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Non-price competitiveness of exports from emerging countries

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Contents

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Abstract

This analysis of global competitiveness of emerging market economies accounts for non-price aspects of competitiveness. Building on the methodology pioneered by Feenstra (1994) and Broda and Weinstein (2006), we construct an export price index that adjusts for changes in the set of competitors (variety) and changes in non-price factors (quality in a broad sense) for nine emerging economies (Argentina, Brazil, Chile, China, India, Indonesia, Mexico, Russia and Turkey). The highly disaggregated dataset covers the period 1999−2010 and is based on the standardized 6-digit Harmonized System (HS). Unlike studies that use a CPI-based real effective exchange rate, our method highlights notable differences in non-price competitiveness across markets. China shows a huge gain in international competitiveness due to non-price factors, suggesting that China critics may be overstressing the role of renminbi undervaluation in explaining China's competitive position. Oil exports account for strong improvement in Russia's non-price competitiveness, as well as the modest losses of competitiveness for Argentina and Indonesia. Brazil, Chile, India and Turkey show discernible improvements in their competitive position when accounting for non-price factors. Mexico's competitiveness deteriorates regardless of the index chosen.

JEL-codes: C43, F12, F14, L15

Keywords: non-price competitiveness, quality, relative export price, emerging countries

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1 Introduction

Emerging economies account for an ever-increasing share of world trade. According to the *CPB World Trade Monitor* (February 2011), the share of emerging and developing countries in total world exports was just 35% in 1999, but 49% in 2011. This gain in global export market share is largely the consequence of a substantial growth differential between emerging and advanced economies. Over the period 1999-2011, annual real export growth in emerging markets averaged 8.4% well outstripping the 3.2% annual performance of advanced countries.

The gains of emerging economies in the world market reflect their increased competitiveness relative to advanced economies. Durand et al. (1998) were among the first researchers to notice this competitive strength. In their study of East Asian economies in the wake of the Asian crisis, they note sharp devaluations in Asian countries resulted in substantial gains in nominal price competitiveness. China, in particular, emerged as an important competitor to OECD countries, altering the overall pattern of competition in the three major OECD regions (US, EU and Japan). However, they also point out that nominal competitiveness gains through currency devaluations were largely offset by cost and price inflation in those countries, thus yielding a smaller influence on patterns of real competitiveness.

By extension, we would also expect that real effective exchange rates of Central and Eastern European economies engaged in the "catching up" process would display a similar loss in pure price competitiveness as economic advancement brings with it a long-run real appreciation trend. In our recent paper (Benkovskis and Wörz, 2012), however, we note that this trend does not necessarily reflect losses in competitiveness when price developments are calculated net of quality improvements.

What is clear is that relative price movements arise for numerous reasons, including underlying changes in production costs, technological change or changes in consumer perceptions of quality. Direct measurement, especially of matters involving taste or perceived quality, is a non-trivial (if not impossible) task, so indirect estimation methods must be applied to control for such factors.

Here, we illustrate price and non-price competitiveness of a range of globally important emerging markets over the period 1999−2010. Our sample of nine emerging economies (Argentina, Brazil, Chile, China, India, Indonesia, Mexico, Russia and Turkey)

represents roughly one-fifth of total world exports. The existing literature on these countries focuses largely on price competitiveness as their productivity and wage levels are clearly below those of their industrialized competitors. While they enjoy a natural cost advantage that should result in strong price competitiveness, most are in the process of catching up with their more advanced counterparts, a development that tends to induce rising price levels and erode real cost advantage over time. Further, the very fact these emerging economies are catching up with advanced economies makes them attractive destinations for capital investment, adding to price appreciation pressure.[1] Finally, the integration of emerging economies into global value chains may impact positively on production processes or product quality. While weighing negatively on price competitiveness as measured through the real effective exchange rate, these factors clearly may also influence competitiveness in a positive and comprehensive way through the upgrading of capital (human and technological) and increased productivity.

Our approach allows us to take account of non-price aspects of competitiveness indirectly. We measure the evolution of competitiveness by relative export prices, allowing for entry and exit of competitors in narrowly defined goods markets. We control for changes over time in non-price aspects of exported goods (e.g. quality). This enables us to assess the extent to which the outstanding export performance of these major emerging economies over the past decade can be explained by their ability to produce cheaply (exploit cost advantages) and the extent to which they have improved the quality of their exported products in a broad sense (physical characteristics, labelling, meeting consumer tastes, etc.).

Our analysis uses the approach developed in Benkovskis and Wörz (2012). It builds on the framework developed by Feenstra (1994) and Broda and Weinstein (2006) for the calculation of variety-adjusted import prices, applying it to export prices and extending it to incorporate changes in the quality of goods and the set of competitors. Our use of the term "quality" here refers both to the physical properties of the good and consumer perceptions (i.e. taste, labelling, etc.).

The paper proceeds as follows. Section 2 summarizes the conventional wisdom with respect to price competitiveness as described by the real effective exchange rate, and explains why the real effective exchange rate conceals non-price elements of competitive-

[1] See, for example, Ibarra (2011) for evidence supporting this effect in the case of Mexico.

ness, and therefore provides an insufficient picture of a country's competitiveness. Section 3 outlines our methodological approach to reveal these non-price aspects. Section 4 describes the database and section 5 reports the results. Conclusions are given in section 6.

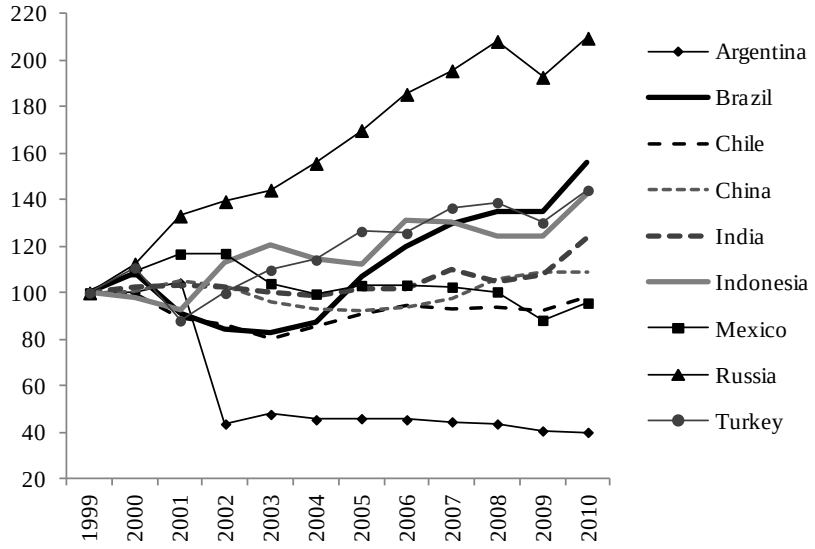
2 From price to non-price competitiveness

Competitiveness of a country relative to another is often assessed by its real exchange rate, a reflection of relative changes in nominal exchange rates net of differences in inflation rates. Inflation, in turn, can be measured in terms of consumer price inflation (CPI), producer prices (PPI) or unit labour costs. Beyond bilateral comparisons, competitiveness can also easily be measured through the real effective exchange rate (REER) index, a trade-weighted average of all bilateral real exchange rates. While REER calculation is tedious, the necessary data (exchange rates and inflation rates) are readily available.

Figure 1 below shows CPI-based real effective exchange rates for our nine countries over the observation period.[2] Increases reflect real appreciation, so they are associated with losses of international competitiveness. Apart from Argentina, Mexico and Chile, the sample countries experience a loss in price competitiveness as measured through the CPI-based REER. The increase in relative prices is especially pronounced for Russia, Brazil, Turkey and Indonesia. In Russia's case, this increase is clearly related to the dominance of energy products in its exports. High oil revenues lead to higher incomes with a consequent upward pressure on inflation and the real effective exchange rate. In Turkey, the disinflation process after the 2001 crisis has supported a long-term appreciation trend with an adverse effect on external price competitiveness. India and China show no clear trend, although a trend towards rising relative prices emerges in the final years of the sample. All countries show signs of improving or stable price competitiveness in 2009 in the midst of the global financial crisis.

[2] For a description of the calculations, see Darvas (2012).

Figure 1 CPI-based real effective exchange rates of emerging countries (172 trading partners, 1999=100)



Source: Darvas (2012)
Notes: We change Darvas' base year of 2007 to 1999 for ease of comparison with our reported results. An increase denotes a real appreciation of the national currency that can be interpreted as a loss of competitiveness.

The above analysis can be criticized for failing to illustrate competitiveness adequately as changes in consumer prices often do a poor job in approximating relative export price dynamics. Domestic and export prices are often the products of largely distinct demand and supply conditions. Moreover, the CPI is subject to changes in indirect taxes (e.g. VAT) that do not affect export prices directly. While the PPI might be a better measure for purely production-related price dynamics, it usually refers primarily to production for the domestic sector, and in most cases, data on purely export-oriented producer prices are unavailable. Similar caveats apply for unit labour costs as a price measure as these often refer to the whole economy including services, especially in the case of emerging economies.

Our solution is to construct an index for export prices calculated at the most detailed product level available to take into account different export structures across countries. This avoids an incorrect comparison of different goods across countries. However, even when the correct prices are used for deflating exchange rate movements, a new problem arises from the use of real effective exchange rates, which only measure the price competitiveness of exports and ignore important factors such as changes in the quality of exported products (Flam and Helpman, 1987). Quality has both an objective (e.g. physical

properties and technological features) and a subjective aspect (e.g. consumer tastes, branding and labelling).

Consumers also gain utility from the increased product variety that results from international trade. Thus, while for example the CPI or the PPI are adjusted for changes in product quality, neither takes into account the changes in the number of products or product variety available to the consumer.

In response to these challenges, we employ an index that adjusts for quality and the set of competitors to improve on existing measures and disentangle changes in pure price competitiveness from changes in non-price competitiveness (i.e. changes in variety and quality). Specifically, we define "variety" following the Armington assumption (Armington, 1969) as products of different origin within the same product category. "Quality" is defined as the tangible and intangible attributes of a product that change the consumer's valuation of it (Hallak and Schott, 2008), i.e. the combination of physical attributes of the product and consumer preferences.

3 Disaggregated approach to measure price and non-price competitiveness

We now apply the disaggregated approach proposed in Benkovskis and Wörz (2012) to measure price and non-price competitiveness of exports of emerging countries. Our approach combines the methodology developed by Feenstra (1994) and Broda and Weinstein (2006), with evaluation of the unobserved quality or taste parameter based on the work of Hummels and Klenow (2005). The insight here is that consumers value physical attributes of products and variety (i.e. the set of exporters in line with the Armington assumption) and that consumer utility depends to a certain extent on quality or taste preference. By solving this consumer maximization problem, it is possible to introduce non-price factors into a measure for relative export prices (see Appendix, sections A1-A4 for technical derivations). Having derived a formula for a variety- and quality-adjusted import price index, we then use the mirror image of trade flows to apply this formula to export prices. In other words, we interpret imports of product *g* originating from country *c* as country *c*'s export of product *g* to the importing market.

Following Benkovskis and Wörz (2012), changes in the relative export price of good g exported to a particular market are defined as

$$RXP_{gk,t} = \prod_{c \in C_g^{-k}} \left(\frac{p_{gk,t}}{p_{gc,t}} \frac{p_{gc,t-1}}{p_{gk,t-1}} \right)^{w_{gc,t}^{-k}} \left(\frac{\lambda_{g,t}^{-k}}{\lambda_{g,t-1}^{-k}} \right)^{\frac{1}{1-\sigma_g}} \prod_{c \in C_g^{-k}} \left(\frac{d_{gk,t}}{d_{gc,t}} \frac{d_{gc,t-1}}{d_{gk,t-1}} \right)^{\frac{w_{gc,t}^{-k}}{1-\sigma_g}}, \quad (1)$$

where k denotes a particular emerging country, $p_{gc,t}$ is the price of good g imported from country c, $d_{gc,t}$ is the unobservable quality or taste parameter of a product, C_g^{-k} is the set of countries exporting particular product in both periods (excluding emerging country k), $w_{gc,t}^{-k}$ represents the shares of emerging country *k*'s rival competitors on a particular market and $\lambda_{g,t}^{-k}$ shows the share of new or disappearing exporters (excluding emerging country k).

The index of adjusted relative export price in (1) can be divided into three parts:

- The first term gives the traditional definition of changes in relative export prices driven by changes in relative export unit values weighted by the importance of competitors in a given market (represented by $w_{gc,t}^{-k}$). An increase in relative export unit values is interpreted as a loss in price competitiveness.
- The second term represents Feenstra's (1994) ratio for capturing changes in varieties (in this case, the set of exporters of a particular product). This term is calculated excluding exports coming from emerging country k, and interpreted as the effect of changes in the set of competitors. More competitors producing the same product lower minimum unit costs and confer higher utility for consumers. At the same time, the market power of each producer is lowered. Therefore, additional competitors for a specific product imply a positive contribution to the adjusted relative export price index and are associated with a loss in non-price competitiveness.
- The third term is simply the change in relative quality or taste preference for a country's export products. If the quality or taste preference for a country's exports rises faster than that of its rivals, the contribution to the adjusted relative export price index is negative, thereby signalling an improvement in non-price competitiveness. Although relative quality or consumer tastes are unobservable, it is possible to evaluate it using information on relative unit values and real market shares (see Appendix, section A3).

Finally, we need to design an aggregate relative export price index as the index in (1) describes relative export prices for a specific product exported to a particular country only. The aggregate adjusted relative export price index can be defined as a weighted average of specific market indices, where weights are given by shares of those markets in a country's exports.

4 Description of the database

For the empirical analysis in this paper we use trade data from UN Comtrade. Although the data reported in UN Comtrade have a lower level of disaggregation and longer publication lag than Eurostat's COMEXT, the worldwide coverage of the UN database is a significant advantage. We use the most detailed level reported by UN Comtrade, which is the six-digit level of the Harmonized System (HS) introduced in 1996. This gives us 5,132 products, i.e. enough to ensure a reasonable level of disaggregation. While this is lower than the 8-digit CN (Combined Nomenclature) level available through Eurostat's COMEXT (which covers over 10,000 products), the UN Comtrade data are quite sufficient for calculating unit values.

Although our ultimate goal is to evaluate competitiveness of exports from emerging countries, we start with the import data of partner countries in the analysis. The argument for focusing on partner imports rather than the emerging country's exports is driven by the theoretical framework on which our evaluation of price and non-price competitiveness is based. Recall that our methodology starts with the consumer's utility maximization problem. Thus, import data are clearly preferred as imports are reported in CIF (cost, insurance, freight) prices, giving us the cost of the product at the point it arrives at the importer country's border. From the consumer's point of view, import data provide a better comparison of prices. On the other hand, import data come with certain drawbacks. Obviously, the data on imports from emerging countries do not necessarily coincide with the country's reported exports due to differences in valuation, timing, sources of information and incentives to report. That said, and especially with respect to emerging economies, which are still subject to import tariffs for a considerable range of their products, import data are as a rule fairly well reported as national authorities have an interest in the proper recording of imports on which they collect a tariff revenue.

Our import dataset contains annual data on imports of 75 countries at the six-digit HS level between 1999 and 2010.[3] The list of reporting countries (importers) appears in Table A1 in the Appendix. Our data on imports of the 75 countries cover over 96% of world imports in 2010. Several importer countries (e.g. United Arab Emirates, Vietnam,

[3] Data is not available for several years at the beginning or middle of the sample period for some countries, i.e. import data for South Africa, Philippines, Oman and Tunisia is unavailable in 1999, Ukraine and Ethiopia

Egypt and Kazakhstan) were not included in the dataset due to lack of detailed data or missing information for 2010. To avoid calculation burdens, we accordingly restrict the list of partners (exporters) to 75 countries. The list of exporters also appears in Table A1 (note that the list of exporters does not fully coincide with the list of importers). These 75 countries used represent roughly 93% of world imports in 2010 and reasonably reflect global trade flows.

We use unit value indices (dollars per kilogram) as a proxy for prices and trade volume (in kg) as a proxy for quantities. If data are missing for values or volumes, or data on volumes is not observed directly but estimated by statistical authorities, a unit value index cannot be calculated. Moreover, estimating unit values is complicated for many reporting countries. Even the world's top importer, the US, only publishes import data that would allow calculation of unit values for about 70% of imports in 2010 (in value terms). The situation is better for the EU countries, China, Japan, while other countries (e.g. Canada, Mexico, Australia) provide coverage of 50% or less. Coverage is also generally worse for the first half of the sample period. This problem makes the analysis of non-price competitiveness more challenging and our results should be taken with a grain of salt. However, the sometimes low coverage of available unit values in several countries is rather homogenous across different product groups, so we argue this problem is unlikely to affect our results significantly. The other adjustment we made to the database is related to structural changes within the categories of goods. Although we use the most detailed classification available, it is still possible that we may be comparing apples and oranges within a particular category. One indication of such a problem is given by large price level differences within a product code. Consequently, all observations with outlying unit value indices were excluded from the database.[4]

Finally, we use export data of our nine emerging countries to construct our aggregated relative export price index. For the export data to reflect the structure of exports adequately, the export dataset contains annual value data on exports to our 75 importer countries at the six-digit HS level between 1999 and 2010.

in 1999−2000, Malaysia, Bahrain and the Dominican Republic in 1999-2001, Pakistan and Bosnia Herzegovina in 1999−2002, Serbia in 1999-2004, Sri Lanka in 2000, Panama in 2004 and Nigeria in 2004−2005.

[4] The observation is treated as an outlier if the absolute difference between the unit value and the median unit value of the product category in the particular year exceeds four median absolute deviations. The exclusion of outliers does not significantly reduce the coverage of the database. In the majority of cases, less than 2% of total import value was treated as an outlier.

5 Empirical results for exports of emerging countries

We start by calculating a rather conventional export price index that ignores changes in the set of competitors and in non-price factors. This index is shown as the solid line in Figure 2 below. We next augment this index by taking into account exit and entry of competitors in each narrowly defined goods market (dashed line). Finally, we adjust the export price index for non-price competitiveness to include quality and consumer tastes (line plotted in diamonds).

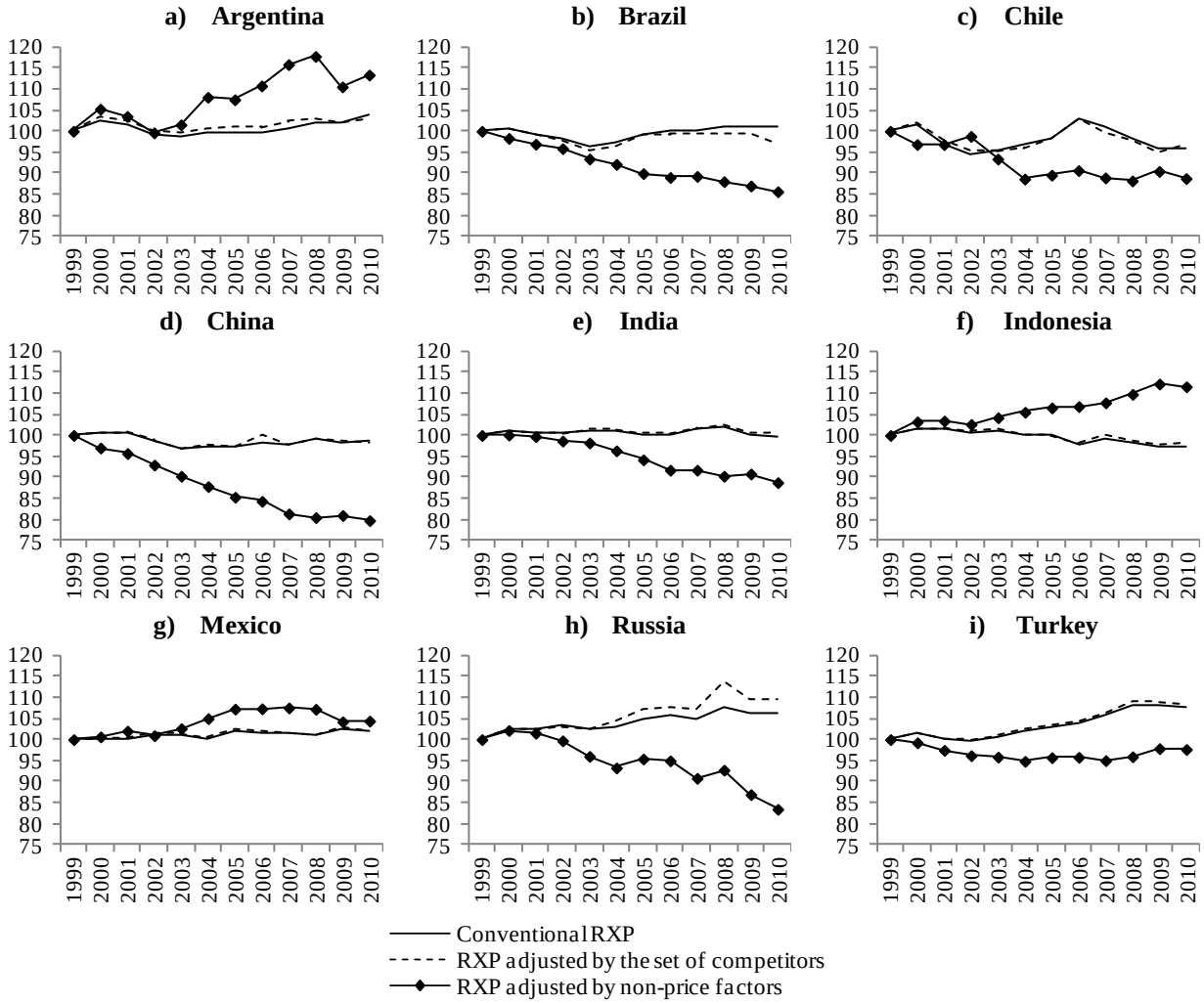
Compared to the findings based on real effective exchange rates, we observe no strong gains or losses in price competitiveness for these countries using the conventional export price index. Most countries experience no significant gains or losses in international price competitiveness. The REER line representing the index in Figure 2 is almost flat for most emerging countries and fluctuates narrowly around its initial level. Only Chile shows a notable signs of improving price competitiveness after 2006. Indonesia and China show only modest gains in price competitiveness, although we would have expected to see stronger evidence of rising price competitiveness in China, given the often-repeated claims of its trade partners that it undervalues its currency.[5]

In line with our expectations, the majority of the countries in our sample continuously lose price competitiveness over the observation period. As all our emerging economies are catching up with their advanced counterparts, we would expect the convergence in income levels to be accompanied by convergence in price levels as observed for emerging economies in Central and Eastern Europe (Benkovskis and Wörz, 2012; Oomes, 2005). This trend of falling price competitiveness was strongest in Russia up until 2008 and can largely be attributed to Russia's oil income. For example, Égert (2005) finds evidence of a clear "Dutch Disease" pattern for Russia that explains the real appreciation trend. Égert (2003) also points out exchange rate pass-through, oil price shocks and cyclical factors as determinants of inflation in Russia. As an observation from our data, when oil

[5] Coudert and Couharde (2007) relate this undervaluation to the absence of the Balassa-Samuelson effect in China which can be inferred from the limited degree of currency appreciation despite its strong catching-up performance. The issue of China's currency undervaluation is not only a hot topic because of large trade imbalances with some advanced countries (most prominently the US) but also within the context of competition among emerging markets. Pontimes and Siregar (2012) note the great concern in East Asian countries over relative appreciation against the renminbi and to a lesser extent against the US dollar that points to strong intra-regional price competition. Gallagher et al. (2008) mention Chinese undervaluation as a potential detrimental effect on Mexico's export performance beyond purely domestic factors.

prices collapsed at the beginning of the global economic crisis, prices for Russian exports fell considerably.[6] Similarly, Turkey shows a continuous trend of decreasing price competitiveness until 2008 and some stabilization thereafter. Adjusting the index for changes in the set of competitors produces no notable changes − the two lines are almost identical for all countries.

Figure 2 Export prices of emerging countries relative to competitor export prices (1999=100)



Sources: *UN Comtrade*, authors' calculations.
Notes: Relative export prices are calculated by cumulating RXP changes from equations (1), (A9) and (A10). Increase denotes losses in competitiveness.

[6] Given the relatively inelastic demand for oil products in normal times, this deterioration in Russian price competitiveness up to 2008 did not impact notably on Russia's global market share, a fact well documented in the empirical literature (e.g. Ahrend, 2006; Cooper, 2007; Porter, 2007; Robinson, 2009 and 2011) and discussed below.

However, as soon as we adjust for non-price factors such as quality improvements, the results become more differentiated. The majority of countries in our sample show clear improvements in non-price competitiveness (as reflected in a falling double-adjusted export price index).

China, in particular, stands out. Prices of Chinese goods on international markets fell by more than 20% after correcting for quality improvements and other non-price factors. No other emerging economy in our sample comes close to realizing such a large gain in competitiveness. Indeed, only a few small, highly open transition countries in Central, Eastern and Southeastern Europe display comparable improvements in non-price adjusted competitiveness over the same period (Benkovskis and Wörz, 2012). This suggests that China's inexorable rise as a trading power - we see China overtake Germany to become the world's largest exporter in 2009 - is based on a combination of non-price factors and an abundance of relatively cheap labour. Our finding here corroborates the earlier results of Fu et al. (2012), who observe weakening price competition and rising importance of non-price factors such as quality and variety for China over the period 1989−2006. They analyze unit prices of imports into the EU, Japan and the US (a smaller and more homogenous market than in our analysis) and conclude that this trend, if sustained, poses a serious threat to high-income countries. Our findings also support the view that a revaluation of the exchange rate would only have a limited impact on China's competitiveness (Mazier et al., 2008; Coudert and Couharde, 2007).

The implications of the enormous gains in China's international non-price competitiveness have been noted in several recent discussions. For example, Kaplinsky and Morris (2008) assert that the dominance of China in sectors such as textiles and clothing that serve traditionally as early sectors for industrialization not only precludes gains by other emerging countries but shuts down opportunities for less-developed countries even thinking about embarking on an export-led growth strategy in these sectors. Indeed, our results show that China's dominance in textiles (now a fifth of total Chinese exports) is due in large part to the contribution of non-price factors.[7]

The substantial improvement in Russia's non-price competitiveness observed in our non-price adjusted index post-Russian crisis tracks exports of oil, Russia's prime ex-

[7] Detailed results by sector and trading partner are not reported here, but are available from the authors upon request.

port good.[8] When oil is excluded from the analysis, a small deterioration in non-price competitiveness is observed for Russia (see Figure A1 in the Appendix). The global financial crisis along with falling demand for oil interrupts this trend in 2008, but the trend re-emerges again in the last two years of observation. This finding comports with the empirical literature on Russia's competitiveness. Ahrend (2006) finds that Russia has experienced great increases in labour productivity in its major export sectors, but qualifies this with the observation that these increases in competitiveness are largely limited to a small number of primary commodity and energy-intensive sectors. Robinson (2009) points out Russia's dependence on oil exports carry a persisting risk of Dutch Disease problems. Subsequently, he argues that political reform is needed to abate this risk (Robinson, 2011). Finally, Ferdinand (2007) observes similarities between Russia and China in their orientation towards building on and promoting national industrial champions and the tendency of this approach to foster specialization.

Brazil, Chile, and India also show sizable improvements in their non-price adjusted competitiveness, a finding which is robust when oil products are excluded from the analysis. In line with our results, Brunner and Cali (2006) also observe rising unit values for South Asia in their analysis of technology upgrading in this regions. However, they report a closing of the technology gap by the South Asian countries only with respect to Southeast Asia and not with respect to OECD countries. Interestingly, our detailed results for India by trading partners[9] show the same pattern only for the first half of our observation period; the picture becomes more differentiated in more recent years with an increase in non-price competitiveness on the US market accelerating from 2005 onwards. We also observe strong rises in price competitiveness vis-á-vis France and the UK. The results for Turkey suggest some marginal improvements in non-price factors, a finding which is again robust when oil exports are excluded. These competitiveness improvements were most pronounced in 2001, the year of a major currency and banking crisis in Turkey.

Thus, while the majority of emerging countries in our sample (5 out of 9) experienced a loss in price competitiveness, the ratio is exactly opposite for non-price competitiveness.[10] We also observe some apparent losses in non-price competitiveness in Argen-

[8] Mineral products, which includes gas & oil, accounted for 71% of Russia's total exports in 2010.
[9] These results are available from the authors on request.
[10] Taking the sensitivity of the results with respect to oil exports into account, we do not include Russia into the group of countries that experienced a gain in non-price competitiveness.

tina and Indonesia. In both cases, the finding is not robust to excluding oil exports.[11] Figure A1 in the Appendix shows that when oil is excluded, both countries show no apparent positive or negative trend. Finally, Mexico shows some clear signs of weakening export competitiveness in all three versions of our indicator, the results are invariant whether oil products are excluded or not. The deterioration is particularly pronounced in the indicator adjusted for non-price factors, thus raising serious concerns about Mexico's global competitiveness. With respect to price competitiveness, this is most likely explained by peso appreciation. Ibarra (2011) relates this appreciation trend to strong capital inflows with a resulting upward pressure on the exchange rate. Gallagher at al. (2008) mention additional factors such as the decline in public and infrastructure investment in Mexico, limited access to bank credit for export purposes and the lack of a government policy to spur technological innovation.

In contrast to the findings based on real effective exchange rates, the crisis in 2009 is not visible in these indices. This is to be expected; changes in non-price factors are driven more strongly by structural (i.e. longer-term) factors than exchange rates and consumer prices, which react quickly to changes in global demand conditions.

Conclusions

This paper highlights an often-overlooked aspect of international competitiveness in the literature on emerging economies, where the emphasis is on price competitiveness. The effects of sharp or forced devaluations are frequently discussed (hardly surprising given the long history of currency crises in such economies) and generally follows a narrative that the abundance of relatively cheap labour in these markets provides them with considerable cost advantages. To our knowledge, however, there is no study that explicitly analyses non-price competitiveness in emerging economies within the narrowly defined concept of competitiveness as "a country's ability to sell goods internationally."

To fill this gap and go beyond pure price competitiveness, we measure the evolution of competitiveness by relative export prices, allowing for entry and exit of competitors in narrowly defined goods markets and controlling for changes in non-price aspects (e.g.

[11] Mineral products are the most important export category for Indonesia, representing 36% of total exports in 2010. In contrast, mineral products only accounted for 12% of Argentina's total exports that year.

quality or consumer tastes) of exported goods over time. Drawing on our earlier work (Benkovskis and Wörz, 2011, 2012) that extends the approach developed by Feenstra (1994), Broda and Weinstein (2006), we consider a highly disaggregated dataset of mostly global imports and exports at the detailed 6-digit HS level (yielding more than 5,000 products) over the period 1999−2010. This period is more or less free of any country-specific economic crises in any of the countries covered in our sample. The sample consists of nine emerging economies (Argentina, Brazil, Chile, China, India, Indonesia, Mexico, Russia and Turkey) that together represent roughly one-fifth of total world exports. Our observation period starts right after the Russian and Asian crises, thereby excluding large domestic crises apart from Turkey's 2001 financial crisis. However, it includes the current global financial and economic crisis, which is likely to have hit the nine emerging markets in a highly similar fashion.

While we also observe some losses in price competitiveness for the majority of countries in our sample when we base our conclusions on the traditional export price index, these losses are far less pronounced compared to the conclusions from the CPI-based real effective exchange rate. Taking changes in the global set of competitors into account does not alter the picture, which shows that the set of competitors is fairly stable in any given year.

However, as soon as we allow for non-price factors such as changes in the (physical or perceived) quality of exported products, we observe more pronounced trends for individual emerging markets.

Perhaps our foremost finding is that non-price factors have contributed strongly to China's gains in international competitiveness. Thus, we conclude that China has assumed its dominant role in the global market through non-price factors, as well as other factors such as the size and structure of its labour force. Our results suggest that the role of the exchange rate is explaining China's competitive position may have been overstressed by some of China's critics. Further, Brazil, Chile and India show discernible improvements in their competitive position. The surprisingly strong non-price related improvement of Russia's export position is entirely related to developments in the oil sector, which accounted for roughly 70% of Russian exports in 2010. Turkey showed modest improvements in non-price competitiveness. The rather pronounced losses in non-price competitiveness for Argentina and Indonesia were fully due to developments in the oil sector, whereby oil exports are far less important for these countries than for Russia (36% for Indonesia and 7% for

Argentina). Finally, we observe a loss in Mexican price and non-price competitiveness, confirming earlier findings in the literature.

Although our analysis is based on highly disaggregated data and separates price from non-price effects, it still does not yield a comprehensive picture of competitiveness. Competitiveness continues to be a vague concept, and therefore multiple approaches have to be combined before drawing firmer conclusions. However, our analysis points towards important factors often ignored, mostly because data sources are missing. Our methodology offers a simple, yet theoretically sound, way to look explicitly at price versus quality adjustments in international competitiveness. Bearing all methodological and data-related caveats in mind, the results have to be interpreted with care.

Another important issue that emerges is the increasing global integration of production and shifts in geographic patterns of production chains. Internationalization of production implies a diminishing domestic component of exports, so data on gross trade flows are no more an adequate representative of a country's competitiveness. Combining trade data with information from input-output tables is a potential solution pointing the direction for further research on the value-added content of exports.

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Appendix

A1 Import price index

We define a constant elasticity of substitution (CES) utility function for a representative household consisting of three nests. At the topmost level, a composite import good and domestic good are consumed:

$$U_t = \left(D_t^{\frac{\kappa-1}{\kappa}} + M_t^{\frac{\kappa-1}{\kappa}} \right)^{\frac{\kappa}{\kappa-1}}; \quad \kappa > 1, \tag{A1}$$

where D_t is the domestic good, M_t is composite imports and κ is the elasticity of substitution between domestic and foreign good. At the middle level of the utility function, the composite imported good consists of individual imported products:

$$M_t = \left(\sum_{g \in G} M_{gt}^{\frac{\gamma-1}{\gamma}} \right)^{\frac{\gamma}{\gamma-1}}; \quad \gamma > 1, \tag{A2}$$

where M_{gt} is the subutility from consumption of imported good g, γ is elasticity of substitution among import goods and G denotes the set of imported goods.

The bottom-level utility function introduces variety and quality into the model. Each imported good consists of varieties (i.e. goods have different countries of origins, so product variety indicates the set of competitors in a particular market). A taste or quality parameter denotes the subjective or objective quality consumers attach to a given product. M_{gt} is defined by a non-symmetric CES function:

$$M_{g,t} = \left(\sum_{c \in C} d_{gc,t}^{\frac{1}{\sigma_g}} m_{gc,t}^{\frac{\sigma_g-1}{\sigma_g}} \right)^{\frac{\sigma_g}{\sigma_g-1}}; \quad \sigma_g > 1 \quad \forall \quad g \in G, \tag{A3}$$

where $m_{gc,t}$ denotes quantity of imports g from country c, C is a set of all partner countries, $d_{gc,t}$ is the taste or quality parameter, and σ_g is elasticity of substitution among varieties of good g.

After solving the utility maximization problem subject to the budget constraint, the minimum unit-cost function of import good g is represented by

$$\phi_{g,t} = \left(\sum_{c \in C} d_{gc,t} p_{gc,t}^{1-\sigma_g} \right)^{\frac{1}{1-\sigma_g}}, \tag{A4}$$

where $\phi_{g,t}$ denotes minimum unit-cost of import good g, $p_{gc,t}$ is the price of good g imported from country c.

The price indices for good g could be defined as a ratio of minimum unit-costs in the current period to minimum unit-costs in the previous period ($P_g = \phi_{g,t} / \phi_{g,t-1}$). The conventional assumption is that quality or taste parameters are constant over time for all varieties and products, ($d_{gc,t} = d_{gc,t-1}$), so the price index is calculated over the set of product varieties $C_g = C_{g,t} \cap C_{g,t-1}$ available both in periods t and $t-1$, where $C_{gt} \subset C$ is the subset of all varieties of goods consumed in period t. Sato (1976) and Vartia (1976) show that, for a CES function, the exact price index will be given by the log-change price index

$$P_g^{conv} = \prod_{c \in C_g} \left(\frac{p_{gc,t}}{p_{gc,t-1}} \right)^{w_{gct}}, \tag{A5}$$

whereby weights $w_{gc,t}$ are computed using cost shares $s_{gc,t}$ in the two periods as follows:

$$w_{gc,t} = \frac{\left(s_{gc,t} - s_{gc,t-1}\right) / \left(\ln s_{gc,t} - \ln s_{gc,t-1}\right)}{\sum_{c \in C_g} \left(\left(s_{gc,t} - s_{gc,t-1}\right) / \left(\ln s_{gc,t} - \ln s_{gc,t-1}\right) \right)}; \; s_{gc,t} = \frac{p_{gc,t} x_{gc,t}}{\sum_{c \in C_g} p_{gc,t} x_{gc,t}}$$

and $x_{gc,t}$ is the cost-minimizing quantity of good g imported from country c.

The import price index in (A5) ignores possible changes in quality and variety (set of partner countries). Broda and Weinstein (2006) relax the underlying assumption that variety is constant. They posit that if $d_{gc,t} = d_{gc,t-1}$ for $c \in C_g = \left(C_{g,t} \cap C_{g,t-1}\right)$, $C_g \neq \emptyset$, then the exact price index for good g is given by

$$P_g^{bw} = \prod_{c \in C_g} \left(\frac{p_{gc,t}}{p_{gc,t-1}} \right)^{w_{gc,t}} \left(\frac{\lambda_{g,t}}{\lambda_{g,t-1}} \right)^{\frac{1}{\sigma_g - 1}} = P_g^{conv} \left(\frac{\lambda_{g,t}}{\lambda_{g,t-1}} \right)^{\frac{1}{\sigma_g - 1}}, \tag{A6}$$

where $\lambda_{g,t} = \dfrac{\sum_{c \in C_g} p_{gc,t} x_{gc,t}}{\sum_{c \in C_{g,t}} p_{gc,t} x_{gc,t}}$ and $\lambda_{g,t-1} = \dfrac{\sum_{c \in C_g} p_{gc,t-1} x_{gc,t-1}}{\sum_{c \in C_{g,t-1}} p_{gc,t-1} x_{gc,t-1}}$.

Therefore, the price index derived in (A5) is multiplied by an additional term to capture the role of new and disappearing varieties.

Broda and Weinstein (2006) assume that taste or quality parameters are unchanged for all varieties of all goods ($d_{gc,t} = d_{gc,t-1}$), i.e. vertical product differentiation is ignored. Benkovskis and Wörz (2011) further introduce an import price index that allows for changes in taste or quality:

$$P_g^q = \left(\frac{\sum_{c \in C_{g,t}} d_{gc,t} p_{gc,t}^{1-\sigma_g}}{\sum_{c \in C_{g,t-1}} d_{gc,t-1} p_{gc,t-1}^{1-\sigma_g}} \right)^{\frac{1}{1-\sigma_g}} = P_g^{conv} \left(\frac{\lambda_{g,t}}{\lambda_{g,t-1}} \right)^{\frac{1}{\sigma_g - 1}} \prod_{c \in C_g} \left(\frac{d_{gc,t}}{d_{gc,t-1}} \right)^{\frac{w_{gc,t}}{1-\sigma_g}} . \quad \text{(A7)}$$

Equation (A7) can therefore be seen as a modified version of equation (A6) with an additional term that captures changes in the quality or taste parameter.

A2 Relative export price index

Equation (A7) gives us a formula for a variety- and quality-adjusted import price index. We can easily interpret $x_{gc,t}$ (imports of product g originating from country c) as country's c exports of a product g to the importing market (assuming for the moment that there exists only one destination of exports for all exporting countries − the importing country where the representative household resides). However, there is still the problem of comparing the performance of one particular country relative to its competitors. Equation (A7) only gives the aggregate import price from all suppliers. Benkovskis and Wörz (2012) assert that changes in the relative export price of good g exported by emerging country k may be defined as:

$$RXP_{gk,t} = \frac{\phi_{g,t}^k / \phi_{gt-1}^k}{\phi_{g,t}^{-k} / \phi_{g,t-1}^{-k}} = \frac{\left(p_{gk,t} / p_{gk,t-1} \right) \left(d_{gk,t} / d_{gk,t-1} \right)^{\frac{1}{1-\sigma_g}}}{\phi_{g,t}^{-k} / \phi_{g,t-1}^{-k}}, \quad \text{(A8)}$$

where $\phi_{g,t}^k$ denotes the minimum unit-cost of good g when exported by (imported from) emerging country k. Similarly, $\phi_{g,t}^{-k}$ is the minimum unit-cost of good g when exported by (imported from) all countries except emerging country k. Combining (A7) and (A8), we obtain

$$RXP_{gk,t} = \prod_{c \in C_g^{-k}} \left(\frac{p_{gk,t}}{p_{gc,t}} \frac{p_{gct-1}}{p_{gk,t-1}} \right)^{w_{gc,t}^{-k}} \left(\frac{\lambda_{g,t}^{-k}}{\lambda_{g,t-1}^{-k}} \right)^{\frac{1}{1-\sigma_g}} \prod_{c \in C_g^{-k}} \left(\frac{d_{gk,t}}{d_{gc,t}} \frac{d_{gc,t-1}}{d_{gk,t-1}} \right)^{\frac{w_{gc,t}^{-k}}{1-\sigma_g}}, \quad \text{(1)}$$

where C_g^{-k} is set of product varieties available in both periods, excluding varieties coming from emerging country k, $w_{gc,t}^{-k}$ and $\lambda_{g,t}^{-k}$ are calculated similar to $w_{gc,t}$ and $\lambda_{g,t}$, again excluding emerging country k from the set of exporters (varieties).

Finally, we need to design an aggregate relative export price; the index in (4) only describes relative export prices for a specific product exported to a particular market. The assumption of a single destination for exports is relaxed to allow for multiple importing countries. In all these countries, consumers are assumed to be maximizing their utility. All parameters and variables entering the three-layered utility function can differ across countries. If we denote the export price, export volume and relative export price index of a

product g exported by emerging country k to country i as $p(i)_{gk,t}$, $x(i)_{gk,t}$ and $RXP(i)_{gk,t}$ accordingly, the aggregate adjusted relative export price index can be defined as

$$RXP_{k,t} = \prod_{i \in I} \prod_{g \in G} RXP(i)_{gk,t}^{W_{ig,t}}, \tag{A9}$$

where $W_{ig,t} = \frac{\left(S_{ig,t} - S_{ig,t-1}\right) / \left(\ln S_{ig,t} - \ln S_{ig,t-1}\right)}{\sum_{i \in I} \sum_{g \in G} \left(\left(S_{ig,t} - S_{ig,t-1}\right) / \left(\ln S_{ig,t} - \ln S_{ig,t-1}\right)\right)}$; $S_{ig,t} = \frac{p(i)_{gk,t} x(i)_{gk,t}}{\sum_{i \in I} \sum_{g \in G} p(i)_{gk,t} x(i)_{gk,t}}$.

Equation (A9) reveals that the aggregated index is just another Sato (1976) and Vartia (1976) log-change index. Its weights are computed using the share of product g exports to country i out of total exports by country k.

A3 Evaluation of relative quality

The calculation of the adjusted relative export price index in (4) is challenging as relative quality is unobservable. Following Hummels and Klenow (2005), we evaluate unobserved quality from the utility optimization problem, i.e. after taking first-order conditions and transformation into log-ratios, we express relative quality in terms of relative prices, volumes and the elasticity of substitution between varieties as

$$\ln\left(\frac{d_{gc,t}}{d_{gk,t}}\right) = \sigma_g \ln\left(\frac{p_{gc,t}}{p_{gk,t}}\right) + \ln\left(\frac{x_{gc,t}}{x_{gk,t}}\right), \tag{A10}$$

where k denotes a benchmark country.

A4 Estimation of elasticities

To derive the elasticity of substitution, we need to specify both demand and supply equations. The demand equation is defined by re-arranging the minimum unit-cost function in terms of market share, taking first differences and ratios to a reference country:

$$\frac{\Delta \ln s_{gc,t}}{\Delta \ln s_{gk,t}} = -\left(\sigma_g - 1\right) \frac{\Delta \ln p_{gc,t}}{\Delta \ln p_{gk,t}} + \varepsilon_{gc,t}, \tag{A11}$$

where $\varepsilon_{gc,t} = \Delta \ln d_{gc,t}$.

We can thus assume that the log of quality is a random-walk process.

The export supply equation relative to country k is given by:

$$\frac{\Delta \ln p_{gc,t}}{\Delta \ln p_{gk,t}} = \frac{\omega_g}{1+\omega_g} \frac{\Delta \ln s_{gc,t}}{\Delta \ln s_{gk,t}} + \delta_{gc,t}, \tag{A12}$$

where $\omega_g \geq 0$ is the inverse supply elasticity assumed to be the same across partner countries.

An unpleasant feature of the system of (A11) and (A12) is the absence of the exogenous variables that would be needed to identify and estimate elasticities. To get these estimates, we transform the system of two equations into a single equation by exploiting the insight of Leamer (1981) and the independence of errors $\varepsilon_{gc,t}$ and $\delta_{gc,t}$. This is done by multiplying both sides of the equations. After transformation, the following equation is obtained:

$$\left(\frac{\Delta \ln p_{gc,t}}{\Delta \ln p_{gk,t}}\right)^2 = \theta_1 \left(\frac{\Delta \ln s_{gc,t}}{\Delta \ln s_{gk,t}}\right)^2 + \theta_2 \left(\frac{\Delta \ln p_{gc,t}}{\Delta \ln p_{gk,t}}\right)\left(\frac{\Delta \ln s_{gc,t}}{\Delta \ln s_{gk,t}}\right) + u_{gc,t}, \tag{A13}$$

where

$$\theta_1 = \frac{\omega_g}{(1+\omega_g)(\sigma_g - 1)};\ \theta_2 = \frac{1-\omega_g(\sigma_g - 2)}{(1+\omega_g)(\sigma_g - 1)};$$

$$u_{gc,t} = \varepsilon_{gc,t}\delta_{gc,t}$$

Broda and Weinstein (2006) argue that it is necessary to define a set of moment conditions for each good g using the independence of the unobserved demand and supply disturbances for each country over time, i.e.

$$G(\beta_g) = E_t(u_{gc,t}(\beta_g)) = 0 \quad \forall c,$$

where $\beta_g = (\sigma_g, \omega_g)$ represents the vector of estimated elasticities. For each good g the following GMM estimator is obtained:

$$\hat{\beta}_g = \arg\min_{\beta \in B} G^*(\beta_g)' W G^*(\beta_g), \tag{A14}$$

where $G^*(\beta_g)$ is the sample analog of $G(\beta_g)$ and B is the set of economically feasible values of β ($\sigma_g > 1$ and $\omega_g \geq 0$). W is a positive definite weighting matrix, which weights the data such that the variance depends more on large shipments and becomes less sensitive to measurement error.

The elasticity of substitution among varieties is estimated using (A14) for all products where data on at least three countries of origin are available. Table A2 displays the main characteristics of estimated elasticities of substitution among varieties. For easier interpretation, we calculate the median mark-up $\sigma_g/(\sigma_g - 1)$.

Table A1 2010 shares of world imports of the analysed 75 exporters and 75 importers

Importers (reporters)	Share of world imports, %	Exporters (partners)	Share of world imports, %
United States	13.51	China	12.71
China	9.59	United States	8.18
Germany	7.33	Germany	8.03
Japan	4.76	Japan	5.15
France	4.12	France	3.56
United Kingdom	3.86	Korea	2.98
Italy	3.35	Netherlands	2.88
Hong Kong	3.03	Italy	2.87
Netherlands	3.02	Russia	2.69
Korea	2.92	Canada	2.64
Canada	2.69	United Kingdom	2.63
Belgium	2.68	Mexico	2.15
India	2.40	Belgium	2.07
Spain	2.17	Malaysia	1.70
Singapore	2.14	Switzerland	1.62
Mexico	2.07	Spain	1.61
Russia	1.71	Saudi Arabia	1.57
Australia	1.30	India	1.47
Turkey	1.27	Brazil	1.41
Thailand	1.25	Singapore	1.41
Brazil	1.24	Australia	1.39
Switzerland	1.21	Thailand	1.34
Poland	1.20	Indonesia	1.16
Malaysia	1.13	Ireland	1.06
Austria	1.03	United Arab Emirates	1.06
Sweden	1.02	Sweden	1.02
Indonesia	0.93	Poland	0.98
Czech Republic	0.86	Austria	0.96
Saudi Arabia	0.73	Norway	0.92
Hungary	0.60	Czech Republic	0.82
Denmark	0.58	Turkey	0.70
South Africa	0.55	South Africa	0.64
Norway	0.53	Denmark	0.60
Portugal	0.52	Hungary	0.60
Finland	0.47	Nigeria	0.55
Slovakia	0.44	Vietnam	0.51
Greece	0.44	Finland	0.49
Romania	0.43	Philippines	0.48
Ukraine	0.42	Chile	0.47
Ireland	0.42	Hong Kong	0.46
Israel	0.41	Argentina	0.45
Philippines	0.40	Qatar	0.45
Argentina	0.39	Venezuela	0.42
Chile	0.39	Kuwait	0.42
Nigeria	0.30	Algeria	0.40
Algeria	0.28	Slovakia	0.40
Colombia	0.28	Israel	0.38
Pakistan	0.26	Ukraine	0.37
Morocco	0.24	Kazakhstan	0.33
Belarus	0.24	Romania	0.32
Venezuela	0.22	Portugal	0.30
New Zeeland	0.21	Colombia	0.28
Peru	0.21	Peru	0.22
Slovenia	0.18	Oman	0.21
Bulgaria	0.17	New Zealand	0.20
Lithuania	0.16	Costa Rica	0.18

Importers (reporters)	Share of world imports, %	Exporters (partners)	Share of world imports, %
Tunisia	0.15	Egypt	0.17
Ecuador	0.14	Slovenia	0.16
Luxembourg	0.14	Greece	0.15
Croatia	0.14	Azerbaijan	0.15
Oman	0.14	Pakistan	0.14
Lebanon	0.12	Belarus	0.13
Panama	0.11	Ecuador	0.13
Serbia	0.11	Bulgaria	0.13
Jordan	0.10	Morocco	0.13
Dominican	0.10	Luxembourg	0.12
Costa Rica	0.10	Lithuania	0.11
Guatemala	0.10	Tunisia	0.11
Estonia	0.09	Trinidad and Tobago	0.10
Sri Lanka	0.08	Sudan	0.07
Kenya	0.08	Estonia	0.07
Latvia	0.08	Croatia	0.07
Bahrain	0.07	Cote d'Ivoire	0.06
Bosnia Herzegovina	0.06	Latvia	0.06
Ethiopia	0.06	Panama	0.05
Total	96.25	Total	93.01

Sources: *UN Comtrade*, authors' calculations.
Notes: Share of exporters and share of importers are calculated relative to total world imports.

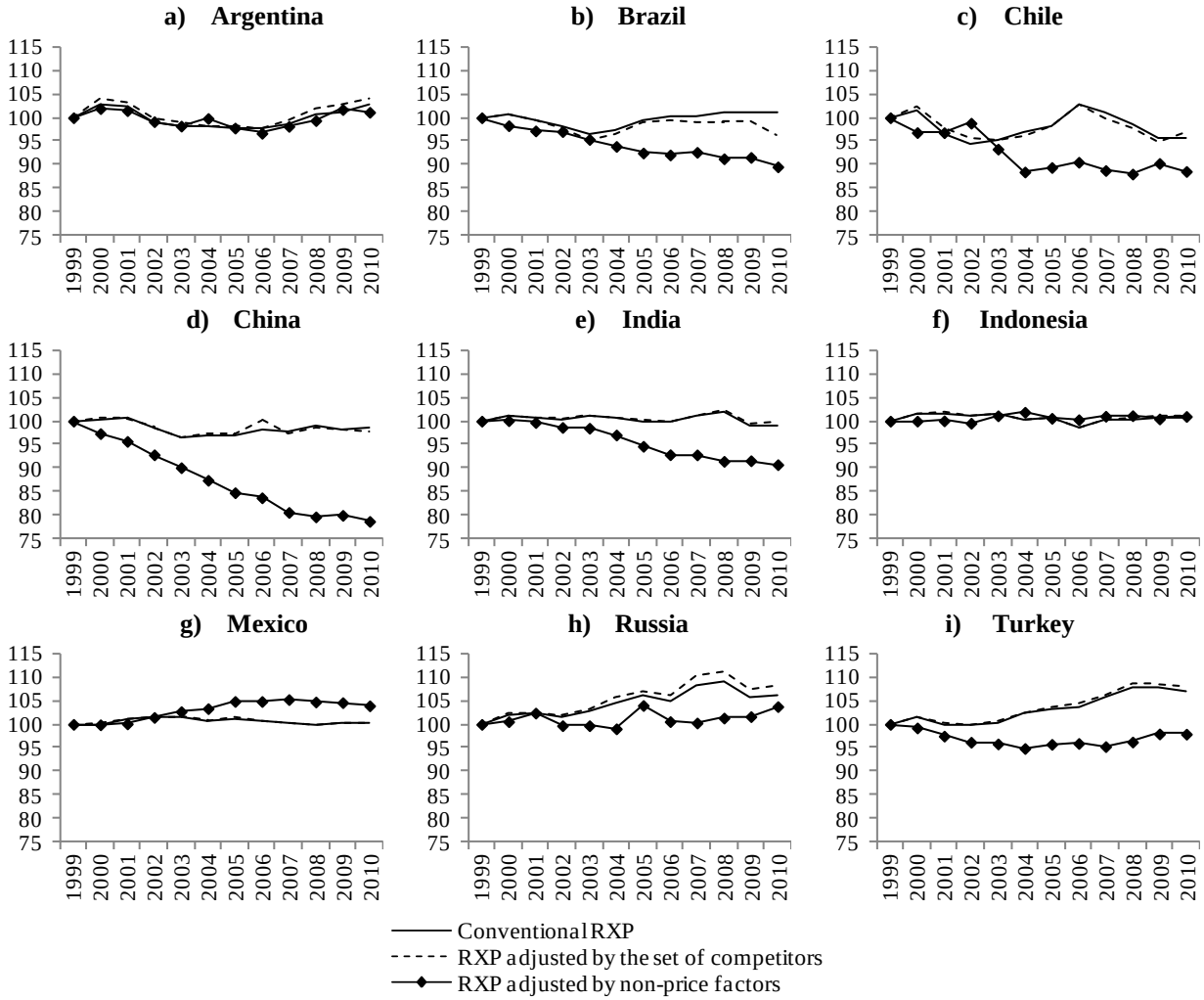
Table A2 Elasticities of substitution between varieties

	No. of estimated elasticities	Mean	Standard Deviation	Maximum	Minimum	**Median**	**Median mark-up**
Algeria	3204	20.6	46.5	762.5	1.04	**6.28**	**18.9**
Argentina	2820	21.2	115.0	5374.6	1.03	**6.90**	**16.9**
Australia	2786	80.4	646.8	18180.6	1.01	**12.42**	**8.8**
Austria	4449	20.8	52.2	1518.6	1.05	**7.12**	**16.4**
Bahrain	2263	19.2	39.7	559.8	1.05	**5.60**	**21.7**
Belarus	3259	21.3	56.9	2023.7	1.09	**6.57**	**17.9**
Belgium	4818	19.1	45.4	1291.2	1.04	**7.23**	**16.0**
Bosnia Herzegovina	3206	22.4	55.9	1453.2	1.09	**6.81**	**17.2**
Brazil	3876	20.2	84.8	3745.5	1.09	**7.05**	**16.5**
Bulgaria	3826	18.9	39.5	848.2	1.07	**6.09**	**19.6**
Canada	3535	73.4	425.2	10404.7	1.00	**11.99**	**9.1**
Chile	3456	55.7	543.2	28249.1	1.01	**7.56**	**15.2**
China	4086	43.0	242.8	8726.3	1.01	**9.64**	**11.6**
Colombia	3654	17.5	39.8	1504.7	1.06	**6.30**	**18.9**
Costa Rica	3060	20.9	44.4	931.7	1.04	**6.41**	**18.5**
Croatia	3982	18.1	38.3	992.7	1.04	**6.09**	**19.6**
Czech Republic	4638	17.3	30.2	463.0	1.03	**7.05**	**16.5**
Denmark	4391	19.3	63.1	2662.3	1.07	**7.62**	**15.1**
Dominican	954	112.6	497.6	9915.4	1.01	**14.28**	**7.5**
Ecuador	3002	20.6	51.7	1368.1	1.04	**6.07**	**19.7**
Estonia	3397	18.1	34.1	493.1	1.03	**6.27**	**19.0**
Ethiopia	1711	18.2	36.6	860.7	1.02	**6.17**	**19.3**
Finland	4154	17.8	45.4	1271.3	1.03	**6.48**	**18.2**
France	4942	19.3	37.6	927.1	1.05	**7.14**	**16.3**
Germany	4710	18.1	34.5	978.0	1.02	**7.53**	**15.3**
Greece	4238	18.3	48.9	1248.6	1.06	**5.71**	**21.2**
Guatemala	2809	23.0	61.1	1374.3	1.05	**6.49**	**18.2**
Hong Kong	3491	46.5	245.2	6232.2	1.01	**9.77**	**11.4**
Hungary	4075	21.9	42.1	687.3	1.03	**6.89**	**17.0**
India	4228	19.0	44.7	849.6	1.07	**6.45**	**18.3**
Indonesia	3769	58.1	320.2	7432.2	1.01	**8.61**	**13.1**
Ireland	4103	25.3	123.2	4072.3	1.01	**6.45**	**18.4**
Israel	1339	108.2	512.3	8874.1	1.00	**24.33**	**4.3**
Italy	4900	17.1	30.3	503.1	1.11	**6.81**	**17.2**
Japan	4286	22.1	70.4	2296.6	1.01	**6.67**	**17.6**
Jordan	2065	21.3	49.2	790.5	1.05	**5.75**	**21.1**
Kenya	2339	42.3	363.4	15090.8	1.03	**5.97**	**20.1**
Korea	4452	18.6	53.7	1963.7	1.01	**6.88**	**17.0**
Latvia	3378	18.7	41.6	946.2	1.03	**6.07**	**19.7**
Lebanon	2940	21.5	58.4	1469.7	1.03	**5.73**	**21.1**
Lithuania	3616	17.8	37.9	727.7	1.06	**6.60**	**17.9**
Luxembourg	3517	26.1	113.7	5751.3	1.01	**7.20**	**16.1**
Malaysia	3879	79.8	687.1	24067.1	1.01	**6.73**	**17.5**
Mexico	3483	37.1	200.3	6927.5	1.01	**7.23**	**16.0**
Morocco	3329	20.0	50.7	1412.4	1.02	**6.34**	**18.7**
Netherlands	4140	47.1	320.1	12614.0	1.01	**7.37**	**15.7**
New Zealand	3908	19.2	43.8	844.4	1.10	**6.42**	**18.4**
Nigeria	1490	28.4	138.5	4931.2	1.03	**5.41**	**22.7**
Norway	4290	16.4	40.0	1079.7	1.07	**5.78**	**20.9**
Oman	2239	22.2	64.0	1922.0	1.02	**5.86**	**20.6**
Pakistan	2333	66.6	431.6	9144.4	1.01	**11.31**	**9.7**
Panama	2415	18.9	39.8	661.5	1.00	**6.38**	**18.6**
Peru	3320	19.6	59.0	2359.3	1.02	**6.30**	**18.9**
Philippines	3521	22.2	71.6	2832.5	1.02	**5.61**	**21.7**

	No. of estimated elasticities	Mean	Standard Deviation	Maximum	Minimum	**Median**	**Median mark-up**
Poland	4522	17.4	32.5	777.6	1.06	**7.03**	**16.6**
Portugal	4263	21.6	56.5	1460.3	1.05	**6.52**	**18.1**
Romania	4187	19.0	96.6	5783.4	1.07	**6.53**	**18.1**
Russia	4230	18.0	32.9	997.8	1.07	**7.75**	**14.8**
Saudi Arabia	3879	18.5	40.2	1270.7	1.02	**5.96**	**20.1**
Serbia	3222	20.3	44.0	1024.1	1.06	**6.93**	**16.9**
Singapore	3020	99.6	547.7	10129.7	1.00	**10.01**	**11.1**
Slovakia	4060	22.2	110.3	4686.2	1.04	**6.92**	**16.9**
Slovenia	4194	19.9	56.5	1844.6	1.07	**6.83**	**17.2**
Southern Africa	4064	67.0	436.3	11358.9	1.01	**8.51**	**13.3**
Spain	4850	18.3	45.8	1640.5	1.07	**6.86**	**17.1**
Sri Lanka	2213	47.4	211.9	3549.3	1.00	**6.89**	**17.0**
Sweden	3901	22.5	59.7	2055.0	1.03	**7.53**	**15.3**
Switzerland	4645	19.0	44.1	1311.5	1.04	**7.27**	**15.9**
Thailand	3668	57.6	577.0	25465.1	1.01	**7.85**	**14.6**
Tunisia	3306	20.0	47.3	1018.2	1.03	**6.04**	**19.8**
Turkey	4170	16.7	36.0	1015.0	1.04	**6.45**	**18.3**
UK	4855	16.8	44.6	1144.8	1.03	**5.72**	**21.2**
Ukraine	3658	19.1	33.9	619.3	1.08	**7.34**	**15.8**
US	3928	33.8	171.5	6777.5	1.01	**8.27**	**13.7**
Venezuela	3463	21.9	77.9	2767.1	1.04	**6.24**	**19.1**

Sources: *UN Comtrade*, authors' calculations.
Notes: Elasticities of substitutions are estimated using equation (A14) for all products where data for at least three countries of origin are available.

Figure A1 Export prices of emerging countries relative to competitors, excluding oil exports (1999=100)



Sources: *UN Comtrade*, authors' calculations.
Notes: Relative export prices are calculated by cumulating RXP changes from equations (1), (A9) and (A10). Increase denotes loss in competitiveness.

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