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Guillaume GAULIER
Gianluca SANTONI
Daria TAGLIONI
Soledad ZIGNAGO[1]

Joint project BANQUE DE FRANCE/WORLD BANK

[1] This is a joint work World Bank/Banque de France by, for the World Bank, D. Taglioni (dtaglioni@worldbank.org) and, for the Banque de France, G. Gaulier (guillaume.gaulier@banque-france.fr), S. Zignago (soledad.zignago@banque-france.fr) and G. Santoni, (g.santoni1@gmail.com), also affiliated to Paris School of Economics and Scuola Superiore Sant'Anna, Pisa. The authors would like to thank the ITC (International Trade Center, UN/WTO, Geneva), and particularly Yvan Decreux, for providing their complete set of monthly trade data, spanning the years 2005-2013 and 228 countries worldwide. They also thank Catherine Martin for assistance in early stages of this project, as well as many other colleagues and peer reviewers at Banque de France, at the World Bank, at the IMF and researchers from the CompNet & MapCompete Research Networks for useful inputs, discussions, and for successfully applying the database to many specific country cases. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the Banque de France, the Eurosystem of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent, or any of the aforementioned individuals or the institutions they are affiliated to.

PARTS DE MARCHÉ MONDIALES EN TEMPS DE CRISE: UNE DÉCOMPOSITION TRIMESTRIELLE

G. GAULIER, G. SANTONI, D. TAGLIONI & S. ZIGNAGO

BANQUE DE FRANCE/WORLD BANK

Résumé. Au cours des deux dernières décennies, le commerce international est devenu un moteur de croissance privilégié pour beaucoup de pays en développement. En temps de crise, les pays doivent accorder une attention particulière à leur positionnement sur la carte mondiale du commerce et de la production, ils doivent prendre conscience de la façon dont ils s'en sortent par rapport aux concurrents et aux performances passées. Les variations dans leurs parts de marché sont-elles tirées par leur propre capacité d'offre ou par des facteurs externes, de composition de leur spécialisation géographique ou sectorielle ? Ce travail utilise des données trimestrielles couvrant tous les échanges internationaux du monde depuis 2005 pour calculer des indicateurs de performance à l'exportation dépouillés de ces effets de composition. La base de données qui en résulte (*Export Competitiveness Database*, ECD) révèle que la capacité à gagner des parts de marché a été plus forte pour les pays émergents et en développement, en particulier pour ceux d'Asie et du Pacifique, avec une croissance plus forte en volume qu'en prix, une fois contrôlée la dynamique propre aux secteurs et marchés d'exportation. Les indicateurs de la base ECD retracent également l'héritage du *double-dip* dans la zone euro, qui a rendu négatif le rôle joué par les effets géographiques, malgré des effets de structure sectoriels généralement positifs. Cette mesure de compétitivité est corrélée aux taux de change nominal et réel effectif des pays, communément perçus comme d'importants déterminants de la compétitivité d'un pays.

Mots-clé : compétitivité, performance à l'exportation, analyse à parts de marché constantes
Classification JEL : F10, F14, F40, C43

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Abstract. Au cours des deux dernières décennies, le commerce international est devenu un moteur de croissance privilégié pour beaucoup de pays en développement. En temps de crise, les pays doivent accorder une attention particulière à leur positionnement sur la carte mondiale du commerce et de la production, ils doivent être en mesure de comparer leurs performances commerciales à celles de leurs concurrents et à leurs propres performances passées. Les variations dans leurs parts de marché sont-elles tirées par leur propre capacité d'offre ou par des facteurs externes, de composition de leur spécialisation géographique ou sectorielle ? Ce travail utilise des données trimestrielles couvrant tous les échanges internationaux du monde depuis 2005 pour calculer des indicateurs de performance à l'exportation hors effets de composition. La base de données qui en résulte (*Export Competitiveness Database*, ECD) montre que la capacité à gagner des parts de marché a été plus forte pour les pays émergents et en développement, en particulier pour ceux d'Asie et du Pacifique, avec une croissance plus forte en volume qu'en prix, une fois contrôlées les dynamiques propres aux secteurs et aux marchés d'exportation. Les indicateurs de la base ECD retracent également l'héritage du *double-dip* dans la zone euro, qui a fait apparaître des effets géographiques très négatifs, que n'ont pas compensé des effets généralement positifs de la spécialisation sectorielle. Les indicateurs de compétitivité proposés sont corrélés aux taux de change nominal et réel effectif des pays, communément perçus comme d'importants déterminants de la compétitivité.

Keywords: export competitiveness, trade performance, shift-share decomposition
JEL Classification: F10, F14, F40, C43

1. INTRODUCTION

In the past two decades, international trade has become a privileged engine of growth for much of the developing world. However the global economy is changing rapidly. While the current degree of globalization remains unchanged, countries need to continuously reposition themselves in the global trade and production map. With advanced countries increasingly retrenching and specializing, South-South trade is growing in volume and scope, creating many new opportunities, in particular for competitive developing economies, but also new challenges for developing and developed countries alike.

In this framework is it important for countries to understand how they fare relative to competitors and to their past export performance. However, assuming that country A is "more competitive" in trade than country B – or compared to itself a decade earlier – simply because it is growing exports faster, is too simplistic. Even using relative performance in terms of market share growth may be prone to misinterpretation. This is because export growth is composed of two different types of effects: compositional effects and performance effects. Two countries may actually have similarly competitive bundles of export firms, but overall export performance of one country will be higher in the short-medium term because it has a more favorable (at the time) composition of exports, in terms of geographical markets or sectors.

This paper proposes and describes a new Export Competitiveness Database (ECD), which allows distinguishing between sectoral and geographical composition of exports and other factors specific to the exporting country and to track their evolution over time, at a quarterly frequency. Assuming that country A is more competitive than country B if its exports and market shares increase over and above those of countries having the same composition of exports, export performance can be considered a proxy for countries' competitiveness or supply-side performance. In other words, this effect is a natural metric for export competitiveness since it isolates the effects of a change in demand and a change in composition from the changes due to other determinants of export performance.

The interpretation of the export performance effect as a proxy for relative trade competitiveness follows a consolidated tradition in the trade literature (see for example Magee, 1968, 1975, Leamer and Stern, 1970; Richardson, 1971 and Milana, 1988). Since data in value are subject to possible bias driven by price effects (Richardson, 1970), the information in the database also allows distinguishing between price and volume components.

Specifically, the Export Competitiveness Database computes and makes publicly available information on the various components of export performance for 228 countries and territories. The indicators are provided with a quarterly frequency and computed as year-on-year changes relative to the same quarter of the previous year. Since the underlying bilateral export data are available from 2005 onward, the first data point in our database is relative to 2006q1 and reports the percentage change of each variable relative to 2005q1. The last data point refers to 2013q1. The database will be updated on a semi-annual basis and indicators are expected to cover information up to six months earlier. In the process, we identify interesting patterns of trade performance across countries.

On average, over the eight years covered by the data set, export performance, stripped of compositional effects, was strongest for countries from the Asia and the Pacific region. Moreover

such performance was almost entirely driven by exporting country specific factors, with changes reflecting volume growth rather than price developments. The export performance effect remained the most important driver of these countries' gains in market shares also in the wake of the global crisis (2009q1-2013q1 period). Interestingly, in the recent period all emerging and developing regions have on average improved their relative market position. By contrast, OECD countries on average experienced a deterioration of their supply side capacity since 2009.

Turning to compositional effects, South Asia, East Asia and the Pacific, and Sub-Saharan Africa have had the strongest pull from their choice of destination markets, with the effect mostly due to recent developments (2009-2013 period). At the same time, geographical specialization for Latin America and the Caribbean and for the Middle East and North Africa region, which had a negative bearing on export performance before the crisis, is now slightly positive. This is not the case for Eastern Europe and Central Asia, whose export performance was supported by a favorable geographical specialization before the crisis and is instead suffering from it in the most recent period, possibly due to a faltering demand in Western Europe.

Finally we look at sectoral specialization. This has served well Sub-Saharan Africa (AFR), the Middle-East and North Africa (MENA) region, Eastern Europe and Central Asia (ECA), the Latin America and the Caribbean (LAC) region, and – marginally – the OECD countries, particularly in pre-crisis years. Since 2009, however, sectoral specialization has become a less important driver of changes in the relative positioning of the different world regions in the map of global trade.

An illustrative set of results suggests that our measure of competitiveness is significantly correlated with factors that are commonly perceived as influencing countries' competitiveness, including the nominal effective exchange rate (NEER) and the real effective exchange rate (REER).[2]

The present analysis focuses on countries' overall competitiveness and provides a decomposition of all indicators into prices and volumes. The scope of the analysis can be extended in two important respects going forward. First, indicators can be computed for subsets of countries' trade. For example indicators for trade with different skill or technological intensity, broad sectors, or specific value chains (e.g. the textiles, auto, electronics, or chemicals value chain) within countries can be produced. Second, the decomposition into prices and volumes can be extended to account fully for the extensive margin of trade (now based on the intensive margin). Expanding the analysis on these three fronts should be the focus of future data collection and research.

In the next section, we describe the scope of the data and the methodology, as well as the relation to other databases. In Section 3 we discuss patterns of export performance across main world regions and for selected major exporting countries. Section 4 presents some further applications of the indicators. Section 5 concludes.

2. DATA AND METHODOLOGY

Our aim is to provide a new database, the Export Competitiveness Database, computing export market share growth decompositions that quantify country specific performances, and that capture the extent to which these reflect country *i*'s market specialization, the sectoral specialization, or

[2] A separate note, available from the authors, also tested and found a positive correlation between the indicators presented in this paper and the measures making up the 12 pillars of the World Economic Forum Global Competitiveness Index, as developed by Sala-i-Martin and Artadi (2004).

other determinants of its ability to improve market shares (see Annex 1 for a theoretical framework that provides insights to relate the aggregate indicators to microeconomic and macroeconomic constraints of supply-side export performance or competitiveness).

In Section 2.1, we discuss the methodology of the analysis and how this relates to similar methodologies. In Section 2.2 we describe the scope of the resulting database and how this database relates to existing databases discussing and providing indicators of competitiveness.

2.1. Methodology and relation to other methods

The Export Competitiveness Database resulting from this work encompasses quarterly information on year-on-year export growth from 2006q1 to 2013q1 for a total of 228 countries and territories worldwide, broadly representing all regions and income groups in the world. It is based on monthly and quarterly data available for the period since 2005 at the HS 6-digit level (2002 classification) from Trade Map of the International Trade Centre (ITC).[3] These are bilateral trade data covering the majority of countries and territories worldwide and 5,300 products of the Harmonized System. Reporting is relatively timely as it allows having information up to three months earlier.

The method proposed here envisages the computation of measures of export performance, sectoral specialization and geographical specialization. We use regression analysis to decompose export growth of bilateral export data at the HS-6 digit product level of disaggregation and using high frequency data. Specifically, the method envisages a decomposition of export growth based on a weighted variance analysis (ANOVA) of bilateral export data, disaggregated by product and using high frequency data. The model identifies the export growth of each exporting country as if all exporters had the same geographical and sectoral specialization. This is important for export data, as export growth rates are affected by structural effects: exporters with strong positions in the most dynamic destination markets or specialized in high growth sectors benefit *ceteris paribus* from stronger growth. With this methodology, exporter performance can be assessed assuming neutral geographic and sectoral specialization. As mentioned earlier, the computation consists of four main steps.

This "shift-share" decomposition is based on Jayet (1993), the first paper that used statistical methods for the structural analysis of geography effects. Cheptea, Gaulier and Zignago (2005), Bricongne, Fontagné, Gaulier, Taglioni and Vicard (2011) and Cheptea, Fontagné and Zignago (2012) provide contributions and refinements that make the method suitable for application to international trade.[4] The method developed in this paper harmonizes the various refinements from

[3] Trade Map, International Trade Statistics, International Trade Centre, www.trademap.org/tradestat/Index.aspx.

[4] Cheptea et al. (2005) employs the method to identify factors driving changes in world market shares for 88 countries during the period 1995-2002 using annual bilateral trade data at the HS 6-digit product-level. Along with the export competitiveness, they consider the geographical and sectoral countries' initial position on different import markets and their capacity to adapt to shifts in the world economy. They find that the export performance of emerging countries was fully driven by competitiveness gains, despite an unfavorable specialization in slow growing products and sectors. Cheptea et al. (2012) use an updated version of the data set, covering the period 1995-2009, to decompose annual changes in market shares into structural effects (geographical and sectoral) and a performance effect. The growth rate of country i's exports was computed as the logarithm of the Törnqvist index of the exports of each product k to each partner c. Authors focused on high tech goods and top range products, to better explain the European exports resilience, compared to US and Japan losses in these key segments of international competition. Bricongne et al (2011) applied a similar methodology to decompose the growth of French exports, computed using elementary mid-point growth rates and firm level data covering the period January 2008 to April 2009. Their novel contribution is to

the above literature and proposes additional enhancements that allow obtaining statistically robust and exhaustive time-varying estimates. Moreover, it innovates in two important respects. Namely it decomposes the country specific export performance coefficients in price and volume effects and provides indicators with a quarterly frequency. The quarterly frequency allows better explaining and characterizing the sudden and frequent changes that the global economy is undergoing since the Great Trade Collapse.

More generally, our econometric approach improves the standard Constant Market Share (CMS) decomposition found in the international trade literature (Tyszynski 1951, Richardson 1971a,b, Bowen and Pelzman 1984, Fagerberg 1988). [5] The competitiveness effect is here estimated rather than computed as a residual of the analysis and product and market structure effects are orthogonal, which is a shortcoming of traditional CMS analyses.

Our empirical strategy consists of four main steps. First, following Bricongne et al. (2011) we compute the so-called "mid-point growth rates" of exports (a measure initially proposed by Davis and Haltiwanger, 1992). Unlike normal growth rates, the mid-point growth rate allows to compute export growth accounting not only for the intensive margin of trade but also for the extensive margin. This is particularly important when one works with highly disaggregated data and higher frequency data, in which the extensive margin is highly dominant. Second, we decompose export growth into a sectoral effect, a geographical effect and an export performance effect, as in Cheptea et al. (2005) and Cheptea et al. (2010). Specifically, we regress the mid-point growth rate on three sets of fixed effects, i.e. exporter, importer and sector/product fixed effects, by means of a weighted OLS estimation. The weights are given by the relative share of an export flow (identified as exports from country *i* exporting a value x to a country *c* of product *k* at time *t*) in total exports, where total refers to the exports of the whole sample of countries. Third, we compute the indices from the estimated coefficients, after normalizing the coefficients and standard errors. Fourth, we further extend the decomposition to separating quantity from price effects, using a Törnqvist index to carry out the decomposition.[6]

The methodology proposed follows a top-down approach which quantifies performance moving from an assessment of overall country characteristics based on auxiliary statistical and econometric models to determine weights. In so doing it avoids key criticisms to composite indices, namely about the lack of guidance from theory as to the choice in underlying data and aggregation techniques (Ravallion, 2010).

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properly account for the extensive margin of trade. Previous methods only used the intensive margin of trade to measure competitiveness.

[5] Fabricant (1942) and Maddison (1952) were among the first to formalize the shift-share decomposition, which was extensively used afterwards, although mostly in regional studies on employment and productivity growth, also to international trade and competitiveness issues (those op. cit. and Laursen 1999, Wörz, 2005, among others). In the context of the recent economic crisis CMS analysis gained interest among policy researchers (ECB 2005, Brenton and Newfarmer 2007, Amador and Cabral 2008, Panagiotis et al. 2010, Finicelli et al. 2011, Beltramello et al. 2012). These standard shift-share analysis are based on an algebraic decomposition of the total export growth of a country (or a region) during a given time period (only the intensive margin is then considered) to compute the contribution of the initial geographical and sectoral composition of exports. The remaining proportion of the change is attributed to export performance (i.e. price and non-price competitiveness).

[6] This is a different choice that the one made by Cheptea et al. (2005) and (2010), which use unit values of HS6 traded products to compute bilateral trade price indices, which in turn are used to deflate current dollar values. Cheptea et al. (2005) provide results only in volumes, whereas mixed results are presented in Cheptea et al. (2012), which focus however on changes in values.

Hanson and Robertson (2008) have also proposed an analysis of trade performance based on a decomposition of bilateral flows. Their method differs from ours on several grounds. They use a gravity methodology to decompose bilateral trade into components associated with demand conditions in importing countries, supply conditions in exporting countries, and bilateral trade costs. While their method is useful in assessing how countries react to changes in demand and supply in a given other country, their exercise is of partial equilibrium and unsuitable to construct indicators. Our method allows instead separating the measurement of performance from the econometric assessment of its determinants. Moreover, unlike Hanson and Robertson, we are able to account for changes in the composition of trade, i.e. the extensive margin.

Step 1: Computation of Mid-Point Growth Rates

For a country *i* exporting a value *x* to a country *c* of product *k* at time *t*, the mid-point growth rate is defined as follows:

Equation 1

$$g_{ickt} = \frac{x_{ickt} - x_{ick(t-1)}}{\frac{1}{2}\left(x_{ickt} + x_{ick(t-1)}\right)}$$

To warrant that each country-sector combination reflects its importance in world trade, the weight attributed to each flow g_{ickt} is given by the relative share of the flow in total exports, where total refers to the exports of the whole sample of countries:

Equation 2

$$s_{ickt} = \frac{x_{ickt} + x_{ick(t-1)}}{\left(\sum_c \sum_i \sum_k x_{ickt} + x \sum_c \sum_i \sum_k x_{ick(t-1)}\right)}$$

Finally, the year-on-year growth rate of the total value of world exports is given by summing each individual flow g_{ickt} weighted by s_{ickt}:

Equation 3

$$G_t = \sum_c \sum_i \sum_k s_{ickt} * g_{ickt}$$

The G measure is monotonically related to the conventional logarithmic growth rate measure by the following relationship

Equation 4

$$ln\left(\frac{X_t}{X_{t-1}}\right) \approx g_t = ln\left(\frac{1 + \frac{g_t}{2}}{1 - \frac{g_t}{2}}\right)$$

Equation 4 shows that this represents a very good approximation of the latter except for extremely high growth rates (we will discuss this point further in Section 2.2). For bigger growth rates the two growth measures are linked by the following identity

Equation 5

$$\sum_{i,c,k} G_{ick}^{t} = \sum_{i,c,k} g_{ick}^{t} * s_{ick}^{t} \approx ln\left(\frac{\sum_{i,c,k} x_{ick}^{t}}{\sum_{i,c,k} x_{ick}^{t-1}}\right)$$

A very convenient feature of mid-point growth rates is that they produce very consistent estimates that can be added to each other algebraically, but also work at the aggregate level and are linked to the classical logarithmic growth rate by the following relationship, whatever the level of aggregation of the trade variable:

The advantage of the mid-point growth rate over standard growth rate measures is that it allows factoring in entries and exits of countries in new markets and new products, which would otherwise disappear if log-specifications are used. Moreover it preserves the additivity property as in delta log specifications.

Step 2: Fixed effects regression

Starting from a data set disaggregated by destination and sector (or product), we use the ANOVA methodology to decompose export growth in an export performance effect, a geographical effect, and a sectoral effect. Specifically, we regress the mid-point growth rate on three sets of fixed effects, i.e. exporter (f_i), importer (f_c) and sector/product fixed effects (f_k) by means of a weighted OLS estimation:

Equation 6

$$g_{ickt} = \alpha + \sum_{i} \phi_i f_i + \sum_{c} \beta_c f_c + \sum_{k} \gamma_k f_k + \varepsilon$$

Our model makes the following assumptions about the probability distribution of the responses: 1) Independence of the effects – this is an assumption of the model that simplifies the statistical analysis. 2) Normality – the distributions of the residuals are normal. 3) Equality (or "homogeneity") of variances, i.e. homoscedasticity — the variance of data in groups should be the same. A separate regression is carried out for each quarter in the data.

Step 3: Computation of the indices from the estimated coefficients

In the regression, we omit one exporter *i*, one importer *c* and one sector *k* to avoid perfect multicollinearity with the constant term α. The constant term α corresponds to the export growth of the reference country and the coefficients have to be interpreted as deviations from the performance of the omitted term.

To ease interpretations, we normalize the estimated effects so to quantify them as deviations from the average growth rate of exports for the overall sample in the data set (i.e. in our case this roughly corresponds to world export growth). We do so through a least squared estimation.[7]

Equation 7

$$ln\left(\frac{\sum_{c,k} x_{ick}^{t}}{\sum_{c,k} x_{ick}^{t-1}}\right) \approx \sum_{c,k} G_{ick}^{t} = \sum_{c,k} g_{ick}^{t} * s_{ick}^{t} = \phi_i^t + \sum_{c} s_{ic}^{t} \tilde{\beta}_c^t + \sum_{k} s_{ik}^{t} \tilde{\gamma}_k^t$$

[7] In other words, for each exporter *i*, we need to normalize coefficients for the fixed effects, by summing them up to a constant term equal for all *i*'s and to the weighted mean of the partner and products effects (weights are selected using Equation 2).

This allows writing down the identity in Equation 7, telling us that standard growth (log difference of exports) is well approximated by the weighted mid-point growth rate. The equality exploits the fact that the weights of all flows involving exporter i sum to the weight of its exports in world trade, i.e. $s_i^t = \sum_{ck} s_{ick}^t$ and that the sample weighted average error in **Erreur ! Source du renvoi introuvable.**6 is zero. Namely, coefficients normalization gives the market share change that country *i* would have if its geographical and sectoral specialization would be equal to the average of the full sample. This is our measure of competitiveness or export performance. We will use these two terms interchangeably throughout the text.

Step 4: Computation of price and quantity effects

The decomposition is further extended to separate quantity from price effects in order to capture the role played by price adjustments in the period. We use a Tornqvist index to carry out the decomposition.[8] We decompose values into quantities and unit values. We follow common practice and use changes in unit values as proxies for changes in prices, despite the many well-known shortcomings (Schott, 2004).[9] Accordingly, we compute average price changes, for total exports and vis-à-vis individual trade partners, by means of weighted averages of the elementary price changes. Elementary flows are decomposed as follows:

Equation 8

$$dln(value)_{ick,\frac{t}{t-1}} = dln(quantity)_{ick,\frac{t}{t-1}} + dln\left(\frac{value}{quantity}\right)_{ick,\frac{t}{t-1}}$$

We then aggregate elementary changes using a Tornqvist price index:

Equation 9

$$\sum_{ck} w_{ckt} * dln(value)_{ick,\frac{t}{t-1}} = \sum_{ck} s_{ickt} * dln(quantity)_{ick,\frac{t}{t-1}} + \sum_{ck} s_{ickt} * dln\left(\frac{value}{quantity}\right)_{ick,\frac{t}{t-1}}$$

where the weight factor (s_{ickt}) is computed as in Equation 2, i.e. as the relative share of the flow in total exports, where total refers to the exports of the whole sample of countries (Equation 10):

Equation 10

$$s_{ickt} = \frac{value_{ickt} + value_{ick(t-1)}}{\left(\sum_c \sum_i \sum_k value_{ickt} + x \sum_c \sum_i \sum_k value_{ick(t-1)}\right)}$$

[8] The caveat of our methodology is that only the intensive margin can be taken into consideration when disentangling price from quantity effects. Incorporating the extensive margin requires methodologies so far developed for firm level analysis, e.g. Martin and Méjean (2011). We leave this refinement to a future research agenda, as it has non-trivial computational implications).

[9] Unit value indices differ from price indices since their changes may be due to price and (compositional) quantity changes. Bias in unit value indices are attributed to changes in the mix of goods exported and to the poor quality of recorded data on quantities. The more the data is disaggregated, the more this bias is reduced.

2.2. The Export Competitiveness Database

The Export Competitiveness Database is the resulting database, containing a set of five indicators with information on export performance, measured as a relative change between period *t-1* and period *t*. In particular it contains indices of export growth, export market share change, changes in geographical and sectoral specialization (composition effects) and the export performance, i.e. changes in export market share growth once sectoral and geographical composition effects have been removed. The database contains information for trade in values, as well as in volume and unit value terms and all these terms are additive. Changes are computed relative to the same quarter in the previous year (year on year changes) and relative to the previous quarter (quarter on quarter changes). Year-on-year changes correct for seasonality and therefore these are chosen for describing the patterns and trends in Section 4. However, in some cases the user of the database may want to refer to the quarter-on-quarter changes. For this reason, the latter are also provided.

As a result, the database contains 18 time series for each of the 228 countries in the database. For benchmark purposes, the database also reports the evolution of world trade growth in values, volumes and unit values, against which individual country performances can be assessed.

Growth rates in the database are measured as log first differences (a.k.a. delta log). While expressing changes in the most common percentage growth rates would be much more intuitive, keeping them in this form allows an important advantage for the purpose of the paper. Namely, it allows adding up the various components of the export growth decomposition and to quickly grasp the proportionality of effects between indicators. To exemplify further, Table 1 reports the decomposition for the world region. Showing results in delta-logs allows immediately to see that the 3.2% growth in export market share between 2005 and 2013 is due to a 6.7% improvement due to push factors, but that about half of this effect has been offset by an unfavorable sectoral specialization (-3.7%). If we had used simple percentage growth rates we would have been unable to show how the various effects combine together. This difference is due to the fact that changes in natural logarithms (delta log) preserve the property of additivity, thus allowing to sum up percentage changes across components of the decomposition. This is not the case for the simple percentage export growth rates. While delta logs are only approximately equal to simple percentage growth rates, the discrepancies remain very small (0.02% in the just mentioned example of the market share change for East Asia and the Pacific).[10]

The entire set of results is currently available in the webpages of this working paper and of the authors. A dedicated website will give publicly access to the ECD database in a friendly manner at

[10] Log first differences are a good approximation of a percentage change. When used in conjunction with differencing, a logarithmic transformation converts absolute differences into relative (e.g. percentage) differences. Thus, the numbers reported in the tables represent an approximation of the percentage change in the variable from period to period (in our case relative to the same quarter of the previous year). Strictly speaking, the percentage change in a variable Y at period t is defined as (Y(t)-Y(t-1))/Y(t-1), which is approximately equal to LOG(Y(t)) - LOG(Y(t-1)). The approximation is almost exact if the percentage change is small. For example, a 5% percentage change in delta logs is equal to 4.88%, i.e. ln(1+5%)=0.0488. Related to the results in our database, the difference is very small for all countries reporting more than 10,000 elementary export flows. E.g. for Pakistan, which has about 10,000 elementary export flows, the average absolute difference between the conventional and the (weighted) mid-point growth rate was 0.05% (for an average growth rate of exports of -10% between 2008q4 and 2009q1. Discrepancies are a bit larger for less diversified countries, as the latter are subject to larger variability of export growth. But differences are reconciled by computing the corresponding percentage growth rate. In Table 1 we report for the BRICS an 11.7% annual export growth (the actual record growth is 11.1% annually). For the OECD the growth is equal to 4.6% instead of 4.5%.

the end of the first quarter 2014. Country-specific fact-sheets and short analyses on various topics will also be made available online in the course of 2014.

It is useful to clarify how this database fits into the existing data landscape. No other database proposes cross-country and time-varying measures (quarterly frequency) of geographical and sectoral specialization and export performance netted out of compositional effects, as our data set does. The information on export performance netted out of compositional effects can be related to competitiveness, a topic on which data sets available to the public exist. As discussed in the introduction, to the extent that we assume that country A is more competitive than country B if its exports and market shares increase over and above those of countries having the same composition of exports, our measure of export performance can be viewed as a proxy for countries' trade competitiveness.[11]

World market shares are often used by policy analysts as a main indicator of trade competitiveness (see Box 1). These however are criticized on the grounds that they are affected by other factors, including geographical and sectoral specialization. Our indicators improve on this front. By contrast, our indicators are not immune to another criticism applicable to most existing measures of trade competitiveness. Namely, existing measures of trade competitiveness (i.e. price and cost measures, market share changes, etc.) lend support to a view of competitiveness as a zero-sum game, where the improvement of a country can be seen as corresponding to a loss of opposite sign by other countries. This is the case because such measures are all expressed in relative terms. Therefore they neutralize global trends. Also our measure of competitiveness is expressed in relative terms. However, to account for developments at the world level, in our database we report the evolution in world export growth. Moreover, in illustrating results in a graphical form, we account for the relation between world export growth and a specific country's performance by measuring the deviation of the latter from the world average (see Figures 1-6 of this paper).

Reflecting the concepts discussed in Box 1, there are three two main types of publicly available data on competitiveness besides measures world market share changes and other trade-based indicators. First, there are databases with indicators measuring the institutional characteristics of each country that may influence competitiveness. This is the case, for example, of the Swiss-based World Economic Forum's "Global Competitiveness Index" (GCI) and of the World Bank's "Doing Business" Report. The GCI provides country rankings based on a weighted average of many different components, each informing on a different aspect of competitiveness, and grouped into 12 pillars of competitiveness, spanning what they call the "basic requirements" (institutions, infrastructure, macroeconomic conditions, health and education), and "efficiency enhancers and innovation and sophistication factors" (technological readiness, innovation, financial market development, and market and labor conditions). The "Doing Business" report on the other hand focuses on comparing business regulation environments across economies and over time, based on surveys on the ease of doing business in each country. Three important dimensions along which our data set differs from the existing databases of institutional characteristics are the following. First, it is not a composite index. As such it avoids key criticisms to composite indices, namely about the lack of guidance from theory as to the choice in underlying data and aggregation techniques (Ravaillon, 2010). Second, it allows to benchmark countries without the need of

[11] Obviously competitiveness goes beyond exports (Krugman, 1994). However, exports are a useful lens to look at a country's overall competitiveness. Trade data have the advantage to provide very detailed but internationally comparable information, which can be useful not only to assess countries' relative competitiveness in exports but also overall: if a country is competitive in its exports, it will presumably be competitive on the domestic market as well.

reasoning in terms of rankings, which have the drawback to focus the policy makers and media attention on the ranking themselves rather than the underlying developments. . It provides instead a quantitative assessment of countries performance over time (with a quarterly time frequency). Third, it focuses on performance or competitiveness on export markets.

Box 1: Defining and measuring competitiveness at the macro-level

A large number of concepts of competitiveness have been proposed both in the economic and business literature. Micro-economics based interpretations relate it to productivity. These are relatively well established concepts and easy to quantify, in particular at the firm or sectoral level. Macro-economic based definitions are more broadly defined but also less established and more controversial.

A first interpretation of competitiveness at the macro level is that of an aggregation of the micro-economic concept based on productivity. For example, Dollar and Wolff (1993) define an economy competitive if it "harbors a large number of internationally competitive industries and enterprises". This definition validates the view that domestic competitiveness can be assessed by looking at a country's performance in trade and direct investment abroad, as competitive economies will necessarily perform strongly on exports and direct investment. This explains why trade indicators have been used extensively as a measure of competitiveness. For example the well known use of measures of Revealed Comparative Advantage (Balassa, 1965) but also trade balances with rising real income (Hatsopoulos, Krugman and Summers, 1988 and Markusen, 1992), and market shares or market share increases (e.g. Sharpe, 1986; Fagerberg, 1988, Krugman and Hatsopoulos, 1987, Mandeng 1991, etc.).

A second view is based on relative prices. In competitive economies, equilibrium factor prices will be lower than those of international competitors, irrespective of the source of cost advantage (input abundance, technology, scale or a combination of the above). The real exchange rate and the real effective exchange rate are a measure of competitiveness based on relative prices that has been used by many authors and by literature as old as Lipshitz and McDonald (1991), Durand and Giorno (1987) and Helleiner (1989). Other authors use the unit labor costs criterion with the idea that these indicators are a good basis of international comparison among countries using similar technologies, as they are a function of important underlying determinants of competitiveness, i.e. wage rates, labor productivity and exchange rates (see for example Turner and Golub, 1997 or Hickman 1992). Obviously, there are important shortcomings in using unit labor cost indicators. In particular, they abstract from the cost function. A low labor cost component not necessarily signals competitiveness as it may result from high capital intensity or high intermediate input intensity. Hence there are also attempts to compute full unit costs (Siggel and Cockburn, 1995 and Siggel, 2007). Besides the limits of unit labor cost measures, there are also shortcomings more generally applicable to measures of price and cost competitiveness, including the failure to account for market and product composition differences and changes. Finally, such measures also lend support to a view of competitiveness as a zero-sum game, where the improvement of a country is seen as corresponding to a loss of opposite sign by other countries. This criticism however is applicable to all measurements (including market share changes) that do not account for world export growth.

Finally there are multi-dimensional definitions of competitiveness, such as Porter (1990), the World Economic Forum's World Development Indicators (2004), or Buckley, Pass and Prescott (1988). These have the advantage to capture several aspects of the debate on competitiveness. However it is difficult to derive robust quantitative measures without incurring in a typical problem of composite indices, namely the lack of guidance from theory as to the choice in underlying data and aggregation techniques (Ravallion, 2010).

Second, there are databases of indicators of relative prices and costs, such as the EER published by the Bank for International Settlements (BIS), the "Harmonised Competitiveness Indicators" of the

European Central Bank and Eurosystem[12] or the European Commission's MIP scoreboard, created for the purposes of the EU macroeconomic surveillance and excessive imbalances procedure.[13] Examples of the specific measures used are relative inflation (HIPC) deflated real effective exchange rates (REER), unit labor costs, and house prices. These are very popular measures used by policy makers and macroeconomists to gather views and compare countries' developments in competitiveness. Our database shares with the price and cost measures of competitiveness the important advantages of being based on widely available data (bilateral trade at the product level) and of offering a good coverage in time while also allowing for computations at higher than annual frequencies. It however avoids the typical shortcomings of some commonly used measures of price and cost competitiveness, including the failure to account for market and product composition differences and changes.

Both types of data, i.e. those that concentrate on countries' institutional characteristics and those that provide measures of relative prices and costs, are largely complementary to our database, and together they can provide an increasingly comprehensive perspective on international competitiveness. In Section 4 we illustrate econometrically the correlations between the Export Competitiveness Database and other indicators of competitiveness.

Differences across these data sets in terms of goals, units of measurement and sampling period notwithstanding, we find the information from our performance component of the database to be reasonably consistent with other databases. For instance, in Section 4 we show that there is a tight correlation between the country-level performance component over time and the change in NEER and REER. In a separate note, available from the authors on request, we further show that country-level export changes (net of sectoral and geographical composition) are also positively correlated to several indicators included in the 12 pillars of the World Economic Forum Global Competitiveness Index.

3. PATTERNS OF TRADE PERFORMANCE

3.1. Main world regions

What does decomposing exports as explained above say about countries' and regions' export competitiveness in recent years? Table 1 shows averages of the year-on-year change for each indicator, broken down by major region of the world, covering the entire period of data availability, i.e. in the period going from the first quarter of 2005 to the first quarter of 2013 (2005q1-2013q1).[14]

[12] http://sdw.ecb.europa.eu/browse.do?node=6374972
[13] http://ec.europa.eu/economy_finance/indicators/economic_reforms/eip/
[14] The indicators are provided with a quarterly frequency and the tables reported in this paper present year-on-year changes (i.e. relative to the same quarter of the previous year). Since the underlying bilateral export data are available from 2005 onwards, the first data point in our database is relative to 2006q1 and reports the percentage change of each variable relative to 2005q1. Similarly the data-point relative to 2006q2 quantifies the change over the 2005q2-2006q2 period. The last data point (2013q1) refers to changes between 2012q1 and 2013q1. The quarter on quarter version of the database, available online, contains instead data-points from 2005q2 to 2013q1. The 2005q2 data-point refers to changes that took place between 2005q1 and 2005q2. The 2013q1 data point refers to changes between 2012q4 and 2013q1.

On average, annual export growth percentage change was at double digit figures in most of the developing world. It was highest in South Asia (14.6%), followed in the order by the Eastern Europe and Central Asia (10.8%), Sub-Saharan Africa (10.7%), East Asia Pacific (10.4%), MENA (10.2%) and Latin America and the Caribbean (9%). Annual export growth rate was over the half for advanced economies from the OECD (5.4%).

Export performance (i.e. export growth stripped of compositional effects or pull factors) was strongest in East Asia and the Pacific and in South Asia, with 13.8% and 13.4% annual growth respectively.[15] In both cases, such impressive export growth was achieved on the back of important competitiveness or "push" supply-side factors. In particular, export market share growth excluding composition effects was 6.8% annually in South Asia. It outperformed all other main regions in the world on average, but developments have been quite erratic over time (see Figure 1). Looking at the decomposition of the push effect in price and volume components, it appears that South Asia's performance was almost entirely driven by volumes growth, while prices have played a somewhat negative role. With respect to composition effects, South Asia showed an almost neutral specialization. Meanwhile the East Asia and Pacific region showed a neutral geographical specialization but a sectoral composition that has weighed negatively on the overall export performance, suggesting a specialization in products and sectors that on average have had a relatively low growth over the eight past years.

Table 1: Decomposition of export growth into composition and country specific performance: main regions of the world (2006q1–2013q1)

	Export growth	**Export market share change**	Specialization composition effects		Market shares growth without composition effects		
			Geographical	Sectoral	Overall (value)	Price	Volumes
East Asia & Pacific	10,4	3,2	0,3	-3,7	6,7	0,8	5,8
South Asia	14,0	6,8	0,7	-0,1	6,2	-0,9	7,1
Latin America & Carribean	9,0	1,9	-0,5	1,7	0,6	1,0	-0,3
Middle East & North Africa	10,2	3,0	-0,1	3,5	-0,4	0,5	-0,9
Sub-Saharian Africa	10,7	3,5	0,4	3,8	-0,7	-0,8	0,0
Eastern Europe & Central Asia	10,8	3,6	0,4	2,1	1,1	1,4	-0,3
OECD	5,4	-1,8	-0,4	0,3	-1,6	-0,5	-1,1
World	7,2	0,0	0,0	0,0	0,0	0,0	0,0

Note: figures are averages of the year on year changes in natural logarithms (delta log) in the period 2006q1-2013q1, which preserve the additivity of its components. For relatively small changes the delta log approximates almost exactly the simple percentage growth rate (e.g. ln(1+5%)=0.0488). To obtain the corresponding growth rate of an indicator or of their sum it is sufficient to compute the exponential. Section 3.2 of the paper and footnote 10 provide additional explanations on this point.

The sectoral and product composition of exports has instead served well other regions over the same period of time, in particular Sub-Saharan Africa (3.8%), the MENA region (3.5%), Eastern Europe and Central Asia (2.1%), and Latin American and the Caribbean (1.7%). However, the average performances over the past eight years can lead to misguided conclusions. The crisis year of 2008 represented in many respects a watershed year. While developed countries battled with the crisis, emerging countries showed much more resilience and moved quickly back in positive growth territory. The case of the MENA region is particularly interesting in this respect. The quantification of the performance effect for the period 2005-2013 shows that the region's average performance was negative throughout the period of analysis, with volume growth falling at 0.9%

[15] Export growth net of compositional effects is not reported in the table but it is easy to gauge. It is obtained by subtracting the geographical and the sectoral effect to the export growth. In the case of East Asia Pacific this is therefore we compute 13.8=10.4-0.3+3.7.

annually on average. Yet, comparable figures for the most recent four years (Table 2) show instead positive – albeit barely – developments (0.1%).

MENA is not an isolated case. Since 2009, supply side performance improved in all developing and emerging regions, in particular in terms of volumes. Meanwhile supply-side performance which has been deteriorating in OECD countries throughout the entire period of analysis (-1.6%) has further increased since 2009 (-1.9%). Hence a comparison of Table 1 and Table 2 shows that by and large the crisis did not represent a structural break but rather an intensification of pre-existing trends.

Table 2. Decomposition of export market shares growth into composition and country specific performance: main regions of the world, 2009q1–2013q1

	Export growth	**Export market share change**	Specialization composition effects		Market shares growth without composition effects		
			Geographical	Sectoral	Overall (value)	Price	Volumes
East Asia & Pacific	7,3	4,5	1,4	-1,5	4,6	1,4	3,2
South Asia	10,5	7,7	1,6	0,7	5,4	-0,5	6,0
Latin America & Carribean	5,2	2,4	0,4	0,4	1,6	1,0	0,6
Middle East & North Africa	1,5	-1,2	0,1	-1,7	0,3	0,2	0,1
Sub-Saharian Africa	4,9	2,1	1,5	0,1	0,5	-1,1	1,7
Eastern Europe & Central Asia	3,2	0,5	-1,6	-1,6	3,7	1,2	2,5
OECD	0,6	-2,1	-0,8	0,6	-1,9	-0,6	-1,2
World	2,7	0,0	0,0	0,0	0,0	0,0	0,0

Note: figures are averages of the year on year changes in natural logarithms (delta log) in the period 2009q1-2013q1, which preserve the additivity of its components. For relatively small changes the delta log approximates almost exactly the simple percentage growth rate (e.g. ln(1+5%)=0.0488). To obtain the corresponding growth rate of an indicator or of their sum it is sufficient to compute the exponential. Section 3.2 of the paper and footnote 10 provide additional explanations on this point.

Certainly the euro-debt crisis took a toll on those countries and regions whose exports are concentrated towards Europe. This is the case of Eastern Europe and Central Asia: the effect of geographical and sectoral specialization moved from positive to negative territory.

The overall improvement in push factors across the developing world likely reflects sound policy frameworks, strong fundamentals and the substantial efforts in capacity building that many emerging and developing countries have put in place to counter lower exports to advanced countries. However, it is also important to look at the temporal profile. Figure 1 traces year-on-year growth from 2005 through the first quarter of 2013. Its top panel, left-hand side, shows that more modest push performance of the East Asia and Pacific region is concentrated in 2011, but it has picked up again in 2012. The disruption of important components of the Asian value chains due to the Japanese earthquake and tsunami may explain these developments. By contrast the South Asia region has experienced exceptional growth due to push factors over the 2011q2-2012q2 period, but overall the performance over time has been very variable. This suggests ample scope for optimizing pro-competitive domestic policies in the South Asia region.

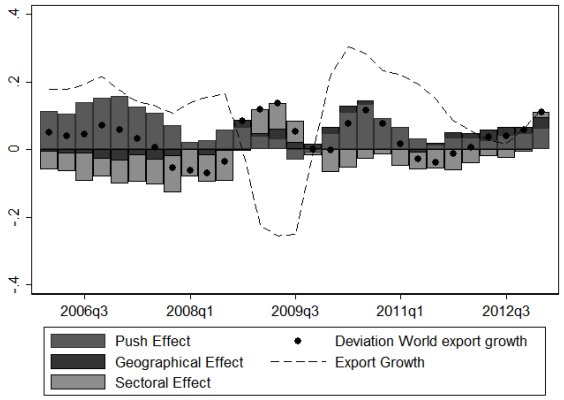
Further decomposition of the performance component[16] shows that the deterioration of the export performance of the MENA region – entirely due to developments in volumes of trade – started in 2010q4. This is not surprising, given the significant internal challenges that several economies in the region face in finding stability and growth after the "Arab spring". Meanwhile OECD

[16] Tables not shown here, moreover the full set of indicators will be available through the ECD website.

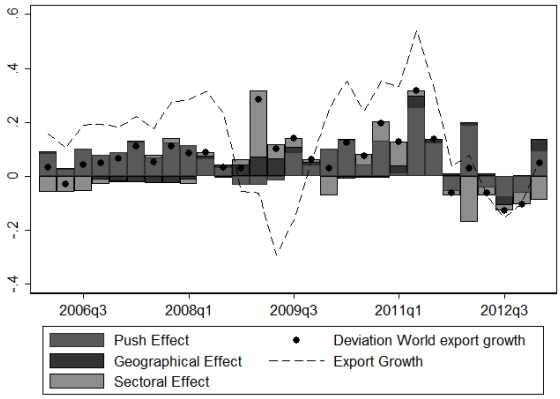
countries and the crisis-ridden EU as a group have experienced negative competitiveness since the inception of the euro-debt crisis in 2010.

Figure 1. Export performance decomposition ("push effect") across world regions: values

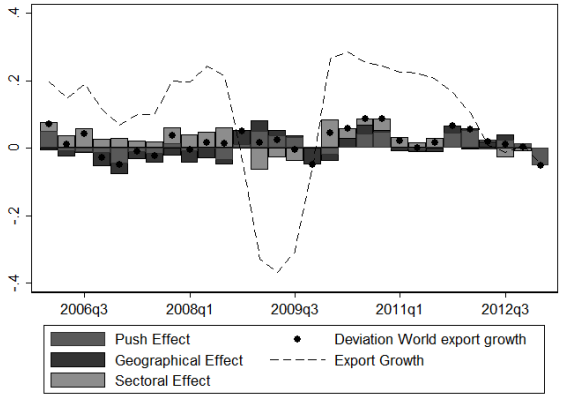
EAST ASIA & PACIFIC



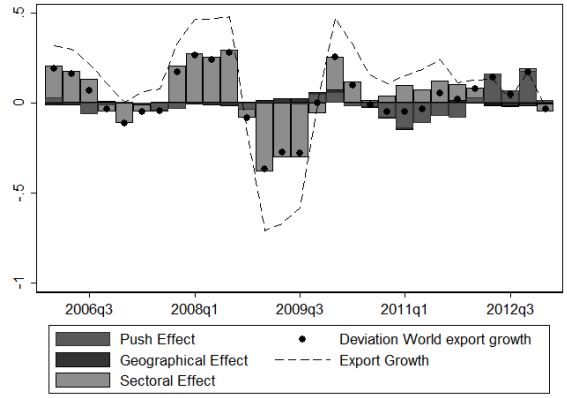
SOUTH ASIA



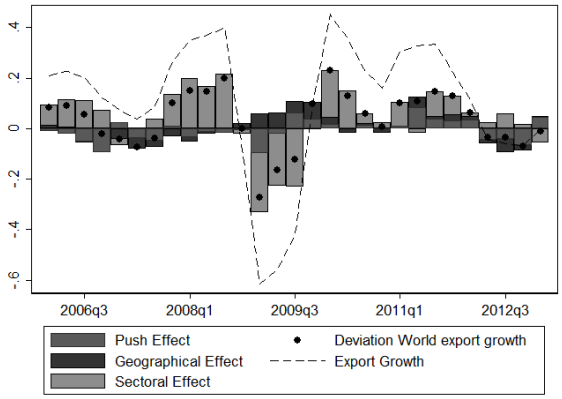
LATIN AMERICA & CARRIBEAN



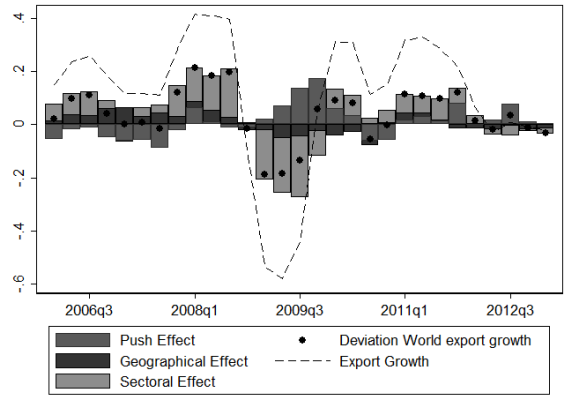
MIDDLE EAST & NORTH AFRICA

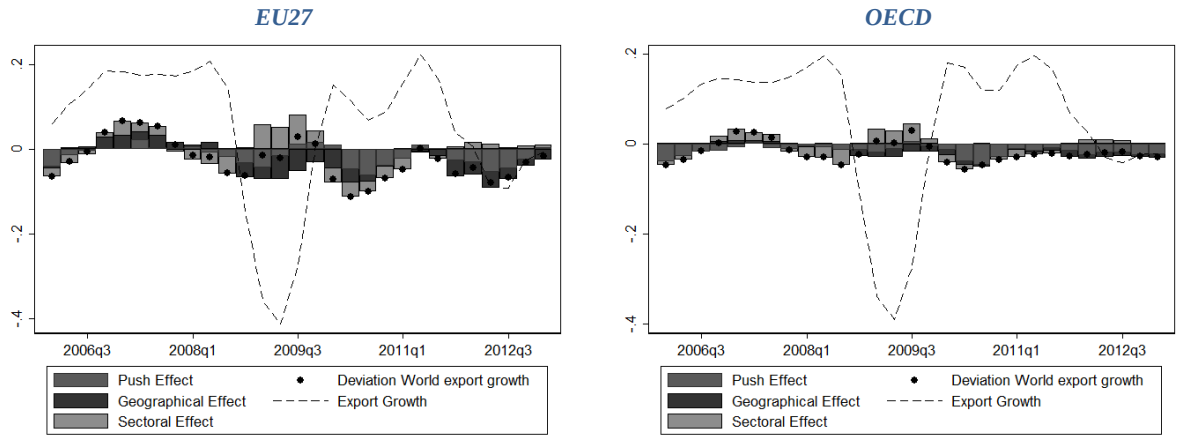


SUB-SAHARAN AFRICA



EASTERN EUROPE & CENTRAL ASIA





Note: figures are averages of the year on year changes in natural logarithms (delta log) in the period 2009q1-2013q1, which preserve the additivity of its components. For relatively small changes the delta log approximates almost exactly the simple percentage growth rate (e.g. ln(1+5%)=0.0488.

3.2. Individual countries

The performances illustrated in Tables 1 and 2 and in Figure 1 are weighted averages of individual country performances. As such, they average out country-specific developments. For this reason it is useful to concentrate next the analysis on developments in individual countries. In Table 3 and Table 4 we discuss and compare performance across a number of systemically important countries: the G-3, i.e. the large advanced countries (USA, Japan, the UK, the European Union and its four largest members), the BRICS (Brazil, Russia, India, China, and South Africa) and the group of large second-tier rising stars: Mexico, Indonesia, South Korea and Turkey (MIST countries[17]). Summary tables for the performance of each of the 228 countries and territories in the data set and over the entire period 2005q1-2013q1 are reported instead in the online appendix, while summary tables for other sub-periods are available from the authors upon request.

What does the export decomposition in pull and push factors say about countries' export competitiveness in recent years? Export growth in the BRICS in the period 2006q1– 2013q1 (Table 3) grew at an average annual pace of 11.1%. Among the BRICS, export growth was highest in India (15.3%) and South Africa (13.1%), followed by China (11.2%), Brazil (9.2%) and Russia (8.8%). This was much higher than the pace in any of the G-3, ranging from 2.3% in Japan to 6.1% in the USA. Export growth in the MIST stood somewhere in between the BRICS and the G-3. At 8.6% on average, it ranged between 12.3% (Turkey) and 7.8% (South Korea). In all BRICS and MIST, higher export growth was associated with gains in market shares over this period of time. These developments were accompanied by a loss in market share on the part of the G-3. Losses were particularly high in Japan (4.9%) and the euro area (2.7%), possibly due to relocation of production to cheaper locations within the context of production models increasingly relying on international value chains.

[17] So-dubbed by Jim O'Neill of Goldman Sachs, who also coined the acronym BRICS.

Table 3: Decomposition of export market shares growth into composition and country specific performance: G-3, BRICS and MIST (2006q1– 2013q1)

	Export growth	**Export market share change**	Specialization composition effects		Export market shares growth without composition effects		
			Geographical	Sectoral	Values (overall)	Price	Volumes
G-3	4,5	-2,6	-0,3	0,0	-2,3	-0,7	-1,6
USA	6,1	-1,1	0,9	0,4	-2,4	-0,7	-1,7
Japan	2,3	-4,9	1,9	-1,5	-5,3	0,3	-5,6
EU-27:	4,6	-2,5	-1,2	0,2	-1,6	-0,9	-0,7
EA17:	4,4	-2,7	-1,1	0,2	-1,8	-1,0	-0,8
France	2,6	-4,6	-1,2	1,2	-4,6	-1,1	-3,5
Germany	4,1	-3,0	-0,8	-0,1	-2,1	-1,3	-0,7
Italy	4,4	-2,8	-0,5	-0,7	-1,6	-0,5	-1,2
UK	2,1	-5,1	-1,5	0,9	-4,5	-1,1	-3,4
BRICS	11,1	4,0	0,2	-2,2	6,0	0,8	5,2
Brazil	9,2	2,0	1,6	2,0	-1,7	1,2	-2,8
Russia	8,8	1,6	0,4	4,0	-2,8	1,6	-4,4
India	15,3	8,1	1,2	1,1	5,9	-1,0	6,9
China	11,2	4,0	-0,2	-4,8	9,0	0,9	8,1
South Africa	13,1	5,9	0,9	5,1	-0,1	-3,0	2,9
MIST	8,6	1,4	0,3	-1,1	2,2	0,3	1,9
Mexico	7,9	0,7	-3,3	0,1	3,9	0,7	3,2
Indonesia	9,0	1,8	0,7	1,6	-0,4	0,6	-1,1
South Korea	7,8	0,6	2,8	-2,8	0,7	-0,2	0,9
Turkey	12,3	5,2	0,4	-2,3	7,0	0,4	6,6

Note: figures are averages of the year on year changes in natural logarithms (delta log) in the period 2006q1-2013q1, which preserve the additivity of its components. For relatively small changes the delta log approximates almost exactly the simple percentage growth rate (e.g. ln(1+5%)=0.0488). To obtain the corresponding growth rate of an indicator or of their sum it is sufficient to compute the exponential. Section 3.2 of the paper and footnote 10 provide additional explanations on this point.

Meanwhile a favorable geographical composition helped US (0.9%) and Japanese exports (1.9%). With the exception of Mexico and China, also the BRICS and the MIST enjoyed advantages due to their geographical specialization. Mexico's geographical specialization dampened the country's export growth, with an annual negative contribution equal to 3.3%, while the geographical specialization was only slightly negative for China (-0.2%).[18] Among the BRICS, China, India and Russia's geographical specialization had mostly a neutral effect on overall export growth while it helped more substantially Brazil (1.6%) and India (1.2%). Sectoral and product specialization, on its part, was favorable to commodity exporters (South Africa, Russia, Brazil, Indonesia and India), mostly neutral for the USA and the euro area, and negative for Japan, China, South Korea and Turkey.

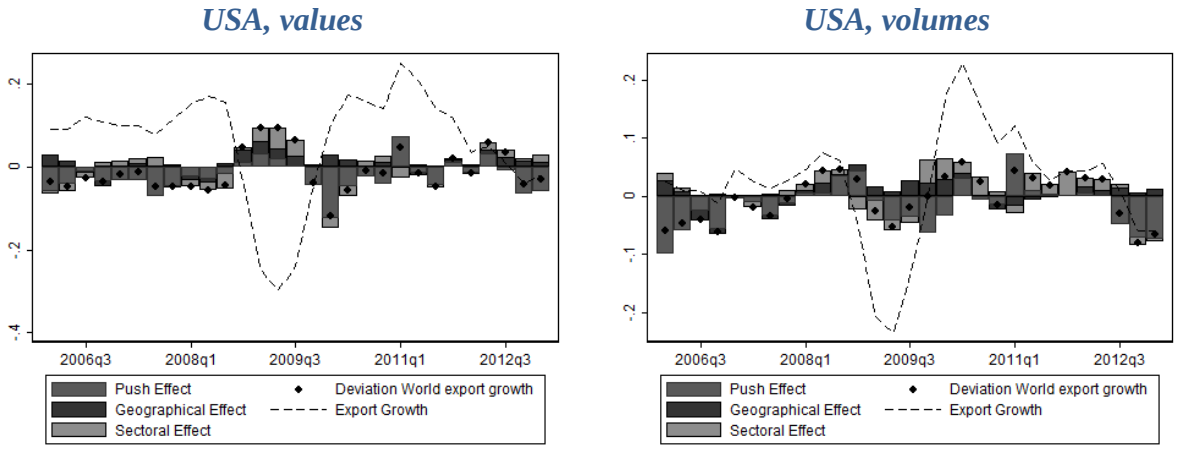
[18] Figure 4 shows the export performance of the MIST, year over year, from 2005 to the first quarter 2013 for exports both in value and volume terms. Mexico's geographical specialization was most detrimental in the period before the global crisis,

Turning to exporting country specific factors, the contribution was negative for the G-3, Brazil and Russia and negative but almost neutral for Indonesia and South-Africa. All other BRICS and MIST experienced improvements in competitiveness. Japan experienced the worst deterioration (5.3%), mostly due to developments in volumes. In the USA, 70% of the deterioration of competitiveness was due to the volumes component, while 55% of the competitiveness loss in the euro area was due to price developments. The negative supply-side performance of Russia and Indonesia was also entirely driven by development in volumes (in both cases, the price component of "push" factors was in fact positive and partially offset the negative performance of volumes).

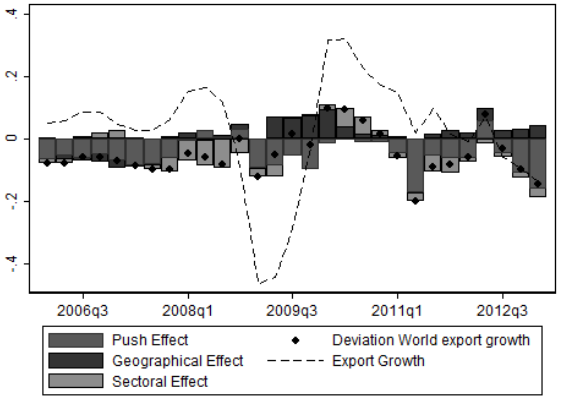
Advanced countries

Before discussing in detail export performance of the BRICS and MIST, it is worth investigating further the evolution over time of such component in the large advanced countries. This has been mostly negative in the US thorough the entire period, both in value and volume terms. In Japan the contribution was negative up to end of 2007 and then again starting with the trade collapse in 2008q4. Having recovered in 2010, it turned again negative in 2011 when the earthquake and tsunami hit the country. Performance in the euro area was mostly negative in value terms but more heterogeneous in terms of volumes. The negative performance is clearly associated with the financial crisis first and with the euro-debt crisis then. Section 4 will provide a further discussion of developments in the euro area. Noteworthy is to highlight the role of sectoral specialization in Europe. While sectoral effects were by and large neutral for Germany and Italy since 2009, these were generally positive for France and for the United Kingdom, compensating the negative geographical effect induced by the euro-debt crisis. This finding challenges received wisdom in current economic debates according to which the market share deterioration of France is driven by a bad sectoral specialization.

Figure 2. Export performance decomposition ("push effect"), values and volumes: G-3



Japan, values



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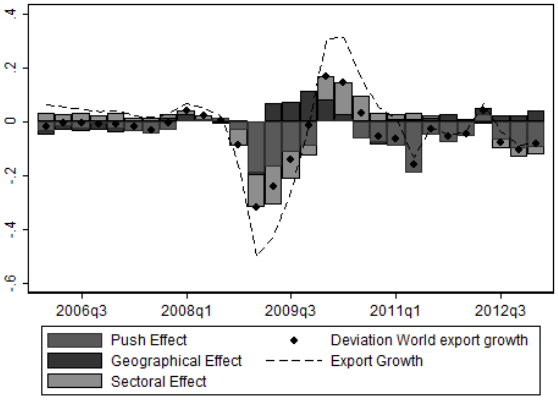
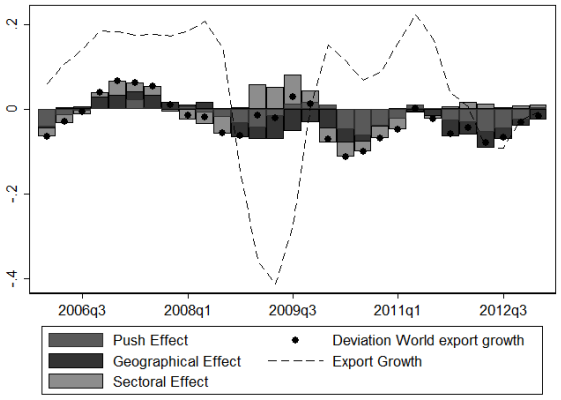
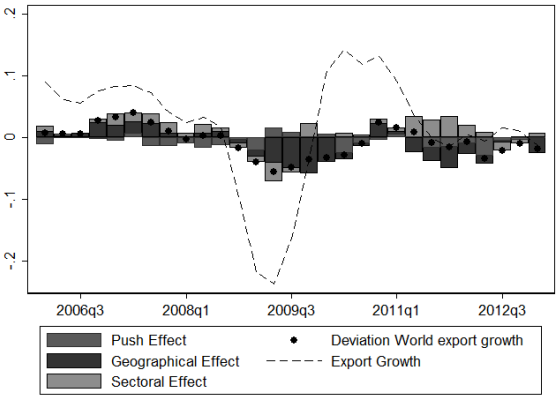


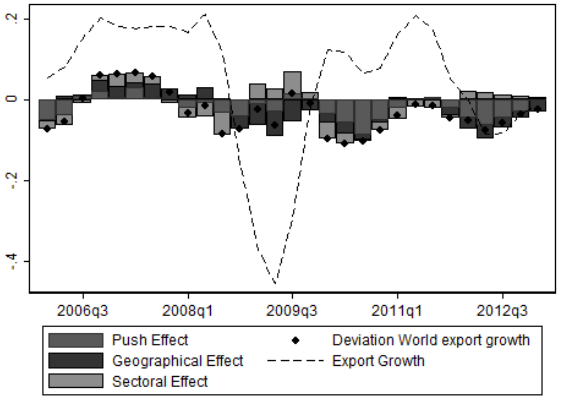
EU 27, values



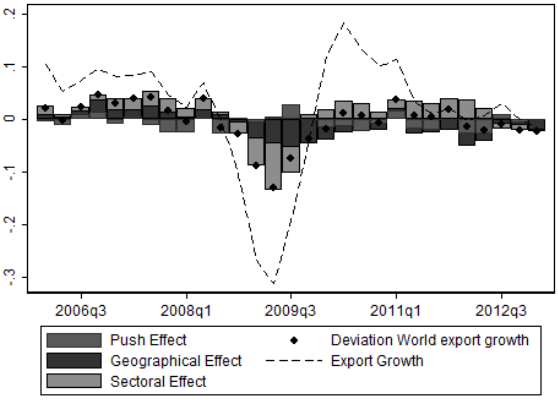
EU 27, volumes

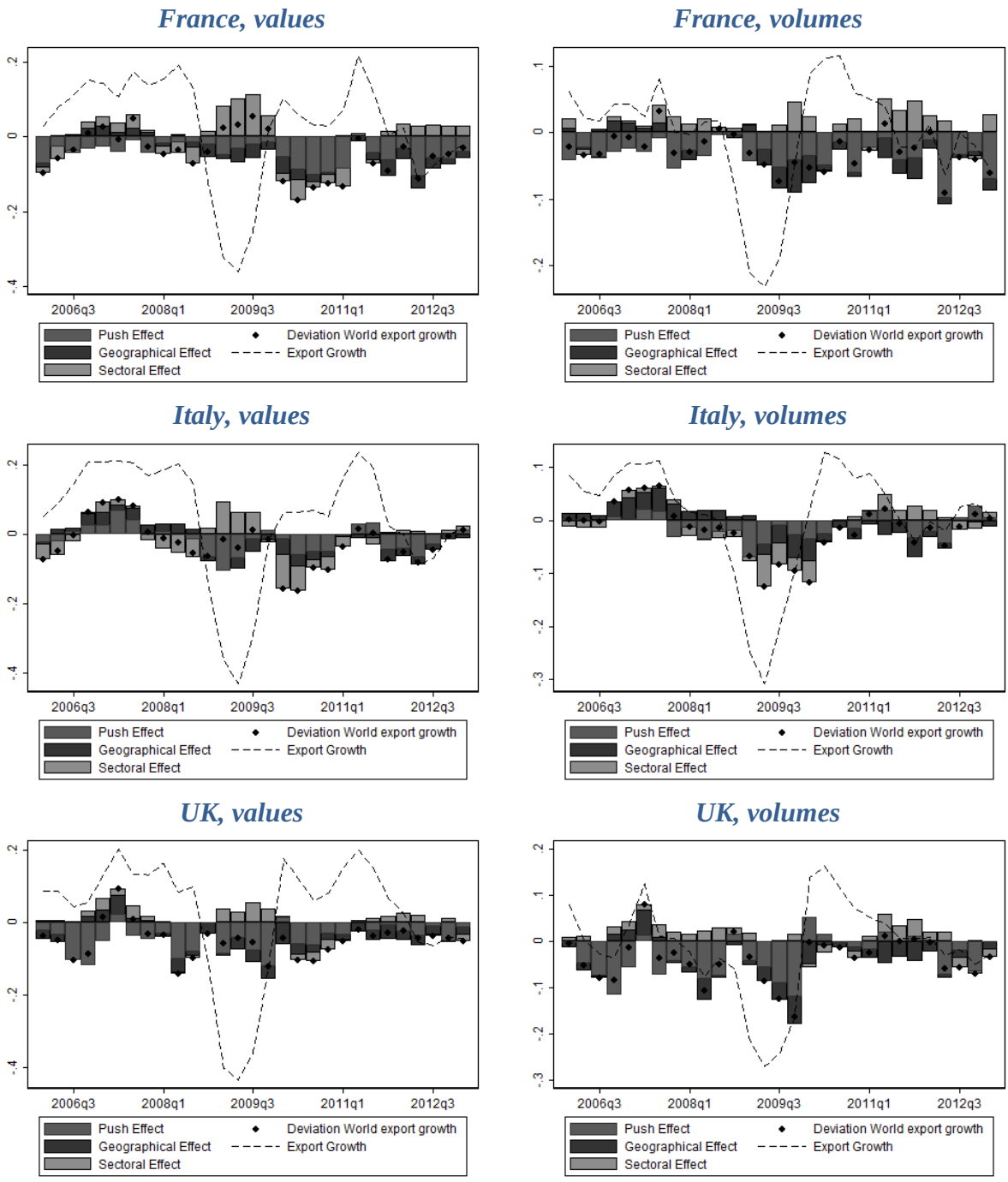


Germany, values



Germany, volumes





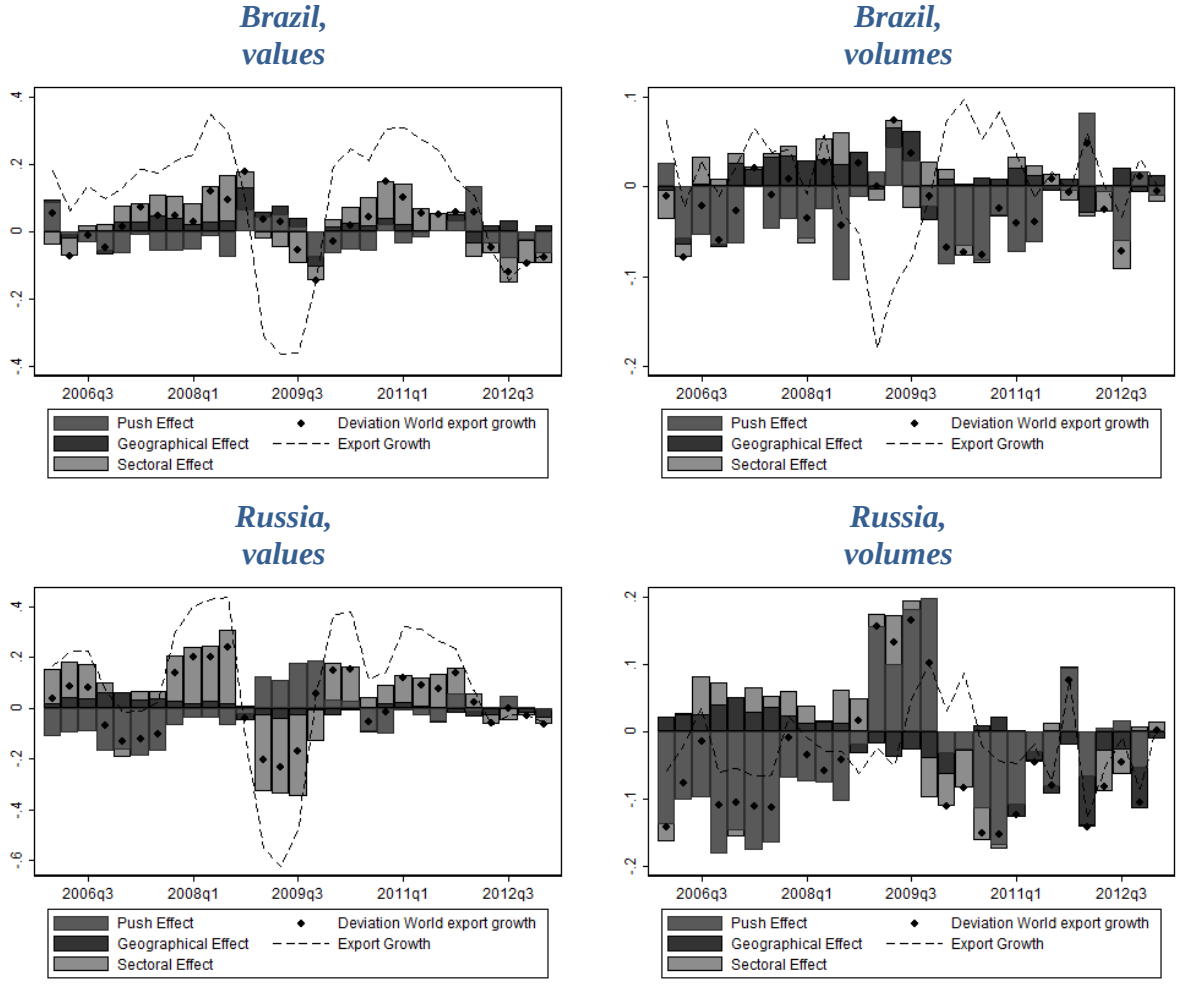
Note: figures are averages of the year on year changes in natural logarithms (delta log) in the period 2009q1-2013q1, which preserve the additivity of its components. For relatively small changes the delta log approximates almost exactly the simple percentage growth rate (e.g. ln(1+5%)=0.0488.

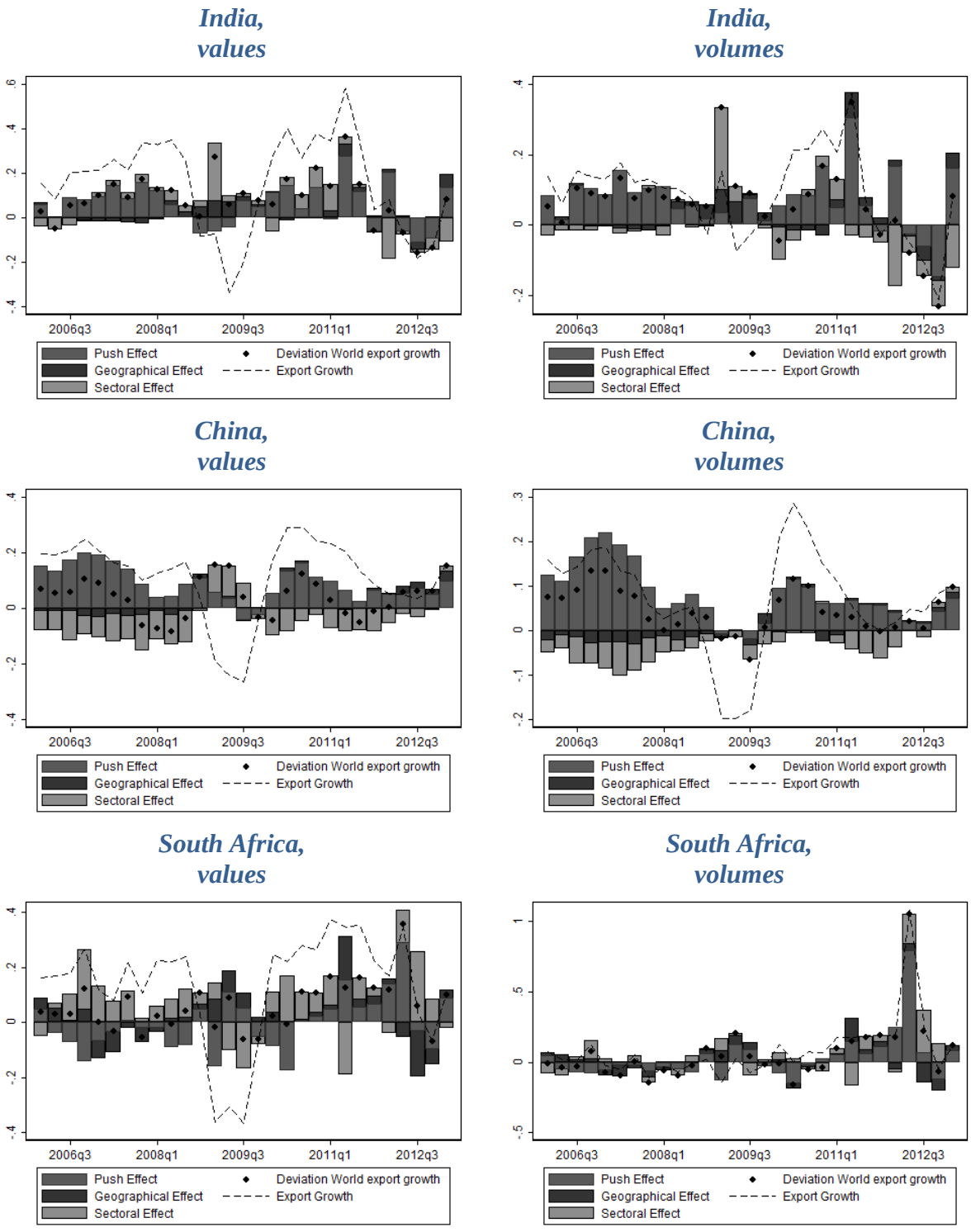
BRICS

Not surprisingly, among the BRICS, China leads every other country in terms of export performance (9% average annual growth in market shares, in the period 2006q1-2013q1, due to country specific factors). Moreover, the decomposition in volumes and unit values shows that this is almost completely driven by increases in volume terms (Table 3). Figure 3 shows that supply-

side performance has been positive throughout the entire period of analysis, except for the two central quarters in 2009 (March to August). It has however moderated in the aftermath of the crisis compared to the boom years up to 2007: it was only 6.4% in the period 2009q1-2013q1 (Table 4). The IMF (WEO, 2012) documents that while the country is expanding manufacturing capacity, particularly at the higher-end industries, and facilitating productivity improvements, including relocation of industries away from the coastal provinces to lower-cost inland locations, there has been in the wake of the global crisis a deterioration of China's terms of trade and rising costs and wages, which may have contributed to the moderation of the contribution of push factors.

Figure 3. Export performance decomposition ("push effect"), values and volumes: BRICS





Note: figures are the year on year changes in natural logarithms (delta log) in the period 2009q1-2013q1, which preserve the additivity of its components. For relatively small changes the delta log is a good approximation of the simple growth rate in %.

With a market share growth mainly due to push factors (5.1%), India was the second best performer among the BRICS. Growth was entirely driven by developments in volume terms. Like China, India was very resilient to the crisis, with its supply-side export performance largely

unaffected. This outlook however has changed in the course of 2012 (Figure 3 shows that supply-side performance has been positive throughout the entire period of analysis, except for the two central quarters in 2009 March to August.) It has however moderated in the aftermath of the crisis compared to the boom years up to 2007: it was only 6.4% in the period 2009q1-2013q1 (Table 4). The IMF (WEO, 2012) documents that while the country is expanding manufacturing capacity, particularly at the higher-end industries, and facilitating productivity improvements, including relocation of industries away from the coastal provinces to lower-cost inland locations, there has been in the wake of the global crisis a deterioration of China's terms of trade and rising costs and wages, which may have contributed to the moderation of the contribution of push factors. The IMF (WEO, 2012) documents policy uncertainty and supply bottlenecks that are constraining potential growth. They may have concurred to the observed recent moderation of supply-side performance.

Table 4: Decomposition of export market shares growth into composition and country specific performance: G-3, BRICS and MIST (2009 q1 – 2013 q1)

	Export growth	**Export market share change**	Specialization composition effects		Market shares growth without composition effects		
			Geographical	Sectoral	Overall (value)	Price	Volumes
G-3							
USA	3,0	0,3	1,3	0,8	-1,8	-0,2	-1,6
Japan	-0,8	-3,5	3,3	-0,7	-6,2	2,0	-8,1
EU-27:	-1,4	-4,2	-2,7	0,7	-2,2	-1,5	-0,6
EA17:	-1,6	-4,3	-2,6	0,7	-2,5	-1,6	-0,8
France	-3,1	-5,8	-2,3	2,1	-5,7	-1,6	-4,1
Germany	-2,1	-4,8	-2,3	0,3	-2,8	-2,1	-0,7
Italy	-2,3	-5,1	-2,1	0,0	-3,0	-1,5	-1,5
UK	-2,9	-5,7	-2,5	0,9	-4,0	-1,7	-2,4
BRICS							
Brazil	3,0	0,3	1,1	0,4	-1,2	0,7	-1,9
Russia	2,5	-0,3	-1,4	-1,4	2,6	2,1	0,4
India	11,1	8,4	2,0	1,3	5,1	-0,9	5,9
China	7,7	4,9	0,8	-2,2	6,4	1,6	4,7
South Africa	10,6	7,8	1,7	3,5	2,6	-4,9	7,5
MIST							
Mexico	7,3	4,6	-1,3	0,1	5,7	1,1	4,6
Indonesia	6,2	3,5	2,2	0,3	1,0	1,2	-0,2
South Korea	6,0	3,3	4,2	-1,4	0,4	0,7	-0,3
Turkey	5,4	2,7	-1,3	-2,8	6,7	-1,3	8,0

Note: figures are averages of the year on year changes in natural logarithms (delta log) in the period 2009q1-2013q1, which preserve the additivity of its components. For relatively small changes the delta log approximates almost exactly the simple percentage growth rate (e.g. ln(1+5%)=0.0488). To obtain the corresponding growth rate of an indicator or of their sum it is sufficient to compute the exponential. Section 3.2 of the paper and footnote 10 provide additional explanations on this point.

Meanwhile, high commodity prices in the run-up to the financial crisis and in the period 2010-2011 supported export growth in commodity exporters, including Brazil and Russia. The export specialization in commodities explains the dependence of export performance on pull factors (more on this in Section 4). Commodity exporters are greatly influenced by price swings. It is not only their exports that are influenced, but also their supply-side performance, with the result that these countries are greatly exposed to economic volatility induced by commodity price

fluctuations. This is visible from Figure 3, which shows important similarities in the patterns of export performance of Russia and Brazil. In both countries, growth in market shares – especially in value terms – is subject to considerable cyclicality and highly correlated to the cycle of the global economy. What this evidence suggests is that, in their role of commodity exporting emerging countries, Brazil's and in particular Russia's efforts to implement structural change will be confronted with the challenges from commodity price volatility. Recent research (Baunsgaard et al. 2012) quantifies the elasticity of the domestic economy to price swings in commodity exporters, differentiating by type of commodity.

Finally in South Africa, push factors have been positive since 2011. Export market share growth due to push factors was almost neutral on average in the years 2005-2013, but increased to 2.6% between 2009 and 2013.

MIST

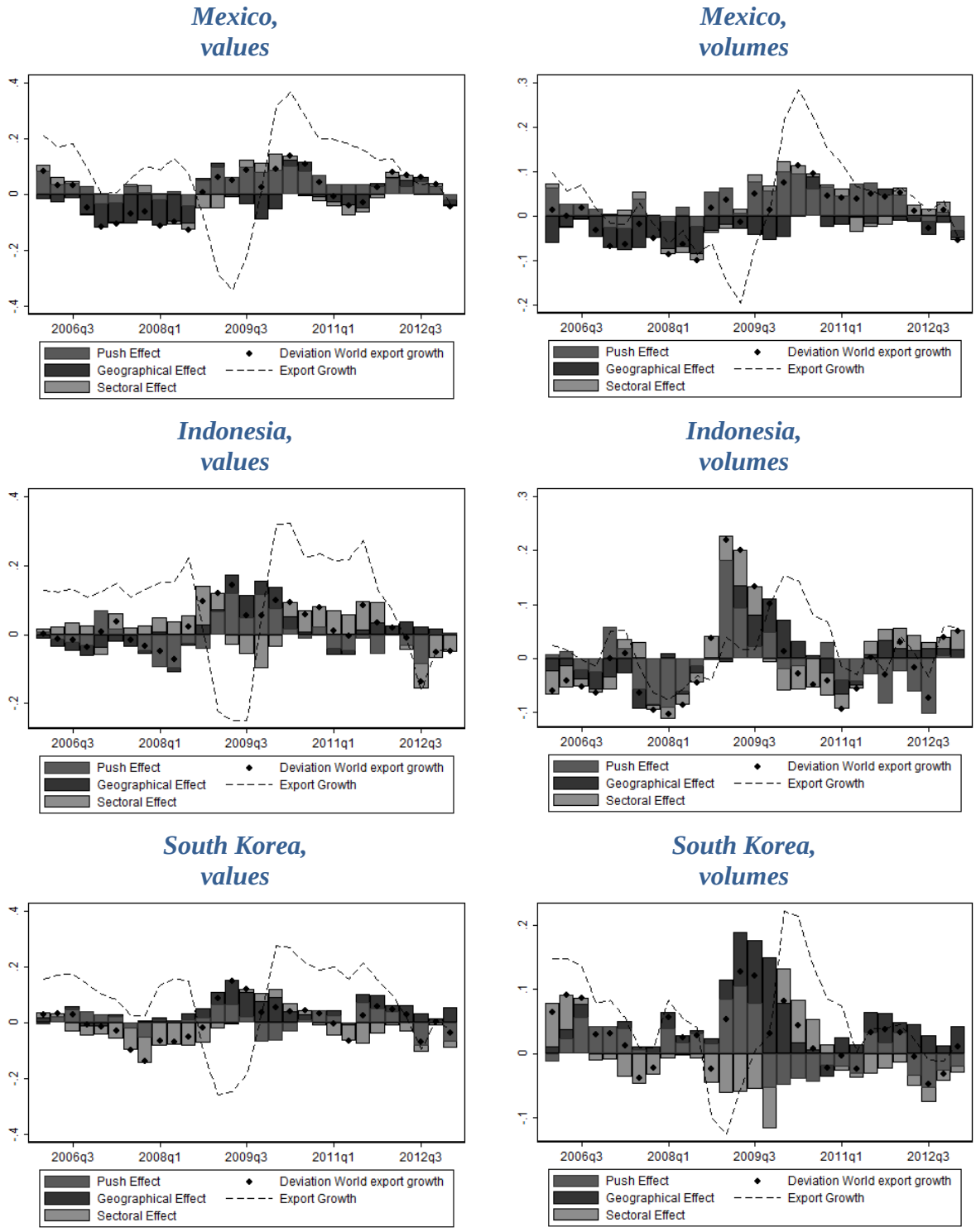
Finally we turn to performance in the MIST. How did successful manufacturing middle income exporters perform over the 2005-2013 period of time? Korea's exports grew by 7.8%, a rate growth close to the world average. However, the average for the period may be misleading. South Korea's export performance has been quite variable over the past eight years, mostly driven by a sectoral specialization that was unfavorable up until 2008; it became mildly favorable during the crisis and until late 2010 and then became again unfavorable. The contribution of geographical specialization, on the other hand, has been almost consistently positive throughout the period. Finally, since mid-2008 the country's export performance has also benefited from positive push factors. However, these have been largely driven by prices effects (see Table 4 and Figure 4, left-hand side panel).Mexico had a good export performance (3.9% increase, of which 3.2% in volume terms throughout the period) allowed the country to increase its export market shares by 0.7% between 2005 and 2013, However, the country was penalized by its unfavorable geographical focus to slow growth export markets, particularly before the global crisis.

Turkey also recorded a very positive export performance in the last eight years. Up until the crisis Turkey clearly outperformed global average growth, but during and after the crisis growth fell below the average. The good performance resumed in 2011q4. Competitiveness or performance effects played the biggest role in driving export growth up until the crisis and again since late 2010. Meanwhile, during the global crisis compositional components (geographical and sectoral specialization) were more prominent, particularly on a value basis. This pattern is certainly good news as it suggests that no serious structural supply-side impediments have emerged during the crisis. Perhaps surprisingly (given the strong trade linkages with debt-ridden Europe and politically troubled MENA countries), Turkey's recent export challenges appear to be more driven by its sectoral than its geographical composition, which dampened export market share growth by 2.8% since 2009 (the negative effect of geographical specialization was instead less than half, standing at -1.3%). Looking at the components of the performance factor, what is clear is that Turkey between 2005 and 2013 has grown well on the back of volume growth, while price has played a relatively minor role in driving growth.

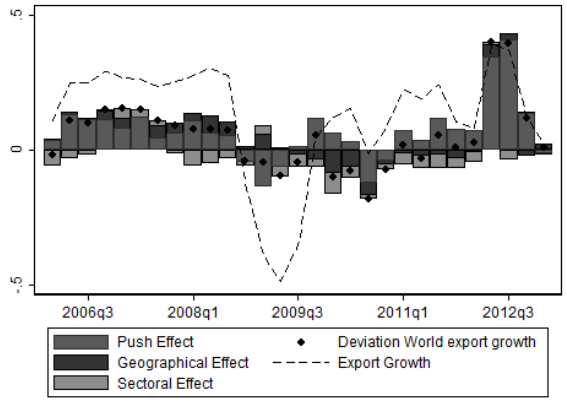
As mentioned before, being a commodity exporter partly explains the dependence of export performance on pull factors. This is the case of Indonesia, a commodity exporter that despite having been successful in transitioning to a more diversified production base, continues to depend on the natural resources sector and from their price. Over the period 2005-2013, Indonesia's world market share increased by 1.8%, with sectoral specialization contributing almost entirely to such

performance. By contrast, country specific effect was negative, fully driven by developments in volume terms. The evolution over time shows that the supply-side performance constituted a major drag for developments in market shares: increases until 2011 were offset by a deterioration in 2012, with the effect being particularly visible in volume terms.

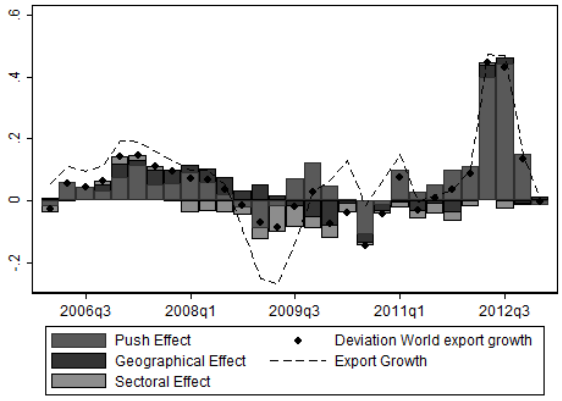
Figure 4. Export performance decomposition ("push effect"), values and volumes: MIST



Turkey, values



Turkey, volumes



Note: figures are averages of the year on year changes in natural logarithms (delta log) in the period 2009q1-2013q1, which preserve the additivity of its components. For relatively small changes the delta log approximates almost exactly the simple percentage growth rate (e.g. ln(1+5%)=0.0488.

4. FURTHER POLICY APPLICATIONS FOR THE DATABASE

After having discussed the magnitude of the push and pull factors and their impact on the market share of distinct countries and country groups, we would like to illustrate additional applications of the indicators to wider topics. The first exercise allows identifying if countries performance is pro-cyclical or anti-cyclical and whether specialization matters in this respect. It illustrates the point using data for the G20 and exploiting information carried by the variance in the model. The second exercise, instead, makes use of correlations with macroeconomic indicators to discuss the role of the non-tradable sector. It does so by looking at data from Eurozone countries during the euro-debt crisis. The third exercise gives correlations between our measure of supply side competitiveness and the real effective exchange rate, which is the most common proxy for competitiveness used by macroeconomists.

4.1. World factor determinants, volatility and cycle

Do countries have a pro-cyclical or an anti-cyclical behavior? And what determines such behavior? One can measure the role played by each of the shift-share components in explaining market share growth over the period by computing the relative weight of the variance of each component in the overall observed variance, together with a term collecting the covariances. Table 5 gives these variances and covariances for the G20 countries.

The table reads as follows. Countries are grouped together due to some common dominant behavior in one or more of the components of the variance. The first column of estimates (var(G)) indicates the variance of export growth. This is expressed in "volumes", i.e. using changes in quantities. Each of the following columns reports a component of the variance. There are overall ten variance or covariance components. The ten components are expressed as percentage of the total variance of the country's export growth. Starting with the left-hand side panel shaded in grey, which reports the components of variance, the first column denoted with the term (Gworld) and the number (1) indicates the contribution of the world trade growth variance. Not surprisingly this is highest for countries with low variability of own export growth. The second column in the panel of variances (Gmktsh, or 2) indicates the volatility of the push (competitiveness effect), while the

last two columns (Gsec, 3) and (Ggeo, 4) report the volatility of the pull factors, sectoral and geographical specialization respectively. The panel on the right hand side reports the co-variances. The first column (tagged 1-2) reports the covariance between the world trade growth (common factor to all countries) and the push factor (country specific). Similarly the second and third columns (tagged 1-3 and 1-4) report the covariance between world trade growth and and the pull factors (sectoral and geographical specialization, respectively). The fourth and fifth columns (tagged 2-3 and 2-4) report the covariance between the push factor and the sectoral and geographical pull factors, respectively. Finally, the last column reports the covariance between geographic and sectoral pull effects. Negative co-variances with respect to world growth indicate anti-cyclical behavior while low variability of export growth is possibly associated with a greater diversification of the export basket. We can distinguish four groups of countries.

- A first group of countries (group 1 in Table 5 – top panel), composed of Canada, Russia, Saudi Arabia, Australia, Indonesia and India is characterized by a very low variability of export growth in volume terms. The push factor and the sectoral pull factor are anti-cyclical: those countries tend to lose market shares when world trade is dynamic and vice-versa to consolidate it when world export growth is sluggish. This is demonstrated by the negative correlation numbers for the first two columns in the panel of the covariances, which reports the covariance with their export growth and push factors and sectoral specialization, respectively. We speculate why this is the case and produce hypotheses that the interested reader may test with appropriate methodologies and data. Two hypotheses come to mind. First, these countries are predominantly commodity exporters. The observed effect may be due to price factors: when world growth is high, the price of commodities is also high. Volumes, instead, are less responsive, which would be consistent with the negative sectoral pull effects measured in volumes. The second hypothesis is about the role of the real exchange rate, which tends to appreciate for commodities' producers driven by the higher price of commodities. An appreciated real exchange rate may hurt the overall competitiveness of the industrial sector by appreciating when world demand is high.[19]
- A second group of countries, composed of Argentina, Brazil, South Africa, and China is characterized by a high variability of export growth due to volatile and pro-cyclical push factors, as the high numbers for the column marked with (2) suggests. Moreover, except for China (whose variability is also the lowest of the group), these countries tend to lose market shares when the demand for the products they specialize in is favorable (negative 2-3). A similar effect is also observed for Saudi Arabia and Australia.
- A third group of countries shows medium to low variability of export growth and moderately volatile and procyclical push factors. The covariances on the other hand are very weak. This group is composed of Spain, Italy, Turkey, Great Britain and France.
- Finally, a fourth group of countries, including Japan, the Republic of Korea, Mexico, Germany and the United States is characterized by a combination of three factors: low variability of export growth, anti-cyclical push effect (column 1-2 in the covariances panel), pro-cyclical sectoral pull factors (column 1-3). The anti-cyclical push factor indicates the ability to

[19] In all groups, the individual countries exhibit significant deviations from the average. In the first group Canada is the only country with an acyclical sectoral pull factor. It seems also to be able to preserve its (high) market share in the US when this market is slugglish (negative covariance 2-4). Saudi Arabia and Australia tend to lose market shares when the demand for the commodities they are specialized in are surging. The opposite is true for Indonesia. India exhibits a high variability of export growth due to volatile push factor plus market shares gains when its sectoral specialization is favorable.

consolidate market shares when demand is low. The US, and to a lesser extent Germany, Mexico and Korea seem to have this feature (this was also the case for countries in group 1). These countries, except Japan also exhibit a low variability of export growth, possibly driven by a well-diversified export structure. Japan exhibits a much higher variability of export growth due to the fact that the country combines a pro-cyclical sectoral pull effect with a relatively high degree of specialization. The US has the lowest variability of export growth in the world possibly due to its diversification and to the fact that it performs better when the world markets are struggling (negative 1-2). The generally low variability of export growth also means that these countries export performances are dominated by the common world factors – this is common also to countries in groups 1 and 3.

Table 5: Variance and covariance analysis of countries performance (2006q1-2013q1)

	Group	var(G)	VARIANCE				COVARIANCE					
			(Gworld) (1)	(Gmktsh) (2)	(Gsec) (3)	(Ggeo) (4)	(1)-(2)	(1)-(3)	(1)-(4)	(2)-(3)	(2)-(4)	(3)-(4)
CA	1	**0.00184**	**127%**	**45%**	12%	**22%**	-68%	1%	13%	6%	-44%	-13%
RU	1	**0.00178**	**131%**	**108%**	**34%**	3%	-91%	-102%	21%	17%	-11%	-10%
SA	1	**0.00165**	**141%**	**163%**	**68%**	9%	-39%	-127%	-33%	-80%	-25%	**22%**
AU	1	**0.00137**	**170%**	**162%**	**28%**	**12%**	-180%	-34%	-19%	-45%	15%	-10%
ID	1	**0.00105**	**223%**	**129%**	**44%**	11%	-234%	-119%	-3%	**36%**	2%	11%
IN	1	**0.00757**	**31%**	**101%**	**19%**	1%	-76%	-35%	2%	**73%**	-13%	-3%
AR	2	**0.01358**	**17%**	**76%**	7%	3%	**8%**	-3%	2%	-9%	4%	-3%
BR	2	**0.01000**	**23%**	**60%**	5%	2%	**8%**	0%	2%	-10%	8%	-2%
ZA	2	**0.00538**	**43%**	**75%**	**25%**	3%	**12%**	-2%	-5%	-27%	-2%	2%
CN	2	**0.01181**	**20%**	**15%**	10%	1%	**10%**	5%	2%	6%	3%	2%
ES	3	**0.00695**	**34%**	**30%**	4%	4%	**7%**	0%	-3%	4%	5%	1%
IT	3	**0.00474**	**49%**	**25%**	6%	2%	**14%**	-1%	0%	-5%	3%	-2%
TR	3	**0.00469**	**50%**	**26%**	5%	3%	**8%**	1%	1%	1%	0%	-2%
GB	3	**0.00453**	**51%**	**17%**	1%	4%	**14%**	2%	-4%	1%	0%	1%
FR	3	**0.00411**	**57%**	**17%**	3%	4%	4%	2%	-4%	2%	5%	0%
JP	4	**0.00705**	**33%**	**17%**	8%	5%	2%	**14%**	3%	1%	-1%	0%
KR	4	**0.00475**	**49%**	**13%**	7%	11%	-6%	**11%**	4%	-2%	-1%	3%
MX	4	**0.00394**	**59%**	**16%**	11%	11%	-5%	**10%**	3%	1%	-3%	-5%
DE	4	**0.00345**	**68%**	6%	6%	4%	-6%	**14%**	1%	-2%	0%	1%
US	4	**0.00271**	**86%**	**15%**	5%	3%	-11%	**7%**	3%	1%	-3%	-1%
WORLD		***0.00233***	*100%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*

4.2. Euro zone crisis and competitiveness

The indicators computed in this paper can also be used to assess the causes of uncompetitiveness. We do so by looking at the Eurozone's periphery. Some economists view the Eurozone crisis as driven by the deteriorating competitiveness of periphery countries (see Chen et al. 2012). Specifically, some analysts suggest that low competitiveness in the south is driven by exceptional growth of unit labour costs (Dadush and Stancil 2011). According to this view, increases of wage costs adjusted for productivity differences, or in short adjusted wage costs, made the exports of these countries uncompetitive. Policy prescriptions to improve competitiveness that are based on this view have therefore focused on how to regain lost export market shares (see, for example, Dadush and Wyne 2012). Structural reforms may help but they take time. In the shorter term, increasing market shares can be achieved by increasing price competitiveness. Typically this is done by depreciating the currency. Since Eurozone countries cannot devalue their currency, policymakers should instead try to restore competitiveness through internal devaluation, i.e. by reducing adjusted wage costs. One estimate for Greece, for example, is that adjusted wage costs need to be reduced by 31%, effectively reaching the level of Turkey (Sinn, 2012).

A basic premise underpinning these prescriptions is that exporters from Eurozone crisis countries underperformed. In this section, we use the indicators developed to argue that loss of export competitiveness is likely to be the main determinant of growing current account deficits only for a few countries. In the Southern euro zone countries current account deficits reflected an excessive increase in imports. In the run-up to the crisis, exporters from these countries could perform well on the international markets despite the rise in their countries' adjusted wage costs, because the bulk of the rise in wage costs occurred in the non-traded sector.

What does our shift-share decomposition say about the export competitiveness of Eurozone countries? Portugal and Spain export growth was very significantly reduced by their specialization: trade flows directed to low growth markets (i.e. mainly to the rest of the euro zone) and products such as clothing for Portugal. Finland, France and Ireland have had the lowest performance over the recent period. Finland was able to partly offset its poor exports dynamic thanks to a relatively good geographical specialization. France benefited from a good sectoral specialization in pharmaceuticals, wine, and other luxury goods.

Figure 5: Export market shares growth decomposition in the euro area (2006q1–2013q1)

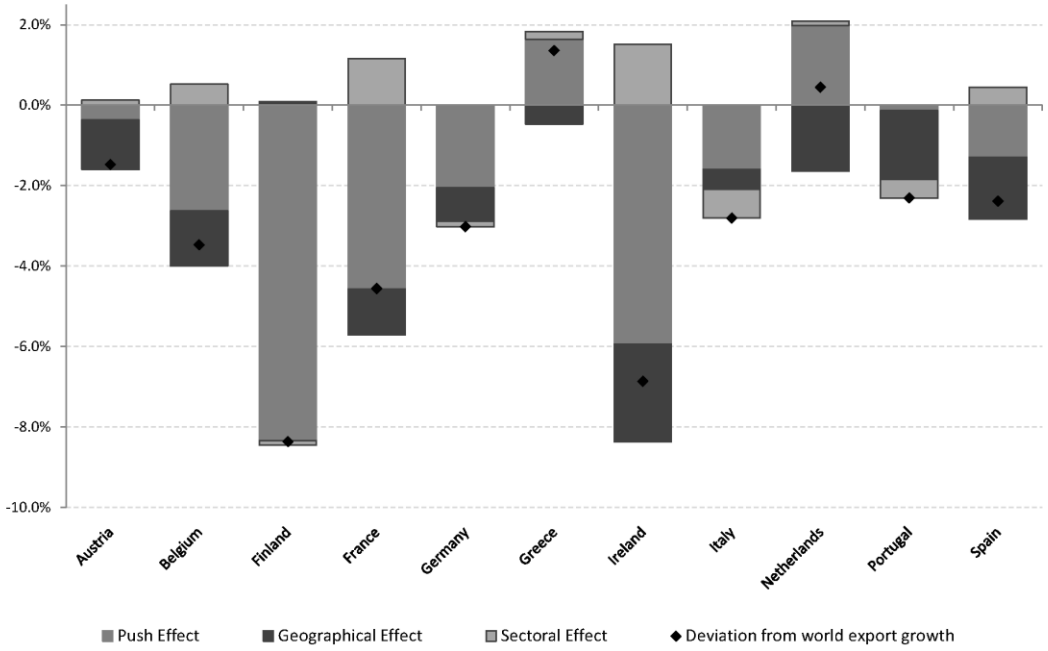
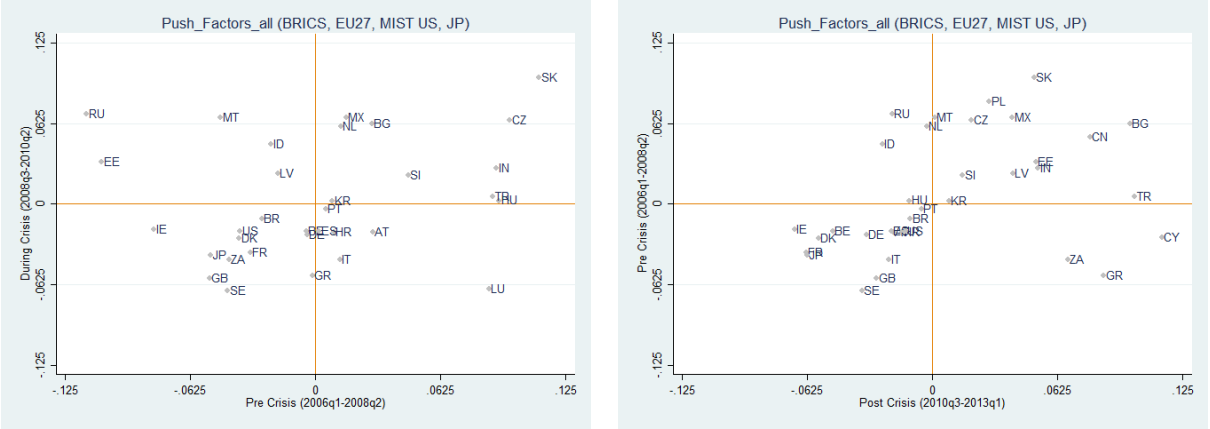


Figure 5 presents the results for Eurozone countries applying the same decomposition illustrated in Section 3. Contrary to received wisdom, once geographical and specialization effects are accounted for, export performance of Eurozone countries emerges as very negative only for Finland, Ireland and France. Ireland and France were able to partly offset its poor exports dynamic thanks to a relatively good geographical specialization. By contrast, the export performance for Portugal, Italy and Spain is similar to that of Germany. Finally, Greece's performance is positive, largely offsetting a negative geographical specialization.

Since 2007, and including during the 2008-2009 crisis, there has been substantial export growth heterogeneity within the euro area. Export performances have deteriorated significantly for most countries. Among euro area countries, the Netherlands, Slovenia and Slovakia are the only two countries that improved their push performance. Spain, Portugal, Greece and France did not

change much their performances (Figure 6, left hand side panel). Since 2010, on the other hand, Greece also saw its push performance improve (Figure 6, right hand side panel).[20]

Figure 6: Export growth contribution from export "push" factors pre and post global crisis



How can we reconcile good export performance by Eurozone laggards with rising wage costs in the periphery of the Eurozone? These developments are easy to explain if we consider that European financial integration during the monetary union led to an inflow of capital to the peripheral countries of the Eurozone (see, for example, Lane and Pels 2012). The inflow of capital boosted domestic demand. The increase in demand in turn pushed the prices of non-tradables while also leading to an increase of imports. Exports were largely unaffected by the shock in domestic demand because they respond primarily to foreign demand and exogenous international prices. Put simply, rising unit labor costs were not a cause but a symptom of the demand shock triggered by the inflow of capital and they were not associated with losses in exporters' competitiveness (see Gaulier and Vicard 2012).

4.3. Correlations with the real effective exchange rate

The real effective exchange rate (REER) measures the development of the real value of a country's currency against the basket of the trading partners of the country. This measure is widely used to assess changes in price and cost competitiveness. Therefore a pass test for our measure of supply-side performance is to assess the correlation with the REER.

We do so by estimating IV regressions. The baseline estimation is reported in Equation 11, where $f_{i,t}$ is the quarterly coefficient of supply side performance. The explanatory variable is the quarterly growth rate of REER as computed by Darvas (2012) at the Bruegel Research Centre[21]. The database complied by Darvas covers 153 countries worldwide[22], providing monthly measures of CPI-based REERs. The REERs are based on the bilateral exchange rates with 138 partners for each country, covering about 97.8% of world trade. The computations include time and country specific fixed effects.

[20] Similar figures for the sectoral component of our decomposition show that countries specialized in durable goods clearly suffered during the crisis (JP, DE, IT, SK).

[21] The quarterly growth rate is constructed on a year-on-year basis to be consistent with the dependent variables.

22 Given the high heterogeneity among reporters and data quality concerns estimation sample encompasses the first 54 countries in terms of volume of trade in year 2012, covering up to 92% of world trade.

Equation 11

$$f_{i,t} = a_0 + a_1 * d\ln\left(REER\right)_{i,t} + a_t + a_i + \varepsilon$$

Table 6 reports estimates for the competitiveness measure in quantities. In both regressions we test the robustness of our results using the Nominal Effective Exchange Rate (NEER)[23] instead of real one; correlation remains significant and stable, both in sign and magnitude. In Table 6 columns (1)-(4) the significance of correlation is estimated via IV using 6 months lag of the growth rate of REER (NEER) as instruments for contemporaneous values.

Table 6: Correlation between REER and performance effect in quantities

Dep. Var.	(1)	(2)	(3)	(4)	(5)	(6)
Performance (quantities)						
Performance (prices)					-1.929***	-3.339***
					[0.591]	[1.159]
Performance (prices)*Low Income						2.273
(=1 if Low/Middle income country)						[1.426]
dlog REER	-0.410***	-0.723***				
	[0.154]	[0.155]				
dlog REER*Low Income		0.481**				
(=1 if Low/Middle income country)		[0.229]				
dlog NEER			-0.452***	-0.903***		
			[0.163]	[0.189]		
dlog NEER*Low Income				0.643***		
(=1 if Low/Middle income country)				[0.248]		
Constant	0.0165	0.0169	0.00188	0.00900	-0.0474	-0.0254
	[0.0371]	[0.0368]	[0.0375]	[0.0366]	[0.0302]	[0.0345]
Observations	1,378	1,378	1,404	1,404	1,379	1,379
R-squared	0.147	0.131	0.122	0.072	-0.044	-0.531
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-Test (first stage)	*26,26*	27,08	*25,79*	*24,25*	*19,15*	*9,74*
Robust standard errors in brackets *** p<0.01, ** p<0.05, * p<0.1						
Note: Contemporaneous values of dlogNEER/dlogREER have been instrumented using 6 months lag.						

Results show statistically robust negative correlations between the EERs (both in real and nominal terms) and the competitive measure in quantities. This indicates that decreases in the effective exchange rates of a country are associated with increases in competitiveness. This effect however takes about 6 months to materialize and gets smaller over time (further lags, not reported here, are no longer statistically significant). Coefficient for Low/Middle income countries appears to be not statically different from those of High Income countries. This may be due to poor data quality, especially approaching the end of the time period considered, resulting in a downward bias of correlation coefficients.

[23] NEER measures are also provided by Darvas (2012) at the Bruegel Research Centre.

The correlation between the REER (NEER) and the price component of the competitiveness is of positive sign. An increase in the effective exchange rate of a country is correlated with an increase in relative export prices. At this stage, we avoid interpreting this result as an evidence of Pass-Through due to two main caveats. First of all, we are dealing with a panel of heterogeneous countries (and by that possibly heterogeneous coefficients as well). Moreover, we are not considering the effect of an appreciation (depreciation) on imports; an effective appreciation, for example, may lower imported input prices, as a consequence firms do not need to raise their exporting ones to compensate such variation.

5. CONCLUSION

Our primary contribution is collecting and making available timely information on export performance and its components, geographical and sectoral specialization, country specific export performance, in values, unit values and volumes, on a wide range of countries, and with quarterly frequency. We then take some first steps toward assessing dominant patterns and the determinants of competitiveness at the macro-level. First, we construct a set of indicators which simply and transparently captures the entire set of export performance components by country and world region. This measure helps us depict the broad patterns of export performance and countries competitiveness in the wake of the global crisis. What have we learned? On average, export performance, stripped of compositional effects was strongest for countries from the East Asia and Pacific region. Moreover such performance was almost entirely driven by exporting country specific factors, with changes reflecting volume growth rather than price developments. Sectoral and geographical specialization has instead served well other regions, including the Middle East and North Africa, Sub-Saharan Africa and Central and Eastern Europe. With the exception of the MENA region, all emerging and developing regions have on average improved their supply-side capacity. The deterioration in the MENA region intensified since 2010. The indicators in the database also trace well the legacy on supply-side capacity and overall export performance of the double-dip recession in the euro area.

Our measure of competitiveness is correctly associated with factors that are commonly perceived as boosting competitiveness. In future work, we plan to construct the measures of export performance for broad sectors and to construct measures of export performance in volumes that also account for the extensive margin of trade. The export performance database is meant to be an instrument at the disposal of researchers, policy makers and the private sector. We hope they will use it, find it of some use and provide critical feedback, so that the database can evolve into an increasingly reliable and up-to-date source of information.

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ANNEXES

Annex 1: Theoretical underpinnings

It is difficult to identify a single framework able to deliver a testable specification aimed at identifying the microeconomic and macroeconomic constraints of supply-side export performance or competitiveness. However some insights can be gained by referring to the framework in Melitz-Ottaviano (RES 2008), Ottaviano et al. (EP 2008) and Corcos et al. (2009). The Melitz-

Ottaviano (RES 2008) yields the following expression for bilateral trade from country *i* to country *c* in sector *k*:

Equation 12

$$T_k^{ic} = \frac{1}{2v(\gamma_k + 2)} \rho_k^{ic} * D^c [m_k^{cc}]^{\gamma_k + 2} * E_k^i [\max(m_k^i)]^{-\gamma_k}$$

Equation 11 states that bilateral trade from country *i* to country *c* in sector *k* is determined by demand in country c (D^c), bilateral trade costs and barriers (ρ_k^{ic}), and by the competitiveness of firms in the origin country, which – following the literature on international trade with firm heterogeneity (Ottaviano et al., EP 2008 and Corcos et al. 2009) – we approximate with a measure that indicates the minimum level of profitability a firm needs to survive and thrive in sector *k* and destination market *c*. This measure is the marginal cost cut-off (m_k^{cc}) specific to a sector *k* and an export market *c*. The number of competitors present in the destination market ($E_k^i [\max(m_k^i)]^{-\gamma_k}$), the degree of product differentiation among varieties of a good (*v)* and the skewness of the distribution of firms along the productivity parameter (γ) also contribute to determine bilateral trade.

The term m_k^{cc} is a concept typical of models of international trade with firm heterogeneity. **Erreur ! Source du renvoi introuvable.** – taken from Ottaviano et al. (EP 2008) and Corcos et al. (2009) – shows that the cost cut-off m_k^{cc} depends on three key elements: First, the size of demand (embodied in the demand-side or pull factors D_k). Second, the remoteness of the market, as summarized in the matrix of sector specific bilateral trade costs $\frac{\sum_{i=1}^{M} |R_k^{ic}|}{|P_k|}$, which determines which foreign firms are effectively able to reach market c, given the specific costs and barriers they have to face for exporting product *k* from country *i* to country *c*. Third, the ability of country *i* - to generate low-cost (i.e. high-productivity) firms (which we denote with the term ψ_k^i). A bundling parameter $\varphi_k = [2v(\gamma+1)(\gamma+2)]^{(1/(\gamma+2))}$ accounts for product differentiation among varieties of a good (*v)* and the skewness of the distribution of firms along the productivity parameter (γ).

Equation 13

$$m_k^{cc} = \frac{\Phi_k}{D_k^c} \left(\frac{\sum_{i=1}^{M} |R_k^{ic}| \psi_k^i}{|P_k|} \right)^{\frac{1}{\gamma_k + 2}}$$

In the current paper we focus primarily on the term ψ_k^i which captures our "push" effect, i.e. the various exogenous determinants of country *i*'s ability to generate low-cost firms, which in short equates to a country's competitiveness as a production location.

We assume that sector specific producer competitiveness ψ_k^i, is given by a Cobb-Douglas function, where firms employ capital and labor as their inputs compounded by two terms: a fixed entry costs *f* that firms have to face in order to produce their variety of a good; and some level of technology/efficiency of production in sector *s* of country *i*, i.e. *[max(m)]*. This is formalized in **Erreur ! Source du renvoi introuvable.**.

Equation 14

$$\psi_k^i \equiv f^i (r_i^k)^{\beta_{1,k}} (w_i^k)^{\beta_{2,s}} (\max(m)_k^i)^{\gamma_k}$$

Fixed entry costs enter the equation because of key assumptions of models of firm heterogeneity[24]. The geographical location of firms' production matters, since countries have the ability to influence factor prices for labour (w) and capital (r), entry costs (f) and the probability of generating firms able to survive in the export markets (low probability of inefficient draws using the terminology by Melitz, 2003). The higher the aggregate level of technology/efficiency of production in country *l*, the higher the probability that a firm's variety is efficient. Hence, summing up, the main ingredients that determine the "push" factor in a country are:

- Fixed costs f: these are likely to be determined by sector and country specific factors, including prevailing trade policy, regulation and behind the border policies, access to key inputs, exporter-specific trade costs.
- Cost of inputs r, w: sector specific unit costs for capital, labour, skilled human capital and intermediates, but also macroeconomic policies which directly or indirectly affect the price of inputs, such as the level and volatility of the real exchange rate, the degree of macroeconomic uncertainty domestically and globally, the costs of servicing public debt and current account exposures, the tax burden.
- Technology/efficiency of production: the full range of structural determinants, including sector and country specific infrastructures but also macroeconomic determinants including the level of a country's inflation and other public policies that may impair an efficient allocation of factors of production.

In Section 2 we describe how we quantify changes in ψ_k^i through an export growth decomposition using bilateral trade data disaggregated at the HS 6 digit sector level. In so doing we are also able to quantify the effect of export composition and changes in importing country's demand (pull effects). Export composition refers to a country's mix of trade partners (market effects) and exported goods (sectoral effects). Trade costs, which do not vary too much over time, do not appear in the export growth decomposition. Their varying component is accounted endogenously in the push and pull effects.

Annex 2: Export Competitiveness Database list of variables

The Export Competitiveness Database (available at the webpages of this working paper and of authors) consists of the five type of export performance indicators given in this paper, each provided in values, volumes, and prices:

- Export growth (in values, volumes, and prices): **Xg**
- Export market share growth (in values, volumes, and prices): **MSg**
    - Export "pull" (composition) effects
        - Market effects (in values, volumes, and prices): **Geo**
        - Sectoral effects (in values, volumes, and prices): **Sect**

[24] Firm heterogeneity is modeled as the outcome of a research and development process with uncertain outcome. Before entering a market, each firm makes a non-recoverable 'sunk' investment in order to produce its own variety, which generates a fixed cost. The outcome is uncertain as it depends on the market realization. The literature on firm heterogeneity formalizes this concept by assuming that each firm is randomly assigned a level of efficiency of its variety only after the investment has been carried out. In particular, models assume that upon entry each firm draws its cost function from a common and known distribution, which varies across countries. Hence, a prospective entrant does not know whether its variety will sell successfully. However, it knows for certain that it will invent a new variety and that in order to do so will need to invest in terms of labour and capital ex-ante and that some of these costs will be non-recoverable

- Export "push" effects (in values, volumes, and prices)[25]: **Push**

This variables are given in values (suffix **_v** refers to export values), quantities (**_q)** and unit values **(_uv)**.

In addition, the online appendix of this working paper, gives two types of sectoral indicators:

- First, the contribution of sectoral composition factors can be further decomposed by **technology intensity**, differentiating between high-tech, low-tech, primary and other sectors, using the classification by Lall (2000). Figure 7 gives sectoral effects by technology contents for main regions (lower case for those of Table 1) and particular regions (uppercase for those of Table 3), sorted by increasing total product effect. Name variables are: **HT, MT, LT, RB** for the manufactures, **PP** for the commodities and **OT** for other transactions.
- Second, sectoral effects are also given by **skills intensity** using the classification by Basu (forthcoming), from the UNCTAD[26]. Products are classified into the following broad categories: **HSb, MSb, LSb, RBb** for the manufactures, **PPb** for the commodities and **OTb** for other transactions.

Figure 7: Sectoral effects by technology intensity, 2005-2013

[25] The "mid-point growth rates" growth rates provided in the database do not necessarily correspond to the growth rates computed by national statistical offices as they are only a proxy for standard growth rates (and are expressed in log differences to allow summing up all the components).

[26] http://www.unctad.info/en/Trade-Analysis-Branch/Data-And-Statistics/Other-Databases/

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