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Who gains and who loses from China's growth?

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Abstract

Emerging countries have been winning large market shares since the early 1990s. Among these, China stands out with the most remarkable performance: it almost tripled its world market share becoming a leading exporter, second only to EU 27. Products exported by China incorporate, however, a large share of foreign inputs. By 2007 one tenth of internationally traded products were shipped to China. These recent evolutions reveal the large and growing domestic market potential and explain the increasing attractiveness of the Chinese market to foreign producers. The present paper attempts to identify the countries that profit and suffer the most from the recent expansion of the Chinese market. I use an econometric shift-share methodology that permits to identify for each trade flow the share of growth arising from the capacity to target the products and markets with the highest increase in demand, and the share due exclusively to exporter's performance.

Keywords: international trade, export performance, market shares, shift-share, China

JEL classifications: F12, F15

Qui gagne et qui perd de la croissance chinoise ?

Résumé

Les pays émergents ont gagné des parts de marché importantes depuis le début des années 1990. Parmi eux, la Chine se distingue avec une performance remarquable: le pays a presque triplé sa part du marché mondial devenant le deuxième plus gros exportateur après l'UE 27. Les produits exportés par la Chine incorporent, cependant, une partie importante d'intrants importés. En 2007, dix pourcents des produits échangés à l'international ont été expédiés vers la Chine. Ces évolutions récentes révèlent l'important potentiel du marché domestique et explique l'attractivité croissante du marché chinois pour les producteurs étrangers. Le présent document tente d'identifier les pays qui profitent et perdent le plus de la récente expansion du marché chinois. J'utilise une méthodologie économétrique shift-share qui permet d'identifier pour chaque flux la part de la croissance découlant de la capacité de cibler les produits et les marchés avec la plus forte demande, et la part due exclusivement à la performance de l'exportateur.

Mots-clefs : commerce international, performance à l'exportation, parts de marché, analyse à parts de marché constantes, shift-share, Chine

Classifications JEL : F12, F15

Who gains and who loses from China's growth?

1 Introduction

One of the most remarkable features that characterized international trade over the last two decades is the transformation of China into the world's largest exporter. In the early 1990s, Chinese products accounted for less than 5% of the world market; by the end of the 2000s, more than one sixth of the value of merchandises traded worldwide originate from China. This impressive market share gain was achieved at the extend of losses experienced by other exporters, especially the ones from the developed world. At the same time, the rising Chinese share in world exports sustained the expansion of the country's domestic and import demand. Two factors lie at the heart of China becoming a major outlet for world production. On one hand, due to increasing outsourcing of world production to China, the country's exports incorporate a large share of imported inputs. Parts and components represent one third of China's imports, compared to less that 20% at the global level. On the other hand, the rapid growth of Chinese exports has increased the purchasing power of domestic consumers and their demand for foreign produced goods. Both trends led to a strong increase in China's import capacity. Unsurprisingly, selling to the Chinese market has become a priority for most countries and large exporting firms, and the Chinese market is often referred to as the new driver of the world economy.

Exporting to China can be very different from exporting to the rest of the global market or traditional trade partners and therefore very challenging. Which countries have profited the most which the less from this increase in the size of the Chinese market? Are the best performers on the Chinese market also the ones that cope the best with the global competition? Which products sell the best on the Chinese relative to the global market? This paper aims at answering these questions by identifying recent changes in specialization and market shares of leading world exporters.

We use an econometric shift-share analysis that allows us to identify for each country the share of export growth arising from the capacity to target the products and markets with the highest increase in demand, and the share due exclusively to its exporting performance. This methodology applies only to the intensive margin of trade, *i.e.* the same products exchanged between the same partners in two different years, as growth rates can be computed only for these trade flows. Symmetrically, the extensive margin is the net value of appearing and disappearing trade flows. While a rapid turnover of trade flows can be observed in a world matrix mostly "filled" with zeros, the largest contribution to the

growth of trade on both global and Chinese markets was the intensive margin.[1]

Using an econometric shift-share analysis, we compute for each exporting country the amount of growth that can be imputed to the geographical and sectoral composition of its exports and the amount owed to its proper efforts, *i.e.* export performance. These intrinsic export growths differ from the overall growth rates of exports for the corresponding categories (country, partner, or product) due to composition terms. Thus, only part of the growth rate of European exports reflects the efforts undertaken by exporting countries. Some of the growth comes from the above world average increase in the import demand of EU partner countries, and some is due to the above world average increase in the world demand for products exported by the EU. In the end, the intrinsic export growth attributable to the EU may be even negative.

Similar export dynamics specific to each country (exporter) and product are estimated for the Chinese market and compared to those of the global market. For that, we perform a shift-share analysis of exports to China alone. Accordingly, we are able to separate the evolution of the 'pure' Chinese import demand from the growth rate of the Chinese market. To simplify the comparison across countries and import markets, all terms are expressed as percentage shifts of initial (1995) market shares.

To implement the methodology described above, it is necessary to rely on detailed longitudinal trade data, on an exhaustive basis. We use the BACI database developed by Gaulier and Zignago (2010) covering bilateral international trade between over 200 countries and 5000 product lines. Since the import content of exports can be very high, especially for China, results are reported for both gross and net exports.

The rest of the paper is organized as follows. Section 2 shows the redistribution of global and Chinese market shares among exporters and sectors over the 1995-2007 period. The trade dynamics of the global and Chinese markets are discussed in section 3. In section 4, we show the decomposition of changes in countries' market shares obtained with the shift-share methodology, the contribution of price fluctuations and volume changes, and evolutions in terms of value-added (*i.e.* after correcting for the foreign content of exports). Concluding remarks are formulated in section 5.

2 The redistribution of market shares

Table 1 summarizes the recent changes in world market shares. I consider all exchanged products, *i.e.* the primary and the manufacturing sectors, with the exception of mineral

[1] Hereafter the Chinese market designates the sum of Chinese imports, or the sum of trade flows having China as destination.

products, notably oil, as well as some specific and non classified sectors. Intra-EU 27 trade flows are excluded to allow the comparison of European countries with other exporters.[2] The first column gives the share of the global market in 2007 of largest world exporters.[3] The second column shows the percentage point changes in market shares over the 1995-2007 period. The four subsequent columns display similar figures for the Chinese market and respectively the world market exclusive of Chinese imports.

Table 1: The distribution of export market shares over 1995-2007

	The global market		*The Chinese market*		*The global market less China*	
	2007 share, %	1995-2007 Δ, p.p.	2007 share, %	1995-2007 Δ, p.p.	2007 share, %	1995-2007 Δ, p.p.
EU 27	19.4	*-1.22*	16.2	*-2.53*	23.0	*0.97*
France	2.3	*-0.54*	2.0	*-0.96*	2.7	*-0.31*
Germany	5.5	*-0.09*	5.8	*0.96*	6.5	*0.54*
Italy	2.3	*-0.41*	1.7	*-1.27*	2.7	*-0.17*
United Kingdom	2.0	*-0.79*	1.5	*-0.98*	2.4	*-0.61*
USA	13.0	*-5.25*	10.3	*-2.09*	15.4	*-4.08*
Japan	8.9	*-5.31*	17.8	*-4.30*	10.5	*-4.63*
Canada	3.8	*-1.42*	1.2	*-0.72*	4.5	*-1.07*
Switzerland	2.3	*-0.56*	1.2	*-0.51*	2.7	*-0.33*
China	15.5	*9.22*				
Brazil	1.7	*0.27*	0.9	*0.25*	2.0	*0.49*
India	1.7	*0.62*	1.4	*0.43*	2.0	*0.86*
Indonesia	1.2	*0.06*	1.1	*-0.33*	1.5	*0.21*
Korea	4.4	*0.57*	11.6	*3.57*	5.2	*1.12*
Malaysia	2.1	*-0.28*	3.1	*0.33*	2.5	*-0.05*
Mexico	2.8	*0.59*	0.3	*0.01*	3.3	*0.95*
Taiwan	3.6	*-0.12*	15.9	*2.18*	4.2	*0.28*
Singapore	2.0	*-0.75*	4.7	*0.07*	2.4	*-0.57*
Thailand	1.9	*0.14*	3.1	*1.00*	2.3	*0.38*
MENA	4.0	*1.54*	1.6	*0.32*	4.8	*2.11*
SSA	1.6	*0.10*	0.8	*-0.15*	1.9	*0.29*
RoW	9.9	*1.80*	8.8	*2.48*	11.7	*3.08*

Notes: Author's calculations using BACI values (current USD) of exchanged goods. Oil and intra-EU 27 trade are excluded. The change in market shares is given in percentage points (p.p.). MENA stands for Middle East and North Africa, SSA for Sub-Saharan Africa, and RoW for Rest of the World.

[2]See Appendix A for details.

[3]For the simplicity of the exposal only countries and group of countries that account for at least 1% of world trade in all years from 1995 to 2007 are shown. Data on other countries can be provided upon request.

The most remarkable evolution in Table 1 is that China has almost tripled its world market share since the mid-1990s, becoming a trade giant, second only behind the EU 27. The EU market share has been fairly affected by the ten-point rise of China over the same period. In contrast, Japan and the US have lost over five percentage points of market shares each. Evolutions were less spectacular for developing countries given their smaller shares in world exports. Most of them managed to increase their exports at a pace at least equal to the growth rate of global trade.

Another important dynamic over the 1995-2007 period is the transformation of China also into a large importer. In 2007 9.7% of the goods traded internationally were shipped to China. Combined with the two-digit growth rate of Chinese production, this makes China a very attractive market. Its capacity to drive world trade and economic growth was confirmed during the 2008-2009 crisis and is being tested again as many industrialized countries are threatened by a deep economic recession.

If we consider the Chinese market alone, only Germany and a few large Asian exporters (Korea, Taiwan, Thailand) succeeded to increase substantially their market shares. For the US, Japan and Canada, their losses on the Chinese market were smaller than on the extra-Chinese market. This reveals their capacity to sell better domestic production to China than to the global market. Differently, the position of most European countries deteriorated more on the Chinese market.

When we look at the product composition of trade flows on the global market and towards China, several differences can be stressed. In terms of the production stage, one third of Chinese imports are in parts and components, compared to less that 20% of world trade (Table 2). This evolution was achieved in the detriment of consumption goods, which account for only 8% of the Chinese market relative to one quarter or the world trade. Large gaps are also observed at the level of the technological content of products. Almost 40% of China's import demand lies in high-technology products and only 9% in goods incorporating low-technology. The technology composition of trade is more uniform on the global market with respectively 25% and 16% of flows in high- and low-technology products. These differences reflect the major role of global production chains in shaping Chinese trade patterns: imported high-tech and domestic low-tech inputs are assembled into products further exported to the global market.

The uneven composition of exports towards the global and Chinese markets are the result of differences in evolutions since the mid 1990s. Indeed, in 1995 the breakdown of exports by production stage and embedded technology, except for consumption and transformed products, was very much alike for the two markets.

If we rely on a more disaggregated classification of products (ISIC Rev. 2), the largest

Table 2: The sectoral composition of exports to the global and Chinese markets by products

	The global market		*The Chinese market*		*The global market less China*	
	2007 share, %	1995-2007 Δ, p.p.	2007 share, %	1995-2007 Δ, p.p.	2007 share, %	1995-2007 Δ, p.p.
Consumption	24.46	-0.86	7.85	-5.54	26.24	0.01
Capital	21.32	1.13	19.70	-1.37	21.50	1.37
Primary	3.78	-1.00	6.34	1.50	3.51	-1.27
Parts and components	19.88	-0.41	33.06	14.42	18.46	-1.95
Transformed	30.56	1.15	33.04	-9.01	30.29	1.85
Primary products	5.76	-1.76	5.22	-0.97	5.82	-1.80
Ressource-based manufactures	15.80	-0.32	16.55	1.86	15.72	-0.51
Low-tech manufactures	16.40	-0.71	9.03	-7.00	17.20	0.00
Mid-tech manufactures	35.46	1.21	30.73	-7.10	35.97	1.99
High-tech manufactures	24.95	1.41	37.85	14.32	23.56	0.02
Other transactions	1.62	0.17	0.61	-1.11	1.73	0.30
Agriculture, hunting	2.84	-0.99	2.73	-0.76	2.85	-1.00
Forestry, logging	0.21	-0.15	0.63	0.40	0.17	-0.20
Fishing & fish farming	0.15	-0.12	0.14	-0.14	0.15	-0.12
Other mining & quarrying	0.42	-0.10	0.32	0.17	0.43	-0.12
Food products & beverages	5.09	-0.98	3.01	-1.76	5.32	-0.85
Tobacco products	0.14	-0.21	0.06	-0.33	0.15	-0.19
Textiles	2.81	-0.99	2.08	-5.38	2.89	-0.63
Wearing apparel	2.46	-0.63	0.29	-0.37	2.70	-0.58
Leather	1.31	-0.36	1.06	-1.26	1.34	-0.28
Wood & wood products	0.95	-0.40	0.35	-0.76	1.02	-0.35
Pulp, paper & paper products	1.52	-0.84	1.64	-0.72	1.50	-0.85
Publishing, printing & reproduction of recorded media	0.59	-0.22	0.36	0.04	0.62	-0.23
Coke, refined petroleum products & nuclear fuel	0.21	0.07	0.03	0.02	0.23	0.08
Chemicals & chemical products	12.04	1.59	14.50	0.70	11.78	1.58
Rubber & plastic	2.71	0.24	2.09	0.05	2.77	0.27
Non-metallic mineral products	1.17	-0.01	0.66	-0.30	1.23	0.03
Basic metals	9.96	2.82	10.04	1.52	9.95	2.92
Metal products	2.53	0.28	1.13	-0.48	2.69	0.38
Machinery	11.53	0.71	10.32	-2.93	11.66	1.02
Office machinery & computers	4.38	-1.91	4.70	1.31	4.35	-2.17
Electrical machinery	4.75	0.21	5.00	0.36	4.72	0.19
Radio, TV & communication equip.	11.08	0.69	22.81	8.28	9.83	-0.25
Medical, precision & optical instr.	4.22	0.60	7.07	3.12	3.92	0.32
Motor vehicles & trailers	9.07	0.24	3.53	0.33	9.68	0.40
Other transport equipment	4.31	0.42	2.94	-0.43	4.46	0.53
Furniture; manufacturing n.e.c.	3.51	0.04	2.51	-0.67	3.61	0.13

Notes: Author's calculations using BACI values (current USD) of exchanged goods. Oil and intra-EU 27 trade are excluded. The change in market shares is given in percentage points (p.p.).

discrepancies between the global and Chinese market structures concentrate in three sectors. Thus, the share of Chinese imports of Radio, TV & communication equipment (23%) and Medical, precision & optical instruments (7%) is twice the share of these products in world trade. These products also registered the most striking upsurge over the considered period: respectively +8.28 p.p. and +3.12 p.p. Chinese imports in these sectors consist mainly of imported parts and components used in the manufacture of final products within the same sector, which account as well for a large share of Chinese exports. This is another illustration of the rising importance of intra-industry trade and golbal value chains. On the opposite, Motor vehicles, trailers & semitrailers are considerably under-represented in the Chinese import demand (3.5% versus 9% for the global market). Unsurprisingly, the largest negative evolution is for textiles (-5.38 p.p.), where Chinese products have become particularly competitive at the world level.

3 Factors driving export growth

In this section, we focus on the contribution of different factors to the growth of exports. First, we separate the increase in exports into the intensive margin (the increase in the value of already existing flows) and the extensive margin (the value of new trade flows, less the value of disappeared flows). Second, we decompose the intensive margin of exports using an econometric shift-share methodology. We analyze the export growth specific to each exporter and product category on the global and the Chinese markets.

The contributions of different margins to the exports' growth for each country or group of countries and the world as a whole are shown in Table 6 of Appendix B. We use bilateral trade flows covering most of the world trade. As in section 2, we exclude trade flows between the twenty-seven EU members, in HS chapters 25-27 (corresponding to mineral products, including oil) and 97-99 (art works and special products). We end up with a panel of 6,032,510 annual bilateral trade flows at the HS 2-digit level and an overall increase in global exports from 1995 to 2007 equal to bn USD 4,938. In addition, we drop trade flows of a value lower than USD 10,000 or involving micro-states (1,310,655 flows representing only bn USD 33 of the increase in world trade) in order to avoid very large growth rates that would alter the explanatory power and the statistical significance of country, partner and product fixed-effect estimates. Out of the remaining flows, 3,245,966 involve the same partners and traded product in at least two consecutive years from 1995 to 2007, *i.e.* constitute the intensive margin. Over the period, the value of these flows increased by bn USD 4,801. This figure does not include trade flows created (801,145 flows, bn USD 209) or disappeared (674,750 flows, bn USD 187) throughout the period.

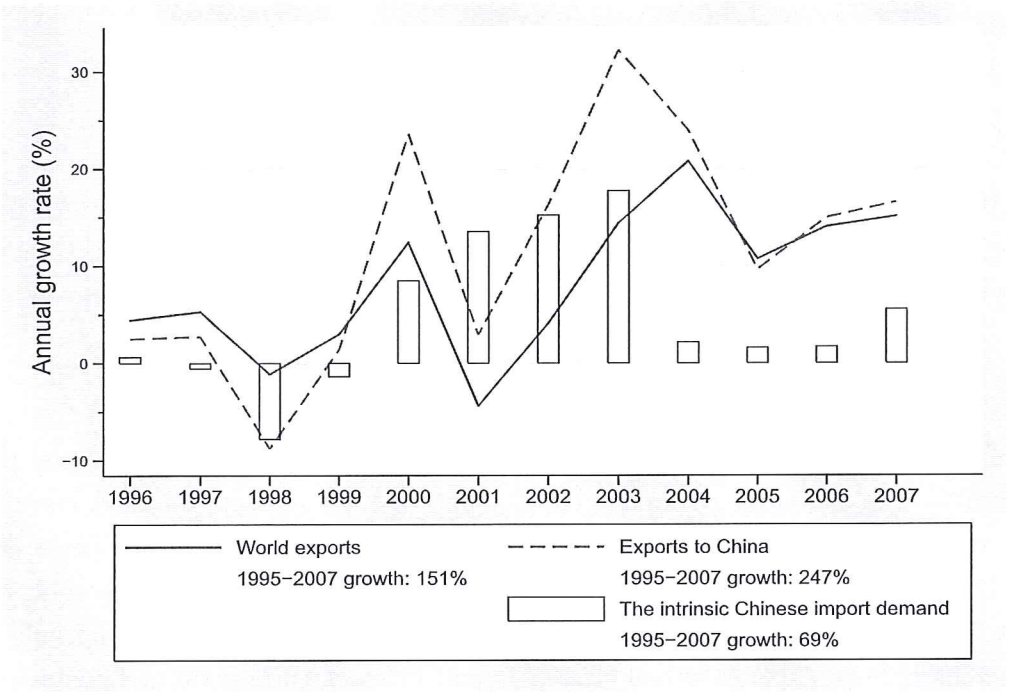


Figure 1: Exports growth on the global and Chinese markets, 1995-2007

Note that the extensive margin of trade is very low (bn USD 22) and the bulk of the growth in world trade comes from a larger volume of goods being exchanged via previously established trade partnerships.

From the about 6 million trade flows (importer×exporter×HS2) that constitute our main panel, 79,628 flows have China as destination. Between 1995 and 2007, these flows increased in value by m USD 562,195. Only 54,259 of these flows correspond to the intensive margin and are used in the shift-share decomposition of changes in exporters' shares of the Chinese market. However, the value of new flows (m USD 3,116) is almost equal to that of flows that disappeared (m USD 2,729) by 2007, suggesting that the intensive margin (m USD 561,532) is very close to the overall change in Chinese imports. This result is obtained also at country level. As shown in Table 6, over 88% of the increase in countries' overall exports and over 95% of the increase in exports towards China occurred on the intensive margin of trade.

In the rest of the paper we focus exclusively on the intensive margin of trade. We regress export growths on country, partner and sector (HS 2-digit) fixed effects, according to the methodology described in Appendix C. Normalized estimated effects $\tilde{\alpha}_i^t$, $\tilde{\beta}_j^t$ and $\tilde{\gamma}_k^t$ give the intrinsic contribution of each exporter (i), importer (j) and product category (k)

to the growth of exports on the global market:

$$d\ln X_i^t = \tilde{\alpha}_i^t + \sum_j \frac{w_{ij}^t}{w_i^t}\,\tilde{\beta}_j^t + \sum_k \frac{w_{ik}^t}{w_i^t}\,\tilde{\gamma}_k^t. \tag{1}$$

In equation (1) $d\ln X_{\cdot}^t$ and $w_{\cdot}^t$ stand for the growth of exports towards all world partners in time period t and, respectively, the average weight of flows in global trade. Similar effects, except for importers, ($\tilde{a}_{iJ}^t$ and $\tilde{c}_{kJ}^t$) are estimated for shipments towards China (J):

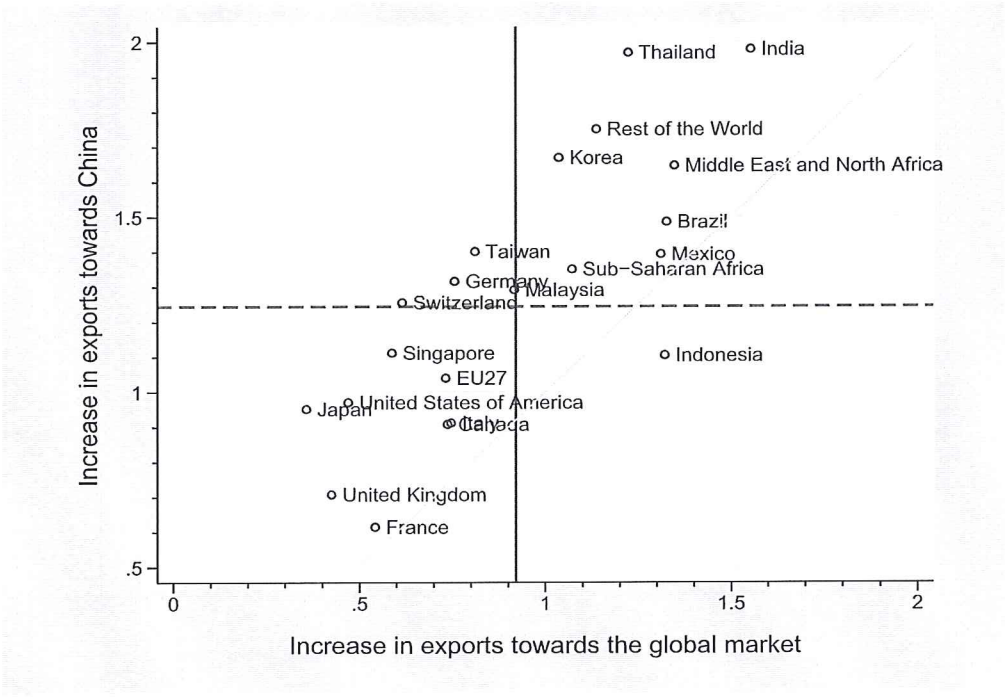
$$d\ln X_{iJ}^t = \tilde{a}_{iJ}^t + \sum_k \frac{w_{iJk}^t}{w_{iJ}^t}\tilde{c}_{kJ}^t. \tag{2}$$

Figure 1 pictures the annual growth rates of exports towards the global and Chinese markets. The evolution of the import capacity of both markets followed more or less the same peaks and downturns. However, in the middle of the period (from 2000 to 2004) exports to China grew much more rapidly. This resulted in an overall increase in Chinese imports from 1995 to 2007 of 247%, while world trade grew by only 151%. Differently, the intrinsic growth of China's import demand, corresponding to parameter $\tilde{\beta}_J$, was considerably lower: 69% for the entire 1995-2007 period.[4] Still, this figure is largely above the trade dynamics of most other import markets. Among the twenty-two countries and groups of countries listed in Tables 1 and 6, only India's intrinsic import demand grew faster. The large gaps between the increase of the intrinsic Chinese demand and the overall growth of Chinese imports reveal the fact that a significant part of the expansion the Chinese market was driven by the strong export dynamics of its trade partners and the strong demand for products they exchange with China. In other words, China imported a lot from countries with the best export performances and in products with the most rapidly growing global demand.

Intrinsic trade dynamics attributed to each exporter and sector for the global and Chinese markets are reported in Figures 2 and 3, respectively.[5] Exporter-led growth gives the would-be increase in country's exports if it had the same structure (by product and partner) as world trade, while product-led growth is the intrinsic growth in world exports driven by the increasing global demand for that product relative to the annual growth rate of global exports. The vertical blue line corresponds to the 1995-2007 log increase in world trade and the dashed horizontal red line to the increase in overall exports towards China. Horizontal and vertical axes give the logarithmic growth rates of exports of each country to the global and Chinese markets.

[4] See Appendix C for details.

[5] More precisely, we report the sum over the period of parameters estimated for each year, *i.e.* amounts $\sum_t \tilde{\alpha}_i^t$, $\sum_t \tilde{a}_i^t$, $\sum_t \tilde{\gamma}_i^t$ and $\sum_t \tilde{c}_i^t$. See Appendix C for details.

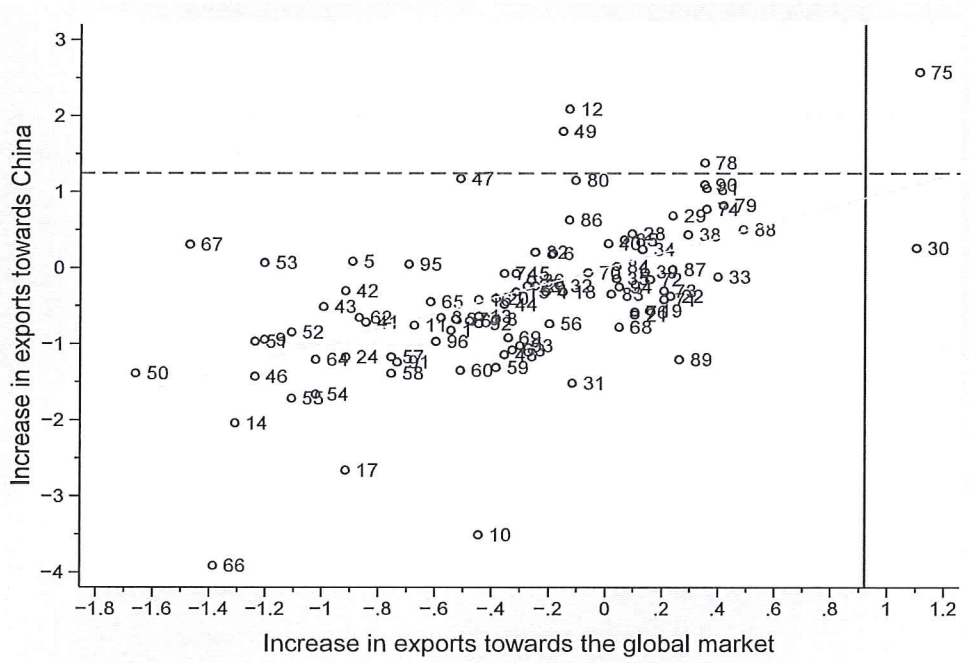


Notes: The horizontal axis gives the country's trade dynamics on the global market and the vertical axis on the Chinese market. The units of the two axes are logarithmic growth rates of country-level exports.

Figure 2: Exporter effects on the global and Chinese markets, 1995-2007

According to Figure 2, most of developing countries (including India and Brazil) had an export dynamic superior to the world average for both the global and Chinese markets. On the contrary, for developed economies the export growth imputable to countries' own efforts was below the world average. A prominent exception is the outstanding capacity of Germany to export its products to Chinese firms and consumers. At the same time, for all countries the export performance on the Chinese market outpaced that on the global market (all points in Figure 2 lie above the first diagonal). This result acknowledges the importance that world exporters ascribe to the Chinese market.

Figure 3 plots export dynamics corresponding to each of the HS 2-digit product category on the Chinese vs the global market. Our data panel includes a total of ninety-two such items. Only two sectors exhibit export dynamics larger than the growth in world trade: Pharmaceutical products (HS 30) and Nickel and articles thereof (HS 75). The latter is also the most dynamic sector on the Chinese market. Sector-specific export growths above the growth rate of overall exports to China are observed in three other sectors: Oil seeds and oleaginous fruits, miscellaneous grains, seeds and fruits (HS 12), Printed books,



Notes: The horizontal axis gives the country's trade dynamics on the global market and the vertical axis on the Chinese market. The units of the two axes are logarithmic growth rates of country-level exports.

Figure 3: Sector (HS 2-digit) effects on the global and Chinese markets, 1995-2007

newspapers, pictures & other products of the printing industry, manuscripts, typescripts and plans (HS 49), and Lead and articles thereof (HS 78). Positive dynamics in both markets (global and Chinese) are also observed for chemical products, base metals, machinery. However, for more than half of HS 2-digit sectors, we observe negative dynamics, *i.e.* a retraction of the market. Thus, any increase in trade flows involving products from these chapters are driven by forces lying elsewhere (*e.g.* in exporter's or importer's trade dynamics).

4 Explaining the evolution of market shares

The present section is dedicated to the decomposition of changes in countries' shares of the global and Chinese markets, at the intensive margin, into export performance and structure effects. We compute the latter using exporter-, importer- and product-specific effects discussed in section 3 and the shift-share methodology presented in Appendix C. Our objective is to identify the countries with the best and the poorest resilience in terms

of their global and Chinese market shares. We focus here only on the intensive margin of exports, which reflects 97.2% of growth in world exports and 99.9% of the increase in exports having China as destination. Therefore, the conclusions reached for this component of exports' growth can be safely generalized.

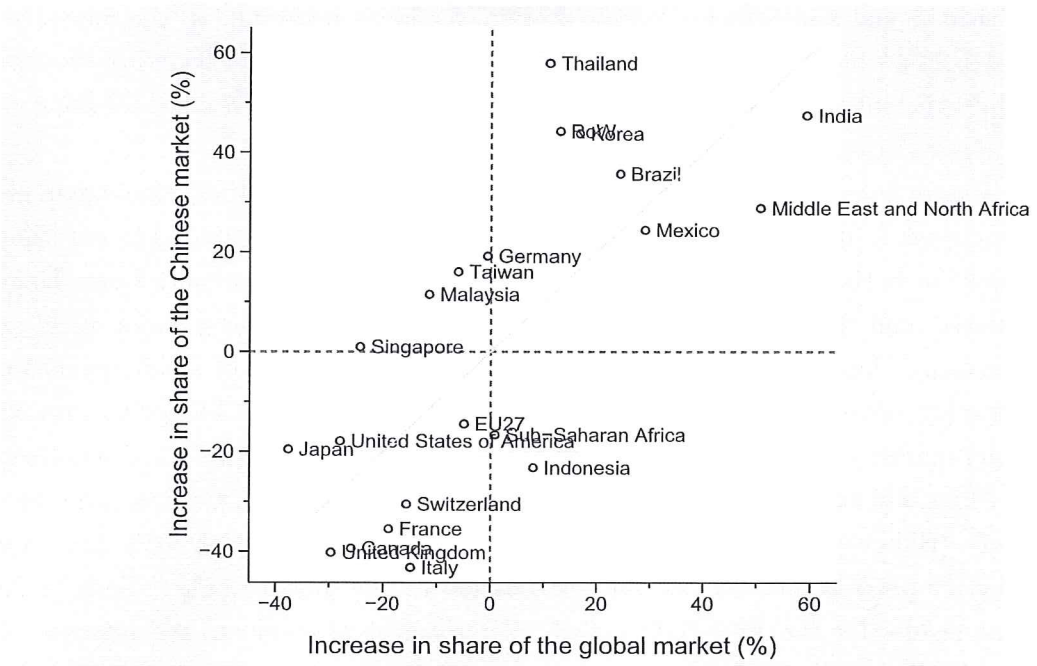
Figure 4 pictures the percent change in a country's share of the Chinese market against the change in its share of the global market. Out of the 180 countries in our sample that export to both the global market and China, only 35 countries had a larger share of the Chinese than the global market in 2007. This group includes some major world exporters (Germany, Japan, Australia, Korea, Taiwan) and a number of small Asian and Latin American countries. All these countries (except Myanmar and Mongolia) also enjoyed a larger market share growth on the Chinese market. The remaining 145 economies exported to China a share of their overall exports lower than the share of Chinese imports in world trade. However, a large number of these countries, among which USA and Japan, had a better performance on the Chinese relative to the global market, both in 2007 and dynamically for the 1995-2007 period. For the rest of countries the increase (drop) in the global market share was faster (slower) than in the share of Chinese imports. This is the case of most European countries and many large emerging countries (Mexico, Russia, Ukraine, Turkey, India, Indonesia, South Africa).

Table 3 displays the evolution of global market shares of main exporters between 1995 and 2007 and its decomposition into exporter-specific performance, geographic and sectoral structure effects according to equation (12) in Appendix C:

$$g_i = \exp\left(\sum_t \left(d\ln \frac{X_i^t}{X^t}\right)\right) - 1 = [1 + PERF_i] \times [1 + GEO_i] \times [1 + SECT_i] - 1.$$

The *export performance* ($PERF_i$) is the change in a country's market share driven by country-specific factors. This is the increase in market shares one would observe in the absence of any differences in the product composition and the geographical orientation of country's exports and world trade. Structural effects (GEO_i and $SECT_i$) reflect the contributions of the country's exports structure by partner and product to the overall growth of its exports. A large positive (negative) structure effect corresponds to a share of country' exports in products and to import markets with strongly growing demand higher (lower) than the world average.[6] The decomposition is obtained for each country and year within the considered period, and, since growth rates are computed as changes in logarithms, country-level *export performance*, *geographic* and *sectoral structure* effects for the entire period are obtained by summing up the corresponding annual effects.

[6]See Appendix C for the computation of effects $PERF_i$, GEO_i and $SECT_i$.



Notes: The units of the two axes are percentage changes in 1995 market shares.

Figure 4: Changes in shares of the global and Chinese markets, 1995-2007

According to Table 3, the 5% loss of EU's share of the global market on the intensive margin is mainly due to its poor export performance (-17.3%), partially compensated by favorable geographic (6.0%) and sectoral (8.4%) structure effects. Market share losses suffered by developed economies, already documented in section 2, were the result of their poor global export performances. The good positioning in terms of best selling products and most dynamic trade partners only hindered the contraction of these countries' shares of the global market. On the opposite, emerging economies reinforced their positions as world exporters by increasing the overall competitiveness of their exports and despite the adverse sectoral and geographic structure effects.

In Table 4, we report the decomposition of changes in exporters' shares of the Chinese market. Columns 2 and 3 of the table reflect the contribution of exporter-specific performance and sectoral structure effects according to equation (22) of Appendix C:

$$g_{iJ} = \exp\left(\sum_t \left(d\ln \frac{X_{iJ}^t}{X_J^t}\right)\right) - 1 = [1 + PERF_{iJ}] \times [1 + SECT_{iJ}] - 1,$$

Table 3: Decomposition of changes in *world* market shares, 1995-2007

	Change in market share	Contribution of:		
	(%)	Performance	Structure effects	
			Geographic	Sectoral
	(1)	(2)	(3)	(4)
EU 27	-5.0	-17.3	6.0	8.4
France	-19.0	-31.7	5.2	12.9
Germany	-0.6	-15.3	4.8	11.9
Italy	-14.9	-16.1	8.2	-6.3
United Kingdom	-29.6	-39.2	1.0	14.5
USA	-28.1	-36.2	4.4	8.0
Japan	-37.7	-43.3	-1.6	11.6
Canada	-26.0	-16.8	-14.4	3.9
Switzerland	-15.7	-26.4	1.4	13.0
China	155.2	264.8	-12.2	-20.4
Brazil	24.3	49.9	-1.7	-15.7
India	59.2	88.4	4.7	-19.3
Indonesia	8.0	49.2	-7.4	-21.9
Korea	16.7	12.2	3.4	0.6
Malaysia	-11.5	-0.4	-9.9	-1.4
Mexico	29.0	47.5	-14.2	1.9
Taiwan	-6.1	-10.6	8.0	-2.8
Singapore	-24.3	-28.3	-1.0	6.6
Thailand	11.0	35.1	-8.3	-10.5
MENA	50.6	53.2	10.5	-11.0
SSA	0.8	16.2	-2.6	-11.0
RoW	12.9	24.1	3.7	-12.2

Notes: Author's calculations. The estimation is performed at the 2-digit level of the HS and explain the annual growth of all trade flows existing in any two consecutive years in the period 1995-2007. MENA stands for Middle East and North Africa, SSA for Sub-Saharan Africa, and RoW for Rest of the World. Columns (1) to (4) correspond to left and right hand side terms of equation (12) from section C. The following identity between columns holds: $\ln((1)/100+1) = \ln((2)/100+1) + \ln((3)/100+1) + \ln((4)/100+1)$.

where $PERF_{iJ}$ and $SECT_{iJ}$ are computed similarly to $PERF_i$ and $SECT_i$.[7] The last two columns correspond to shifts in market shares induced by changes in prices and volumes. To obtain market share evolutions in terms of volumes, we deflate all trade values expressed in current USD, X^t_{ijk}, with trade indices computed for each exporter × importer × HS2 relationship. The procedure is similar to Fontagné, Gaulier, and Zignago (2008) and relies

[7] $PERF_{iJ} = \exp\left(\sum_t \left(\tilde{a}^t_{iJ} - d\ln X\right)\right) - 1$ and $SECT_{iJ} = \exp\left(\sum_t \sum_k \left(w^t_{iJk}/w^t_{iJ}\right)\ \tilde{c}^t_{kJ}\right) - 1$.

exclusively on trade values and unit values available in the BACI database. Trade indices for each pair of countries and HS2 chapter are computed as chained Tornqvist indices of unit value ratios of traded HS 6-digit products within the chapter. The year 2000 is taken as reference, meaning that 2000 trade flows in constant and current/volume terms are equal. The difference between the evolution of trade expressed in current and constant/volume terms is attributed to price fluctuations.

Table 4: Decomposition of changes in *Chinese* market shares, 1995-2007

	Change in market share	Contribution of:		Contribution of:	
	(%)	Perfor-mance	Sectoral structure	*Price* evolutions	*Volume* evolutions
	(1)	(2)	(3)	(4)	(5)
EU 27	-14.5	-18.3	4.7	11,9	-23,6
France	-35.5	-46.8	21.2	-31,7	-5,6
Germany	19.2	7.6	10.7	12,7	5,8
Italy	-43.2	-28.2	-20.9	20,7	-52,9
United Kingdom	-40.2	-41.6	2.4	37,0	-56,3
USA	-17.9	-23.9	7.9	-1,8	-16,4
Japan	-19.5	-25.3	7.7	7,7	-25,3
Canada	-39.4	-28.6	-15.1	37,7	-56,0
Switzerland	-30.5	1.2	-31.4	-1,3	-29,6
Brazil	35.7	27.6	6.4	4,3	30,0
India	47.4	108.8	-29.4	-3,0	52,0
Indonesia	-23.2	-12.9	-11.8	-11,0	-13,7
Korea	43.8	53.2	-6.1	35,9	5,8
Malaysia	11.5	5.0	6.2	66,3	-33,0
Mexico	24.4	16.3	7.0	73,2	-28,2
Taiwan	16.0	17.0	-0.9	-37,9	86,8
Singapore	1.0	-12.4	15.3	-43,3	78,1
Thailand	57.9	106.7	-23.6	9,4	44,3
MENA	28,8	49,6	-13,9	25,9	2,3
SSA	-16,6	11,3	-25,1	109,4	-60,2
RoW	44,2	66,1	-13,2	66,3	-13,3

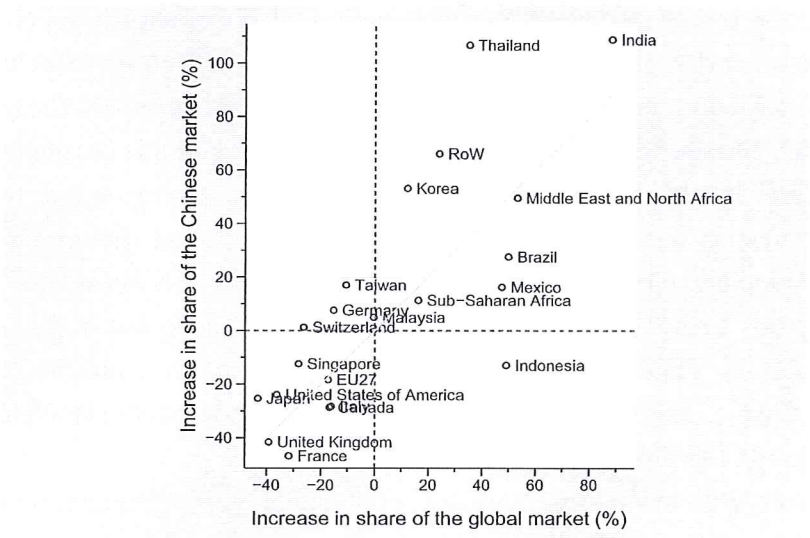
Notes: Author's calculations. The estimation is performed at the 2-digit level of the HS and explain the annual growth of all trade flows existing in any two consecutive years in the period 1995-2007. MENA stands for Middle East and North Africa, SSA for Sub-Saharan Africa, and RoW for Rest of the World. Columns (1) to (3) correspond to left and right hand side terms of equation (22); columns (4) and (5) give the contribution of the evolution of prices and volumes to changes in shares of the Chinese market. The following identities between the different columns hold: $\ln((1)/100+1) = \ln((2)/100+1) + \ln((3)/100+1)$ and $\ln((1)/100+1) = \ln((4)/100+1) + \ln((5)/100+1)$.

Overall, the role of performance and structure effects in explaining changes is shares of the Chinese market are similar to country-level evolutions observed at the global level. The position of industrialized countries weakens although they export the products mostly demanded by Chinese firms and consumers. The only exception is Germany who increased in twelve years its share of the Chinese market by 19%, corresponding to 1 p.p. Other European countries, on the contrary, were much less performant that on the world market. In turn, developing countries benefited the most from the increasing size of the Chinese import demand. This is particularly the case of China's traditional trade partners (Korea, Taiwan, Malaysia, Thailand), but also that of Latin American countries (Brazil, Mexico, Argentina, Chile). The latter succeeded to expand their sales on the Chinese market by mainly targeting the products with fast growing demand.

If we ignore price evolutions, market share losses of most developed countries in China were even more pronounced. The increase in the unit value of products exported by these countries to Chinese partners (up to 38% for Canada) could not compensate for the contraction of Chinese demand for these products in volume (real) terms. The main exception to this trend are French exporters who lost shares of the Chinese market mainly because of the drop in the price of exported products. Price evolutions are very heterogeneous and even larger across developing countries. This is due to larger exchange rate appreciations/depreciations observed for these countries, a main element of price evolutions. For example, Malaysia and Mexico compensate their large market shares losses in real terms by an about 70% price increase in the price of exported goods. On the contrary, Singapore and Taiwan reinforced their positions on the Chinese market as their exports became around 40% cheaper.

Differences between the contribution of different factors, for developed and developing countries, are better visualized in a graphical representation of market share evolutions from Table 4 (Figure 7 of Appendix D). To ease comparisons, evolutions are expressed in logarithms of shifts in exporters' shares of the Chinese demand. Performance and structure bars (log-effects) add up to give the logs of market share shifts. The same is true for price and volume bars (log-effects).

Now, let us compare the competitiveness of different exporters on the global and Chinese markets. Figure 5 pictures country-level export performances, which reflect changes in market shares due exclusively to the efforts undertaken by exporting countries, such as the price and non-price competitiveness of exported products, or the effect of exchange rate depreciations and appreciations. One might expect that these effects, computed at country level, should be constant across destination markets, *i.e.* that points in Figure 5 lie on or very close to the diagonal. This is true for EU 27, Sub-Saharan Africa and Middle East and

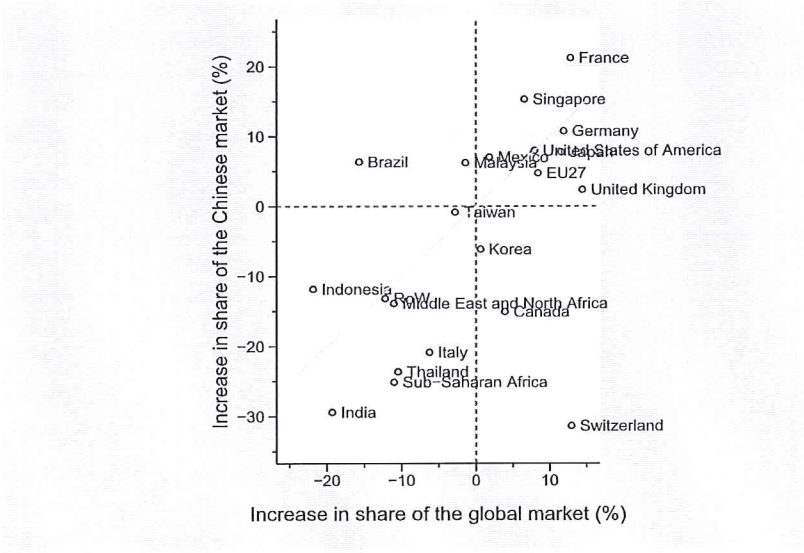


Notes: The units of the two axes are changes (%) in 1995 market shares.

Figure 5: Export performance on the global and Chinese markets, 1995-2007

North African country groups, but not for most countries considered individually. Still, the correlation coefficient between the two measures is high and statistically significant (0.76, p-value 0.0001). The largest gaps are observed for developing countries from South-East Asia and Latin America. Points furthest to the left of the diagonal correspond to countries with which China has established strong commercial ties (Thailand, Korea, Taiwan, Australia) due to a mix of geographical proximity, economic size and complementarity of production stages. Deviations from the diagonal to the right (Brazil, Mexico, Indonesia) indicate a global export competitiveness superior to the one enjoyed on the Chinese market. Thus, although Brazilian, Mexican and Indonesian producers competed quite well at the global level, they faced a much fiercer competition on the Chinese market where they had to struggle as well against a large number of low-cost domestic producers.

Percentage shifts in shares of the Chinese versus the global market are shown in Figure 6. Again, few countries have an exports structure equally competitive on both markets. This is notably the case of American and German exporting firms. Over half of countries lie below the diagonal line, meaning that the by-product composition of their exports towards China was less well adapted to the evolution of demand than their overall exports. This category includes some of China's traditional trade partners (Australia, Japan, Korea, Thailand), most industrialized countries and large developing economies (India, Russia, South Africa). On the other side we have countries with an export product mix very well



Notes: The units of the two axes are changes (%) in 1995 market shares.

Figure 6: Sectoral structure effects on the global and Chinese markets, 1995-2007

adjusted to the dynamics of the Chinese demand. Among the latter stand out France and Latin American exporters.

The fragmentation of production across international borders is particularly high for goods shipped to and from China. To control for this phenomenon, one needs to focus on the value added of exported goods produced in the origin (exporting) country rather than on gross exports. Put in other words, we need to correct for the import content of exported products. We use the difference in market share changes for exports and imports (*net exports*) to proxy the market share evolutions in exporters' value added, as discussed in section C. For that, we complement the decomposition of export growths presented above with a similar shift-share analysis of import growths. Shifts in market shares in terms of net exports and their decomposition according to equation (23) from Appendix C are displayed in Table 5. The first three columns corresponds to the amount of market share growth/loss that can be inputted to the country's export performance and sectoral structure of its exports, controlling for the value of imports embedded in exported products. The last two columns reflect the importance of changes in prices and volumes, similarly to the corresponding columns of Table 4.

When we correct for the import content of exports, US and UK show a better resilience on the Chinese market, while Japan and Switzerland even increase their shares. Largest increases in market share are observed for Taiwan, Singapore and Thailand, and despite their negative sectoral structure effect. For other developing countries imports from China grew

Table 5: Decomposition of changes in Chinese market shares, *net exports*, 1995-2007

	Change in market share	Contribution of:		Contribution of:	
	(%)	Perfor-mance	Sectoral structure	*Price* evolutions	*Volume* evolutions
EU27	-26,7	18,5	4,0	23,3	-40,5
France	-36,0	-4,5	-22,4	-25,9	-13,6
Germany	32,6	17,2	7,1	25,5	5,6
Italy	-49,2	24,5	15,1	43,2	-64,6
UK	-32,9	27,0	9,5	39,1	-51,8
USA	-9,2	-3,3	-0,6	-3,9	-5,5
Japan	45,9	15,9	-0,2	15,8	26,0
Canada	-54,2	-6,4	28,5	20,2	-61,9
Switzerland	12,5	7,9	18,8	28,1	-12,2
Brazil	-6,5	-22,8	43,3	10,6	-15,4
India	-53,9	9,2	38,0	50,7	-69,4
Indonesia	-8,5	-6,1	11,6	4,8	-12,7
Korea	15,3	39,3	2,3	42,5	-19,1
Malaysia	3,0	93,5	-1,2	91,2	-46,2
Mexico	-80,9	182,9	25,2	253,7	-94,6
Taiwan	84,1	-12,3	-4,5	-16,3	119,9
Singapore	38,9	-19,1	-1,0	-19,9	73,4
Thailand	96,1	33,1	18,3	57,5	24,5
MENA	-20,4	14,5	8,1	23,8	-35,7
SSA	-32,1	59,5	18,6	89,2	-64,1
RoW	24,7	14,0	-4,8	8,5	14,9

Notes: Estimation is performed at the 2-digit level of the HS and explain the annual growth of all trade flows existing in any two consecutive years in the period 1995-2007. MENA stands for Middle East and North Africa, SSA for Sub-Saharan Africa, RoW for Rest of the World.

more rapidly than exports, sometimes even generating a negative net effect. This effect is especially large for India and Mexico. Results in terms of net exports are summarized in a graphical mode in Figure 8 of Appendix D.

5 Conclusions

Emerging countries have been winning large market shares since the early 1990s. Among these, China stands out with the most remarkable performance: it almost tripled its world market share and has become a leading exporter, second only to EU 27. Recent evolutions also reveal the large and growing potential of the Chinese market and its increasing

attractiveness to foreign producers. The present paper attempts to identify the countries that have profit the most from the expansion of the Chinese market.

To answer this question, an econometric shift-share methodology is employed. For each exporter the share of trade growth arising from the capacity to target the products and markets with the highest increase in demand, and the share due exclusively to the country's own export performance are identified. This methodology applies only to the intensive margin of trade, which captures in our case the bulk of the growth. Exporter, importer and product specific contributions to export growth rates are estimated from highly disaggregated data with a weighted variance analysis, and then aggregated into country-specific structural and performance effects. The resulting decomposition of export growth rates is then transposed into a decomposition of changes in market shares to obtain comparable results.

We use detailed longitudinal trade data on an exhaustive basis from the BACI database. Shifts in shares of the global and Chinese market, expressed in percentage of the initial share, and their decomposition into performance and structural effects are computed for each exporting country. Since the import content of exports can be very high, especially for China, results are reported for both gross and net exports.

We find that countries that profit the most from the expansion of the Chinese economy are its traditional trade partners (except Japan and Australia), Germany, and large Latin American countries (Brazil, Mexico, Argentina, Chile). For the first group of countries, the main driving forces were the specificities of the bilateral relationship with China (geographical proximity, trade agreements, complementarity of production processes, etc.). The selection of most competitive exporting firms into suppliers of the Chinese market was at the origin of Germany's market share gains. Our results suggest that German firms selling to China were more competitive than average German exporting firms. Lastly, we acknowledge the capacity of Latin American exporters to adapt their product mix to the evolution of the Chinese market demand.

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Appendices

A Data description

Trade data used in this paper are from the BACI database, a new database for the analysis of international trade developed by Gaulier and Zignago (2010). BACI draws on the UN COMTRADE information but, contrary to COMTRADE, in which imports are reported CIF (cost, insurance and freight) and the exports FOB (free on board), BACI provides FOB data for both types of trade flows. Thus, exports from country i to importer j are equal to j imports from i. This reconciliation of mirror flows is done for both values and quantities, and relies on estimated indicators of the reliability of import and export country reporting. Quantity units are converted into tons, making possible the computation of homogeneous unit values at the product level. BACI is available to COMTRADE users at: http://www.cepii.fr/anglaisgraph/bdd/baci.htm

BACI covers trade between more than 200 countries, in about the 5,000 products of the 6 digits Harmonized System (HS) classification. The present study excludes intra-EU 27 trade flows. This choice must be kept in mind when it comes to market shares and changes therein. We exclude also mineral products, specific, and non-classified products, corresponding to chapters 25, 26, 27 (mineral products), 97 (works of art, collectors' pieces and antiques), 98 and 99 (special classifications or transactions) of the Harmonized System. For the shift-share decomposition of the intensive margin of exports in section 4 we also exclude trade flows inferior to USD 10,000 and non-independent territories and micro-countries. For this analysis we employ HS2 data obtained by aggregation of HS6 data. The motivation behind is to keep a larger share of trade flows in the intensive margin, the only component of the growth of trade discussed in that section.

B Intensive and extensive export margins

Table 6: The contribution of intensive and extensive margins to the exports' growth, 1995-2007

	The global market					*The Chinese market*				
	Growth	Intensive margin		Extensive margin		Growth	Intensive margin		Extensive margin	
				exits	entries				exits	entries
	(bn $)	(bn $)	(%)	(bn $)	(bn $)	(m $)	(m $)	(%)	(m $)	(m $)
EU 27	921	906	*98.3*	33	39	85 035	84 948	*99.9*	342	419
France	96	95	*98.5*	2	3	8 776	8 776	*100.0*	0	0
Germany	270	267	*98.9*	2	2	34 603	34 611	*100.0*	13	5
Italy	100	98	*98.0*	2	2	6 540	6 541	*100.0*	2	0
UK	73	72	*99.0*	2	2	6 388	6 387	*100.0*	0	1
USA	475	472	*99.3*	2	3	52 966	52 966	*100.0*	0	0
Japan	269	268	*99.7*	2	2	90 302	90 302	*100.0*	0	0
Canada	144	143	*99.6*	2	2	5 309	5 309	*100.0*	1	1
Switzerland	94	94	*99.7*	2	2	5 419	5 419	*100.0*	9	9
China	1 061	1 058	*99.8*	2	3					
Brazil	93	90	*96.6*	4	7	5 884	5 841	*99.3*	22	64
India	104	102	*98.6*	2	3	9 132	9 093	*99.6*	13	51
Indonesia	63	62	*98.7*	2	3	5 393	5 404	*100.2*	14	2
Korea	235	229	*97.6*	4	5	73 308	73 308	*100.0*	1	1
Malaysia	96	95	*99.0*	2	2	18 416	18 419	*100.0*	3	1
Mexico	157	157	*99.7*	2	3	1 802	1 837	*101.9*	49	13
Taiwan	173	166	*95.8*	4	11	94 179	94 179	*100.0*	0	0
Singapore	76	76	*100.1*	3	3	26 545	26 545	*100.0*	1	1
Thailand	100	99	*99.6*	1	2	19 723	19 716	*100.0*	4	10
MENA	248	222	*89.7*	46	71	9 962	9 918	*99.6*	515	553
SSA	82	74	*90.5*	21	29	3 947	3 777	*95.7*	280	442
RoW	548	487	*88.9*	53	101	54 874	54 549	*99.4*	1 477	1 550
World	4 938	4 801	*97.2*	187	290	562 195	561 532	*99.9*	2 729	3 116

C An econometric shift-share analysis of export growth

The current appendix presents the econometric *shift-share decomposition of export growth* employed in the paper. This decomposition aims to separate between the exports' growth due to the composition of a country's flows by product and destination, and the one arising from its competitiveness on foreign markets. Fabricant (1942) and Maddison (1952) were among the first to formalize the shift-share decomposition, which was extensively used afterwards. Although employed mainly in regional studies on employment and productivity growth, this technique has been successfully extended to international trade issues (Tyszynski, 1951; Richardson, 1971a,b; Fagerberg, 1988). The method has been extensively used in competitiveness studies. Originally, the shift-share analysis was applied to regional (sub-national) level data (Markusen et al., 1991; Hayward and Erickson, 1995; Gazel and Schwer, 1998), but was also employed to analyse export performances at the country level (Laursen, 1999; Wörz, 2005; Brenton and Newfarmer, 2007; Cafiso, 2009). In the context of the recent economic crisis it gained interest among central bank researchers (ECB, 2005; Amador and Cabral, 2008; Jiménez and Martín, 2010; Panagiotis et al., 2010; Finicelli et al., 2011).

Changes in shares of the global market

In the field of international trade, the traditional shift-share analysis, also known as the *constant market share analysis*, aims to measure the contribution of countries' geographical and sectoral specialization to the growth of their exports. The method simply aims at computing the contribution of the initial geographical and sectoral composition of exports to changes in market shares. The remaining part of the change is attributed to pure performance (*i.e.* price and non-price competitiveness).

Departing from this traditional analysis, we rely here on an econometric shift-share methodology similar to Cheptea, Gaulier, and Zignago (2005) and Cheptea, Fontagné, and Zignago (2010). Rather than using a simple balance-sheet decomposition of growth rates into structural and competitiveness effects, we use a weighted variance analysis. Firstly, structural and performance contributions to export growth rates, expressed as changes in logarithms, are estimated from highly disaggregated data with weighted OLS. Secondly, estimated exporter, importer and product effects are aggregated into country-specific structural and performance effects. For this, the growth rate of a country's exports is approximated by the Törnqvist index of its exports of each product to each trade partner. The resulting decomposition of export growth rates (in logarithmic form) is then transposed into a decomposition of changes in global market shares. Finally, we switch from log-linearized growth rates to true growth rates in order to obtain results comparable with

those in section 2. To use the information on time variations in the data, we focus on the sum of annual growths of each trade flow rather than on the increase in its value between the first and last years of a period. Therefore, our method is constrained by the observation of the same flow in two consecutive years (necessary for computing annual growth rates), *i.e.* it applies only to the intensive margin of trade.

Let where X^t represents the value of exports in year t and w^t the average weight of a flow in world trade in years $t-1$ and t: $w^t_{ijk} = \frac{1}{2}\left(\frac{X^{t-1}_{ijk}}{X^{t-1}} + \frac{X^t_{ijk}}{X^t}\right)$ and $w^t_i = \frac{1}{2}\left(\frac{X^{t-1}_i}{X^{t-1}} + \frac{X^t_i}{X^t}\right)$. Growth rates of each individual trade flow, *i.e.* from each exporter to each importer for a given product group and year, are regressed on exporter (i), importer (j), and product (k) dummies, using average shares in world trade w^t_{ijk} as weights:

$$d\ln X^t_{ijk} = intercept^t + \alpha^t_i + \beta^t_j + \gamma^t_k + \varepsilon^t_{ijk}. \tag{3}$$

For a smoother distribution of the explained variable and further computation facilities, we use first-order Taylor-series approximations of true growth rates, *i.e.* the annual change in the logarithms of exports, $d\ln X^t_{ijk} = \ln X^t_{ijk} - \ln X^{t-1}_{ijk}$, as the explained variable. Parameters β^t_j and γ^t_k capture the contribution of the average geographic and product structure in year t to the annual growth rate of exports between $t-1$ and t, α^t_i is the amount of growth in t that can be attributed to the export performance of country i, and $intercept^t$ is a constant term reflecting the average growth of global trade in t. In section 3 we estimate exporter, importer and product fixed effects separately for each year of the considered period except the first, which serves as base (for computing growth rates). Let hats indicate OLS-estimated coefficients in (3). By definition, they by minimize the amount

$$\sum_{ijk}\left(d\ln X^t_{ijk} - \hat{intercept}^t - \hat{\alpha}^t_i - \hat{\beta}^t_j - \hat{\gamma}^t_k\right)^2 w^t_{ijk} = \sum_i \sum_{jk} \left(\hat{\varepsilon}^t_{ijk}\right)^2 w^t_{ijk}.$$

Note that the above sum is composed of non-negative terms and converges to zero when the number of observations approaches infinity. Therefore, each exporter-specific component of this sum also converges to zero. The use of disaggregated data in the empirical part of the paper supplies a large number of observations (over 250,000) for each year and assures that:

$$\sum_{jk} \hat{\varepsilon}^t_{ijk}\left(\frac{w^t_{ijk}}{w^t_i}\right) \approx 0, \quad \forall\, i. \tag{4}$$

Next, fixed-effects estimates discussed above are used to compute country-level structural and performance effects. To do this, one needs to define an aggregation rule for growth rates from the country-partner-product level to the country (exporter) level. We

choose to express the growth rate of country i's exports as a Törnqvist index of growth rates of disaggregated trade flows, *i.e.* as a weighted average of the logarithmic change in its exports of each product k to each partner j:

$$d\ln X_i^t = \sum_{jk} \left(\frac{w_{ijk}^t}{w_i^t} \right) \ln \frac{X_{ijk}^t}{X_{ijk}^{t-1}} = \sum_{jk} \frac{w_{ijk}^t}{w_i^t} \, d\ln X_{ijk}^t. \tag{5}$$

The right hand side of (5) is a close approximation of the true logarithmic change in a country's exports: $d\ln X_i^t \approx \ln\left(\frac{X_i^t}{X_i^{t-1}}\right)$. Combining equation (5) with (3) and (4), one can express the overall growth of country i's exports as a sum of three effects:

$$d\ln X_i^t \;=\; \hat{intercept}^t + \hat{\alpha}_i^t + \sum_j \frac{w_{ij}^t}{w_i^t} \, \hat{\beta}_j^t + \sum_k \frac{w_{ik}^t}{w_i^t} \, \hat{\gamma}_k^t. \tag{6}$$

For the simplicity of the presentation, we set the two sides of (6) as *perfectly* equal, although in virtue of approximation (4) they are only *almost* equal.

When estimating equation (3), one parameter (fixed effect) of each dimension (i, j and k) is dropped because of collinearity. Therefore, parameters $\hat{\alpha}_i^t$, $\hat{\beta}_j^t$ and $\hat{\gamma}_k^t$ represent the contribution of exporter, importer and, respectively, product effects relative to omitted units. A normalization is necessary in order to obtain the corresponding effects independent of the choice of the omitted country/product. We set the weighted average of exporter effects equal to the growth rate of world exports ($\sum_i \tilde{\alpha}_i^t w_i^t = d\ln X^t$), and the weighted mean of importer/product effects equal to zero $\left(\sum_j \tilde{\beta}_j^t w_j^t = \sum_k \tilde{\gamma}_k^t w_k^t = 0\right)$. For consistency with equation (5), the growth in world exports is also computed as a Törnqvist index: $d\ln X^t = \sum_i w_i^t \, d\ln X_i^t$. Accordingly, normalized exporter effects are obtained by adding the intercept and the weighted means of partner and product effects to initially estimated country effects:

$$\tilde{\alpha}_i^t = \hat{intercept}^t + \hat{\alpha}_i^t + \sum_j w_j^t \, \hat{\beta}_j^t + \sum_k w_k^t \, \hat{\gamma}_k^t.\ ^{8} \tag{7}$$

Similarly, normalized effects for each importing market and traded product are obtained by subtracting the weighted mean of estimated effects from the value of parameters estimated

[8]The definition of $\tilde{\alpha}_i^t$ results directly from the normalization condition $\sum_i \tilde{\alpha}_i^t w_i^t = d\ln X^t$:

$$\begin{aligned} d\ln X^t \;&=\; \sum_i d\ln X_i^t w_i^t \;=\; \sum_i \left(\hat{intercept}^t + \hat{\alpha}_i^t + \sum_j \tfrac{w_{ij}^t}{w_i^t} \, \hat{\beta}_j^t + \sum_k \tfrac{w_{ik}^t}{w_i^t} \, \hat{\gamma}_k^t \right) w_i^t \\ &=\; \sum_i \left(\hat{intercept}^t + \hat{\alpha}_i^t + \sum_j w_j^t \, \hat{\beta}_j^t + \sum_k w_k^t \, \hat{\gamma}_k^t \right) w_i^t \;=\; \sum_i \tilde{\alpha}_i^t w_i^t. \end{aligned}$$

originally:

$$\begin{aligned} \tilde{\beta}_j^t &= \hat{\beta}_j^t - \sum_j w_j^t \, \hat{\beta}_j^t, \\ \tilde{\gamma}_k^t &= \hat{\gamma}_k^t - \sum_k w_k^t \, \hat{\gamma}_k^t. \end{aligned} \tag{8}$$

With these notations the decomposition of country-level exports given by equation (6) re-writes as:

$$d \ln X_i^t = \tilde{\alpha}_i^t + \sum_j \frac{w_{ij}^t}{w_i^t} \, \tilde{\beta}_j^t + \sum_k \frac{w_{ik}^t}{w_i^t} \, \tilde{\gamma}_k^t. \tag{9}$$

The term $\tilde{\alpha}_i^t$ is interpreted here as the *exports performance* of country i. It gives the would-be increase in country i's exports if the latter had the same structure (by product and partner) as world trade. Parameters $\tilde{\beta}_j^t$ and $\tilde{\gamma}_k^t$ measure the growth in exports driven by the increasing overall demand of specific import market, respectively by the increasing global demand for specific products, relative to the annual growth rate of global exports. Thus, the last two terms of equation (9) reflect the contributions of country i's exports structure by partner and product to the overall growth of its exports. We refer to them as the *geographic* and *sectoral structure* effects. A large positive (negative) structure effect corresponds to a share of country' exports in products and to import markets with strongly growing demand higher (lower) than the world average.

We subtract the growth rate of global trade in t, $d \ln X^t$, to the left and right hand side expressions of identity (9) to obtain the decomposition of global market share growth rates for each exporter i:

$$d \ln X_i^t - d \ln X^t = \ln \frac{X_i^t}{X^t} - \ln \frac{X_i^{t-1}}{X^{t-1}} = \left(\tilde{\alpha}_i^t - d \ln X^t \right) + \sum_j \frac{w_{ij}^t}{w_i^t} \, \tilde{\beta}_j^t + \sum_k \frac{w_{ik}^t}{w_i^t} \, \tilde{\gamma}_k^t. \tag{10}$$

The decomposition given by equation (10) is accomplished for each country and year within the considered period. Since growth rates are computed as changes in logarithms, the sum of annual rates gives the change in the exporter's market share between the first and last years, $d \ln \frac{X_i}{X}$. Similarly, *export performance*, *geographic* and *sectoral structure* effects for the entire period are obtained by summing up the corresponding annual effects:

$$\begin{aligned} d \ln \frac{X_i}{X} &= \sum_t \left(\ln \frac{X_i^t}{X^t} - \ln \frac{X_i^{t-1}}{X^{t-1}} \right) \\ &= \sum_t \left(\tilde{\alpha}_i^t - d \ln X^t \right) + \sum_t \left(\sum_j \frac{w_{ij}^t}{w_i^t} \, \tilde{\beta}_j^t \right) + \sum_t \left(\sum_k \frac{w_{ik}^t}{w_i^t} \, \tilde{\gamma}_k^t \right). \end{aligned} \tag{11}$$

Up to this point we computed growth rates as changes in logarithms. A simple manipulation of expressions on the left and right hand side of equation (11) leads to a component analysis of true growth rates of countries' shares in world exports, g_i:

$$\begin{aligned} g_i &= \exp\left(d\ln\frac{X_i}{X}\right) - 1 = \exp\left(\sum_t \left(\tilde{\alpha}_i^t - d\ln X^t\right)\right) \times \\ &\quad \times \exp\left(\sum_t \left(\sum_j \frac{w_{ij}^t}{w_i^t}\,\tilde{\beta}_j^t\right)\right) \times \exp\left(\sum_t \left(\sum_k \frac{w_{ik}^t}{w_i^t}\,\tilde{\gamma}_k^t\right)\right) - 1 \\ &= [1 + PERF_i] \times [1 + GEO_i] \times [1 + SECT_i] - 1. \end{aligned} \tag{12}$$

$PERF_i$, GEO_i and $SECT_i$ correspond to export performance, geographic and sectoral structure effects expressed in terms of true (not logarithmic) growth rates.[9] Thus, equation (12) decomposes the growth of each country's share of the global market into three terms: an exporter (performance) effect, a geographic structure effect that depends on the amounts of goods shipped to different destinations, and a sectoral effect that varies with the sectoral composition of country's exports. Countries have no influence on geographical and sectoral effects driving the exports' growth, but they can respond to these dynamics of the markets by adjusting the geographical and sectoral composition of their exports. Changing the bundle of exported products and trade partners is a long process, observed best in the medium and long run. Therefore, computing structural contributions GEO_i and $SECT_i$ from effects estimated on an year basis (rather directly for the entire period) permits to grasp both the positioning of country i in terms of most and less dynamic markets and its capacity to adapt to the international conjuncture by exporting more to markets (partners and products) with fast growing imports demand. In contrast, the export performance term $PERF_i$ captures a true competitiveness effect. It indicates the degree to which the exporting country was able to gain or lose market shares, after controlling for composition effects.

Changes in countries' net exports

The pronounced fragmentation of production lines across national borders points out to the fact that a country can increase its exports without increasing the domestic value-added of products shipped abroad.[10] An illustrative example is the low share of Chinese

[9] More precisely, we define: $PERF_i = \exp\left(\sum_t \left(\tilde{\alpha}_i^t - d\ln X\right)\right) - 1$, $GEO_i = \exp\left(\sum_t \sum_j \left(w_{ij}^t / w_i^t\right)\,\tilde{\beta}_j^t\right) - 1$ and $SECT_i = \exp\left(\sum_t \sum_k \left(w_{ik}^t / w_i^t\right)\,\tilde{\gamma}_k^t\right) - 1$.

[10] Hummels, Ishii, and Yi (2001), Koopman, Wang, and Wei (2008, 2009), Daudin, Rifflart, and Schweisguth (2011), Koopman, Wang, and Wei (2010) and Reimer (2011) show that these differences can be very large for some countries.

value-added assembling activities in the total value of exported final goods.[11] Therefore, to obtain a more authentic view of countries' export competitiveness, one needs to control for the imports content of exported products. The best way to deal with this problem is to use detailed input-output matrices. Unfortunately such data is unavailable at the disaggregation level of our trade data.

An alternative solution is to focus on net exports. We assumed hereby that an increase in a country's imports in one sector beyond (below) the world average (when export flows remain unchanged) is fully attributed to a decrease (increase) in the value-added of its exports within the same industry. To implement this idea, we complement the decomposition of exports' growth with a similar shift-share analysis of import growth rates. As previously, the growth of a country's imports is attributed to a country-specific effect, a geographic and a sectoral structure effect. The contribution of these factors to the growth of both exports and imports are expressed in terms of percentage changes of the country's share of the global market, making possible the addition and subtraction of terms for the same country. Accordingly, the growth in net exports of each country is obtained as the difference between the growth of exports and imports, and can be expressed as a sum of two structural effects (geographic and sectoral) and a country-specific term.

Let M_{ijk}^t denote country i's imports of product k from source j and v_{ijk}^t the average share of this flow in world trade. As for exports, the log-linearized growth rate of a country's imports is obtained as a weighted sum of growth rates computed at the disaggregated level:

$$d\ln M_i^t = \sum_{jk}\left(\frac{v_{ijk}^t}{v_i^t}\right)\ln\frac{M_{ijk}^t}{M_{ijk}^{t-1}} = \sum_{jk}\frac{v_{ijk}^t}{v_i^t}\,d\ln M_{ijk}^t, \tag{13}$$

where $v_{ijk}^t = \frac{1}{2}\left(\frac{M_{ijk}^{t-1}}{M^{t-1}} + \frac{M_{ijk}^t}{M^t}\right)$ and $v_i^t = \frac{1}{2}\left(\frac{M_i^{t-1}}{M^{t-1}} + \frac{M_i^t}{M^t}\right)$. Imports of i from j are also the exports of j to i ($M_{ijk}^t = X_{jik}^t$ and $v_{ijk}^t = w_{jik}^t$), meaning that the right hand side of equation (13) can be expressed in terms of export growth rates of individual trade flows. Using parameter estimates from equation (3), we obtain[12]:

$$d\ln M_i^t = \sum_{jk}\frac{v_{ijk}^t}{v_i^t}\,d\ln X_{jik}^t = \hat{intercept}^t + \hat{\beta}_i^t + \sum_j \frac{v_{ij}^t}{v_i^t}\,\hat{\alpha}_j^t + \sum_k \frac{v_{ik}^t}{v_i^t}\,\hat{\gamma}_k^t. \tag{14}$$

[11] According to Dedrick, Kraemer, and Linden (2010), the Chinese factory gate price of an assembled iPod is \$144. Of this, as little as \$4 may be Chinese value added.

[12] Parameters $\hat{\beta}_i^t$, $\hat{\alpha}_j^t$ and $\hat{\gamma}_k^t$ minimize the weighted sum of the squares of residuals. With large observation panels, $\sum_{ijk}\left(\hat{\epsilon}_{ijk}^t\right)^2 v_{ijk}^t \left[= \sum_{ijk}\left(\hat{\varepsilon}_{jik}^t\right)^2 w_{jik}^t\right] \approx 0$. This implies that $\sum_{jk}\hat{\epsilon}_{ijk}^t\left(\frac{v_{jk}^t}{v_i^t}\right) \approx 0$, $\forall i$. Accordingly, this term is dropped from the right hand side of equation (14).

Since now country i is the importer, we need to impose different normalization conditions than for exports. The weighted mean of country (importer) effects is set equal to the growth rate of world trade, and the weighted mean of partner/product effects is set equal to zero.[13] Then, new country, partner and product-specific effects are obtained as follows:

$$\begin{aligned} \bar{\beta}_i^t &= \hat{intercept}^t + \hat{\beta}_i^t + \sum_j w_j^t \, \hat{\alpha}_j^t + \sum_k w_k^t \, \hat{\gamma}_k^t. \\ \bar{\alpha}_j^t &= \hat{\alpha}_j^t - \sum_j w_j^t \, \hat{\alpha}_j^t \\ \bar{\gamma}_k^t &= \hat{\gamma}_k^t - \sum_k w_k^t \, \hat{\gamma}_k^t. \end{aligned} \tag{15}$$

We subtract the growth rate of world imports from equation (14) to obtain the decomposition of import market share growth rates:

$$d\ln M_i^t - d\ln M^t = \ln \frac{M_i^t}{M^t} - \ln \frac{M_i^{t-1}}{M^{t-1}} = \left(\bar{\beta}_i^t - d\ln M^t\right) + \sum_j \frac{v_{ij}^t}{v_i^t} \, \bar{\alpha}_j^t + \sum_k \frac{v_{ik}^t}{v_i^t} \, \bar{\gamma}_k^t. \tag{16}$$

Again, the growth of a country's imports is attributed to three factors: a country (importer) specific effect, a geographic (by-source composition of imports) and a sectoral (by-product composition of imports) structure effect. In this case, the country specific effect reflects its overall increasing or decreasing dependence on imports, after controlling for product- and supplier-specific dynamics.

Note that equations (10) and (16) reflect the composition of variations in countries' shares in the global market for exports and imports ($M^t = X^t$). Therefore, to obtain a decomposition of net exports, we simply subtract (16) from (10):

$$\begin{aligned} d\ln \frac{X_i^t}{X^t} - d\ln \frac{M_i^t}{M^t} &= \left[\left(\tilde{\alpha}_i^t - d\ln X^t\right) - \left(\bar{\beta}_i^t - d\ln M^t\right)\right] \\ &\quad + \left[\sum_j \frac{w_{ij}^t}{w_i^t} \, \tilde{\beta}_j^t - \sum_j \frac{v_{ij}^t}{v_i^t} \, \bar{\alpha}_j^t\right] + \left[\sum_k \frac{w_{ik}^t}{w_i^t} \, \tilde{\gamma}_k^t - \sum_k \frac{v_{ik}^t}{v_i^t} \, \bar{\gamma}_k^t\right]. \end{aligned} \tag{17}$$

Adding up annual effects and switching from log-linearized to true growth rates, we reach a shift-share decomposition of country-level net export growths into structural and country-

[13] $\sum_i \bar{\beta}_i^t v_i^t = d\ln M^t$ and $\sum_j \bar{\alpha}_j^t v_j^t = \sum_k \bar{\gamma}_k^t v_k^t = 0$.

specific (intrinsic) factors:

$$\begin{aligned} g\_net_i &= \exp\left(\sum_t \left(d\ln\frac{X_i^t}{X^t} - d\ln\frac{M_i^t}{M^t}\right)\right) - 1 \\ &= [1 + PERFnet_i] \times [1 + GEOnet_i] \times [1 + SECTnet_i] - 1. \end{aligned} \tag{18}$$

$PERFnet_i$, $GEOnet_i$ and $SECTnet_i$ reflect the amount of market share growth that can be inputed to the country's export performance, the geographic and sectoral structure of its exports, controlling for the value of imports embedded in exported products.[14]

Changes in shares of the Chinese market

We turn now to the decomposition of market share growths on a single importing market, in occurrence China. Note that the shift-share analysis permits to decompose only the increase in exports to China along the intensive margin. In line the aggregation rules used above, we compute the growth in each country's shipments to the Chinese market as a Törnqvist index of its exports of each product k to this market, let us denote it by J:

$$d\ln X_{iJ}^t = \sum_k \frac{w_{iJk}^t}{w_{iJ}^t}\, d\ln X_{iJk}^t. \tag{19}$$

We use a decomposition similar to the global market analysis to identify the contribution of different factors to the shifts in shares of the Chinese market of different exporting countries. For that, we run a fixed-effects estimation similar to equation (3) only for trade flows towards China and introduce estimated parameters in equation (19).

$$d\ln X_{iJk}^t = b_J^t + a_{iJ}^t + c_{kJ}^t + e_{iJk}^t. \tag{20}$$

Since we choose to focus exclusively on Chinese foreign trade, the importer (China) effect is constant and indistinguishable from the intercept b_J^t. Differently from the global market analysis, exporter dummies capture countries' performances on the Chinese market, and product fixed effects refer to the dynamics of different segments of the Chinese import demand. We adopt the following normalizations: $\tilde{a}_{iJ}^t = \hat{b}_J^t + \hat{a}_{iJ}^t + \sum_k \frac{w_{Jk}^t}{w_J^t}\hat{c}_{kJ}^t$ and $\tilde{c}_{kJ}^t = \hat{c}_{kJ}^t - \sum_k \frac{w_{Jk}^t}{w_J^t}\hat{c}_{kJ}^t$ for being able to interpret estimated parameters as effects relative to the average growth of exports to China rather than relative to some omitted country/product.

[14] The three sources of variations in each country's market share growth rate of net exports are computed as $PERFnet_i = \exp\left[(\tilde{\alpha}_i^t - d\ln X^t) - (\bar{\beta}_i^t - d\ln M^t)\right] - 1$, $GEOnet_i = \exp\left[\sum_j \frac{w_{ij}^t}{w_i^t}\,\tilde{\beta}_j^t - \sum_j \frac{v_{ij}^t}{v_i^t}\,\bar{\alpha}_j^t\right] - 1$ and $SECTnet_i = \exp\left[\sum_k \frac{w_{ik}^t}{w_i^t}\,\tilde{\gamma}_k^t - \sum_k \frac{v_{ik}^t}{v_i^t}\,\bar{\gamma}_k^t\right] - 1$.

Then, country-level growths in exports to China break down as:

$$d\ln X_{iJ}^t = \tilde{a}_{iJ}^t + \sum_k \frac{w_{iJk}^t}{w_{iJ}^t} \tilde{c}_{kJ}^t, \tag{21}$$

and in terms of shifts in shares of the Chinese market over the entire period as:

$$\begin{aligned} g_{iJ} &= \exp\left(\sum_t \left(\tilde{a}_{iJ}^t - d\ln X_J^t\right)\right) \times \exp\left(\sum_t \left(\sum_k \frac{w_{iJk}^t}{w_{iJ}^t}\, \tilde{c}_k^t\right)\right) - 1 \\ &= [1 + PERF_{iJ}] \times [1 + SECT_{iJ}] - 1. \end{aligned} \tag{22}$$

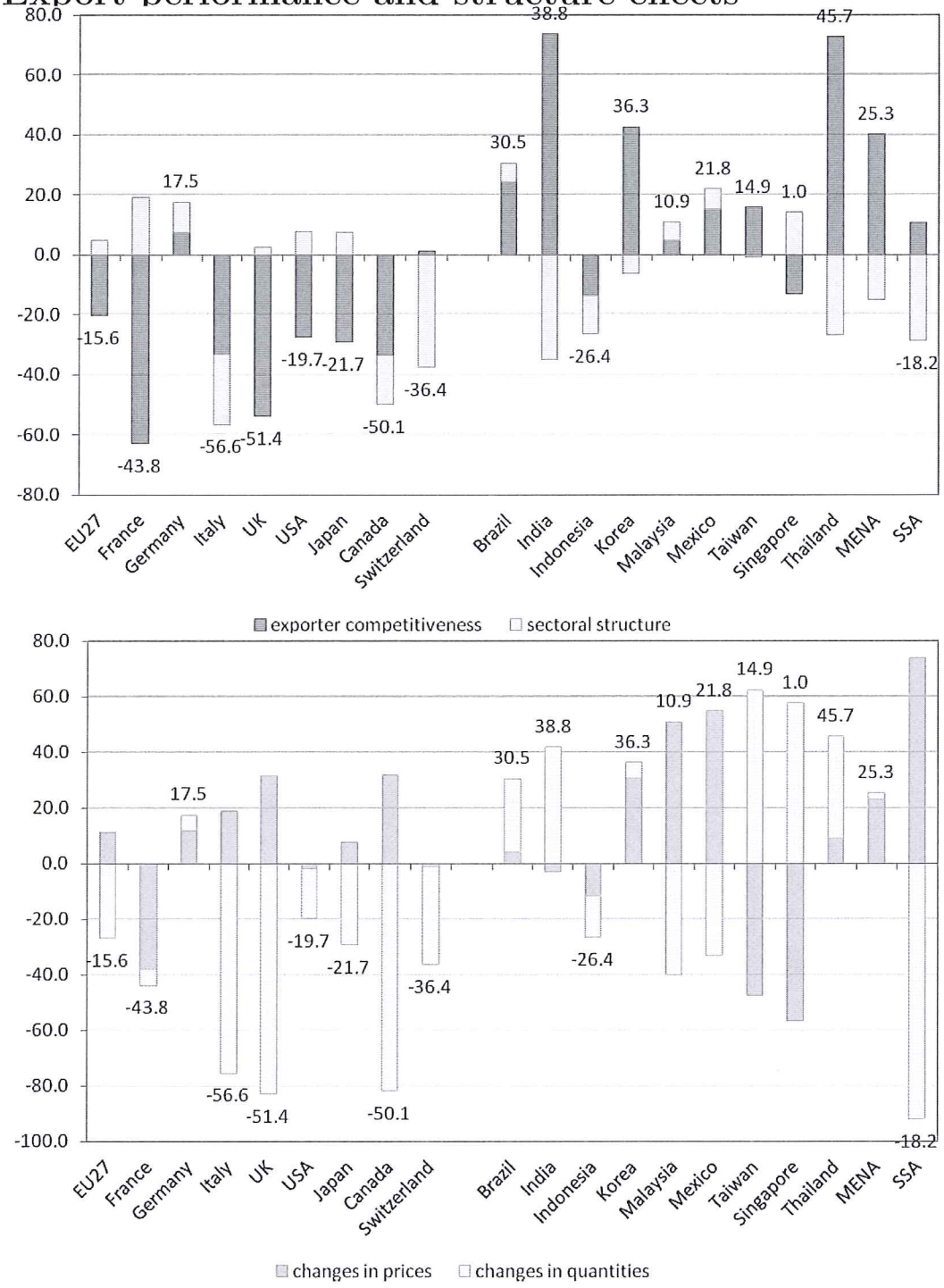
Terms $PERF_{iJ}$ and $SECT_{iJ}$ correspond to the overall growth of country i's exports to China due to its *export performance* on, and the *sectoral composition* of its exports to, this market. When we restrict the analysis to trade flows towards the Chinese market, the 'pure' dynamic of the Chinese market is assimilated to countries' performance effects.

Finally, we can apply the same rationale as for the global market analysis to examine the growth in countries' net exports to China:

$$\begin{aligned} g\_net_{iJ} &= \exp\left(\sum_t \left(d\ln \frac{X_{iJ}^t}{X_J^t} - d\ln \frac{M_{iJ}^t}{M_J^t}\right)\right) - 1 \\ &= [1 + PERFnet_{iJ}] \times [1 + SECTnet_{iJ}] - 1. \end{aligned} \tag{23}$$

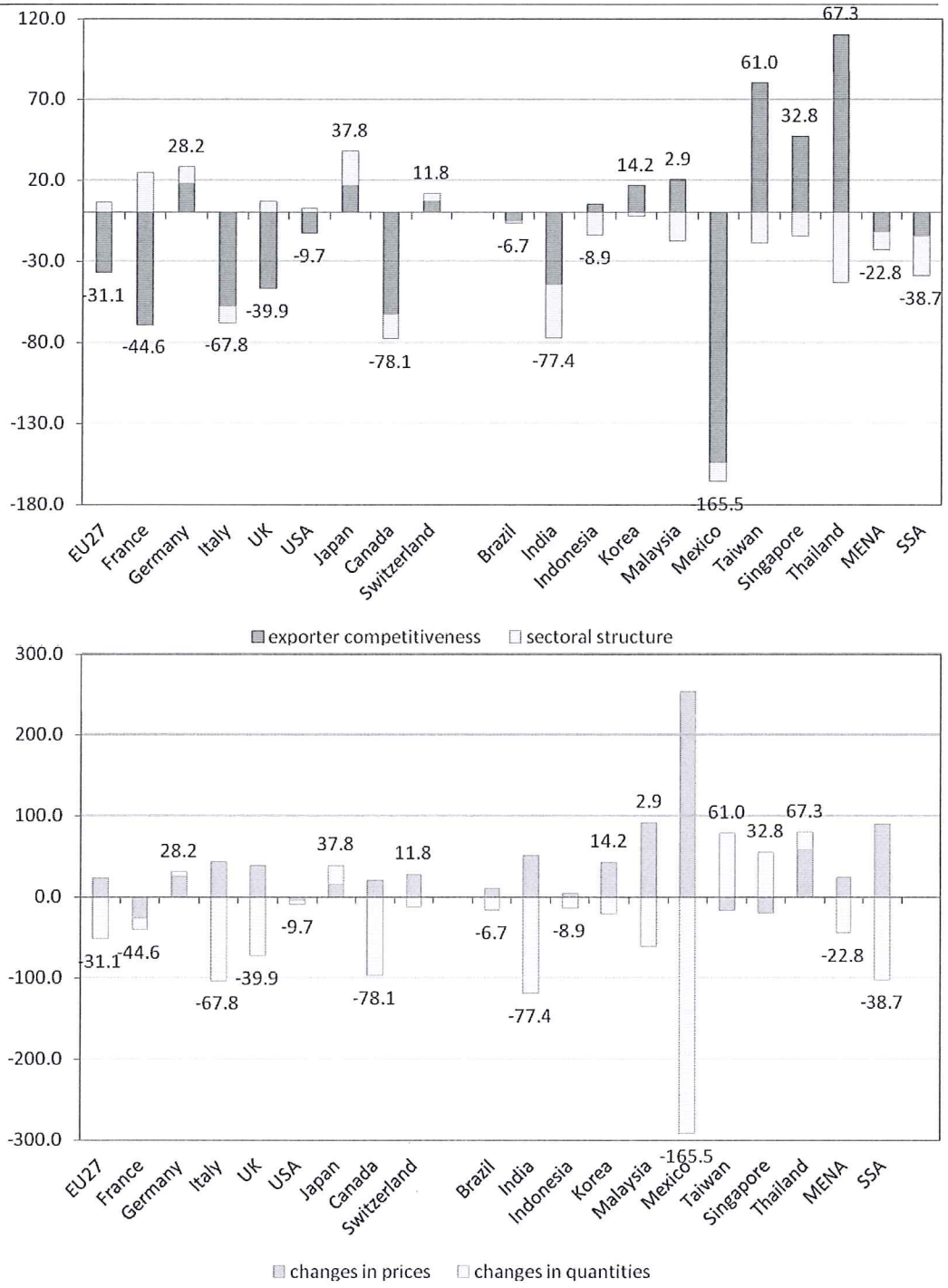
As previously, factors explaining the gains and losses in shares of the Chinese market can be obtained from a variance analysis of all international trade flows having China as destination.

D Export performance and structure effects



Notes: Units on the vertical axis correspond to logarithmic changes (%) in 1995 market shares.

Figure 7: Changes in shares of the Chinese import demand, 1995-2007



Notes: Units on the vertical axis correspond to logarithmic changes (%) in 1995 market shares.

Figure 8: Changes in shares of the Chinese *net* import demand, 1995-2007

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