.8	0.7	0.9	0.6	0.7	1.1	1.1	0.9	0.7
	MT	11.4	11.1	10.9	10.1	9.7	9.5	8.3	8.7	9.3	9.5	8.9	9.2	9.1	8.3	8.1	8.4	8.1
	HT	-1.3	-1.9	-1.8	-1.8	-1.8	-2.0	-1.2	-1.2	-1.2	-1.6	-1.5	-1.7	-1.9	-1.6	-1.8	-2.3	-2.3
	MHT	10.1	9.2	9.1	8.3	7.9	7.6	7.1	7.5	8.1	7.9	7.4	7.5	7.1	6.7	6.3	6.1	5.7
	D_c	*21.2*	*20.5*	*19.4*	*18.3*	*18.0*	*17.9*	*16.5*	*16.7*	*18.5*	*17.9*	*16.5*	*16.4*	*16.0*	*15.7*	*15.0*	*15.0*	*14.6*
	P_c	*14.9*	*13.9*	*13.9*	*13.3*	*13.1*	*12.9*	*12.1*	*12.3*	*13.4*	*13.0*	*12.6*	*12.5*	*12.2*	*11.5*	*11.2*	*11.3*	*10.6*

Source: Elaborations on WTA data.

Appendix 4

Trade data at 3-digit classification (SITC, rev. 2) are taken from Statistics Canada World Trade Analyzer, 2003 release; values are expressed in current US dollars.
Data on **value added**, **employment**, **industrial output**, **wage rates** and **gross capital formation** at 3-digit industry classification (ISIC, rev. 3) are taken from UNIDO, Indstat database, 2003 release. Values are at current prices and expressed in national currency units; industrial output at constant prices is expressed as index number (1991=100) Industrial output at current and constant prices are used to obtain number indexes for industrial deflators (1991=100).
PPP exchange rates are taken from Heston , Summers and Aten (2002), Penn World Tables, ver. 6.1.
GDP at current prices are taken from IMF, World Economic Outlook database (PPP exchange rates to convert them in international dollars are taken from Penn World Table).
GDP at constant prices (1996=100) expressed in PPPs are taken from Penn World Tables, ver. 6.1.
Average years of schooling for population aged 15+ are taken from Bosworth and Collins (2003).

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