EUROPEAN CENTRAL BANK

EUROSYSTEM

WORKING PAPER SERIES

NO 1443 / JUNE 2012

THE STRUCTURAL DETERMINANTS OF THE U.S. COMPETITIVENESS IN THE LAST DECADES

A 'TRADE-REVEALING' ANALYSIS

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ISSN 1725-2806 (online)

Abstract

We analyze the decline in the U.S. share of world merchandise exports against the backdrop of a model-based measure of competitiveness. We preliminarily use constant market share analysis and gravity estimations to show that the majority of the decline in export shares can be associated with a declining share of world income, suggesting that the dismal performance of the U.S. market share is not a sufficient statistic for competitiveness. We then derive a computable measure of country-sector specific real marginal costs (i.e. competitiveness) which, insofar it is inferred from actual trade flows, is referred to as 'revealed'. Brought to the data, this measure reveals that most U.S. manufacturing industries are losing momentum relative to their main competitors, as we find U.S. revealed marginal costs to grow by more than 38% on average. At the sectoral level, the "Machinery" industry is the most critical.

Keywords: Productivity, competitiveness, export shares, marginal costs, firm heterogeneity, firm selection, gravity equation, trade costs.

JEL Classification: F12, F17, F19

Non technical summary

This paper analyzes the decline in U.S. export share. To tackle these issues, we begin by decomposing the decline in share into detailed industry groups and find that only a few of these industries contributed to the decline in any meaningful way. A large part of the drop was driven by the changing size of U.S. export industries and not the size of U.S. sales within those industries. In particular, U.S. exporters appear to have specialized in industries that happen to have been growing relatively slowly as a share of world trade. These observations offer our first suggestion that the fall in aggregate U.S. share has little to do with the underlying productivity of U.S. exporting firms.

To corroborate this argument, we estimate the effect of national income and geography on export shares in a modified gravity equation, in which export flows to a given country are divided through by the entire world export to that country. Such preliminary analysis reveals that the majority of the decline in export shares is in fact due to a declining share of world income.

This type of analysis offers potential for a better understanding of the drivers of the U.S. export performance, as the residuals embody precious information on country-sector underlying productivity. However, the latter is mixed with other unmeasured components, such as relative trade costs and idiosyncratic shocks, making the residual a poor measure of competitiveness.

We thus take a structural approach aimed at identifying relative cost competitiveness across countries by modeling the micro-foundations of trade shares explicitly. The model allows us to derive a measure of country-sector (relative) real marginal costs which, insofar it is inferred from actual trade flows, we refer to as revealed marginal costs (henceforth RMC). This (inverse) measure of competitiveness is endogenous to the model, being the outcome of a process of firm selection driven by: (1) the degree of 'accessibility' (i.e. trade costs) of the country and the size of the market, as well as (2) the exogenous ability of the country to generate low cost firms (exogenous marginal costs), which depends on structural and technological factors such as the entry costs and the productivity distribution of firms.

When brought to the data, for the period 1980-2004, our measure suggests that, notwithstanding significant heterogeneity across sectors, U.S. marginal costs have generally kept decreasing, in absolute terms. However, relative to their main competitors, U.S. manufacturing industries are also suffering from problems of competitiveness, as we find that marginal costs have grown by more than 38\%, on average, relative to the other G20 countries. At the sectoral level, the "Machinery" industry is confirmed to be the most critical, followed by "Non-ferrous metals", "Industrial chemicals", "Professional and scientific equipments". On the other hand, in sectors like "Petroleum and coal", "Plastic products", "Printing and publishing", reported RMCs decreased significantly, i.e. the respective competitiveness increased.

With respect to the main trading partners of the US, two groups can be identified. For the countries in which RMC decreased the most relative to the US (i.e. their relative competitiveness increased) higher trade freeness (relative to the U.S.) appeared to be an important factor, irrespective of the negative (India) or positive (China) variation

in market size. On the other hand, there was another group of countries in which the degree of trade freeness decreased respect to the U.S. In all these countries, except for Korea, trade freeness has been the main driver of a worse performance, in terms of RMC, compared to the U.S. Korea, instead, compensated the decrease in trade openness with a substantial increase in market size which, via increased competition, produced a beneficial effect on competitiveness.

Overall, our analysis suggests that market share performance is not a sufficient statistics for competitiveness, as witnessed by the very low correlation between our RMC measure and the export shares. Market size is definitively the main responsible for the dismal performance of the U.S. market share. On the other hand, trade freeness increased substantially in the countries in which RMC decreased the most (India, China, Germany) relative to the U.S.

1 Introduction

The U.S. market share of world merchandise exports has declined sharply over the past decade. Throughout the 1980s and 1990s, approximately 12 percent of the value of goods shipped globally originated in the United States; by 2010, the share had dropped to only 8.5 percent.

This paper investigates the factors driving the fall in the U.S. export share and, to the extent possible, attempts to determine how big a role the changing productivity of U.S. firms relative to their competitors has played.

Underlying the hypothesis that the U.S. loss in market share hides a progressive reduction in U.S. firms' international *competitiveness* is in fact the fear that, over time, the *productivity* of U.S. firms is falling, relative to that of foreign counterparts selling similar products. Disentangling the factors behind this idea presents however several complications. First, in many instances, and particularly for international comparisons, trade costs and firm productivity are difficult to measure directly.[1] Second, export shares may additionally reflect the idiosyncratic composition of the U.S. export bundle, which may have little to do with the ability of U.S. exporters within a given industry to compete.

To tackle these issues, we begin by decomposing the decline in share into detailed industry groups and find that only a handful of products contributed to the share decline. Among those that did contribute, a significant part of the decline was indeed driven by the shrinking fraction of world trade claimed by those products. While we also find that the United States lost ground to its competitors in the export of certain products that were expanding briskly as a share of world trade (in particular, machinery and transportation products), the change in the overall U.S. export share cannot be interpreted as a simple proxy for the nations reduced competitiveness.

We then estimate a modified gravity equation to see whether the relatively slower growth rate of the U.S. economy, relative to that of its competitors, can help explaining the declining U.S. export share.[2] Such preliminary analysis reveals that the majority of the decline in the latter is due to a declining share of world income. This type of analysis offers potential for a better understanding of the drivers of the U.S. export performance, as the residuals embody precious information on country-sector underlying productivity. However, this information is mixed with other unmeasured components, such as relative trade costs and idiosyncratic shocks, making the residual a poor measure of competitiveness. In other words, it is difficult, without an underlying model, to know whether gravity residuals reflect the actual evolution in the productivity of exporters rather than other factors, such as evolving trade costs.

We thus take a structural approach aimed at identifying relative cost competitiveness across countries by modeling the micro-foundations of trade shares explicitly. We do so by modifying the heterogenous firms model by Corcos et al.(2011)[3] in order to derive a measure of country-sector (relative) real marginal costs which, insofar it is inferred from actual trade

[1] Measures of aggregate tfp, comparable across countries, are in fact usually obtained indirectly, as the residual component of GDP growth that cannot be explained by the growth of the inputs of production. One of the drawbacks of the growth accounting approach is that the role of the sectoral composition of output is ruled out by assumption. By assuming that GDP is produced by a single sector, one cannot disentangle tfp differences (across countries) due to sectoral specialization from tfp differences due to other factors such as within-sector differences or crosscountry differences in the sectoral composition of the economy.

[2] In a large body of research, the size of a nations economy has been shown to be an important determinant of the size of its international trade flows, with larger countries both importing and exporting more. Therefore, the brisk rate of, say, Chinas GDP growth relative to that of the United States would imply a higher Chinese share and a lower U.S. share in any product traded by both countries.

[3] The model in Corcos et al. (2011) is a multi-country multi-sector version of Melitz and Ottaviano (2008). It was first brought to the data by Del Gatto et al. (2006) and further developed by Ottaviano et al. (2009).

flows, we refer to as *revealed marginal costs* (henceforth RMC). This (inverse) measure of competitiveness is endogenous to the model, being the outcome of a process of firm selection driven by: (1) the degree of 'accessibility' (i.e. trade costs) of the country and the size of the market, as well as (2) the exogenous ability of the country to generate low cost firms (exogenous marginal costs), which depends on structural and technological factors such as the entry costs and the productivity distribution of firms.

Our theoretical departure from Corcos et al. (2011) consists of removing the numeraire good. This allows for an income effect which is absent in Melitz and Ottaviano (2008), but it is essential for our purposes. Additionally, we employ the approach described in Novy (2011) to compute competitiveness indicators which are comparable through time. This allows us to overcome one of the main limits of trade costs indicators estimated through standard gravity equations.

Such RMC measure features at least four important characteristics. First, it is derived as an implication of a heterogenous firms model. This is a *conditio sine qua non* for our analysis, which aims at studying whether, and to what extent, the fall in the U.S. export share can be traced back to the evolution of U.S. firms' productivity. Second, although based on a model with heterogenous firms, it only requires aggregate bilateral trade flows to be brought to the data. Third, computation is straightforward, as it does not (necessarily) require econometrics. Fourth, it provides us with a model-based decomposition of country-sector real marginal costs which, within the boundaries of the reference model, represents a fairly good description of the main determinants of competitiveness. Such decomposition identifies in market size, trade freeness and imports, the "revealing" and "observable" components of country-sector real marginal costs.

Moreover, as marginal costs represents a composition of total factor productivity (henceforth tfp), input costs and input shares, the idea of competitiveness associated with RMC fits very well, indeed much better than more conventional measures of tfp, in globalized contexts, in which the link between tfp and international competitiveness is increasingly blurred by offshoring and international outsourcing.

The possibility to 'infer' a measure of productivity, and thus of competitiveness, starting from observable trade flows is not peculiar to our theoretical framework. The general idea is that, although mediated by other factors, such as market size and trade costs, international trade flows are mainly driven by cross-country differences in sectoral productivity. To the extent that the relationship between productivity and trade flows can be purged of the effect of the other factors, bilateral trade flows, which are observable, can be used to 'infer' the otherwise unobservable structure of country-sectoral differences in relative productivity. Defining a reference theoretical framework is however propaedeutical to the analysis. Finicelli et al. (2009) adopt the probabilistic Ricardian framework of Eaton and Kortum (2002); Waugh (2009) adopts a variant of Eaton and Kortum (2002) with traded intermediate goods and non-traded final goods; Fadinger and Fleiss (2011) rely on a monopolistic competition framework with CES preferences. Unlike this literature, which relies on the representative firm hypothesis, our framework encompasses firm heterogeneity in productivity.

When brought to the data, for the period 1980-2004[4], our measure suggests that, notwithstanding significant heterogeneity across sectors, U.S. marginal costs have generally kept decreasing, in absolute terms. However, relative to their main competitors, U.S. manufacturing industries are also suffering from problems of competitiveness, as we find that marginal costs have grown by more than 38%, on average, relative to the other G20 countries. At the sectoral level, the "Machinery" industry is confirmed to be the most critical, followed by "Non-ferrous metals", "Industrial chemicals", "Professional and scientific equipments".

[4]Our choice of the time span is driven by the availability of data on domestic trade flows.

On the other hand, in sectors like "Petroleum and coal", "Plastic products", "Printing and publishing", reported RMCs decrease significantly.

Overall, our analysis suggests that the dismal performance of the U.S. market share is not a sufficient statistic for competitiveness, as witnessed by the very low correlation between our RMC measure and the export shares.

The exposition proceeds as follows. In the next section we present descriptive and econometric analysis of U.S. export shares. In section 3.1 we describe the theoretical framework. In section 3.2 we derive the RMC expression. Our main results are then discussed in section 3.4, after a section (section 3.3) in which we describe our data and specify the RMC decomposition used in the analysis. Section 4 concludes.

2 Export shares dynamics

From 1984 to 2010, the U.S. share of global exports of goods fell by almost one-third. Through 1999, it was fairly stable at a level of roughly 12 percent, then dropped 3.5 percentage points between 2000 and 2010 (Figure 1). For a subset of countries that report data on the export of certain services, we are able to construct an analogous measure of the U.S. services market share for the 2000-08 period (also shown in Figure 1). Clearly, the decline in U.S. share in the 2000s was not particular to merchandise exports: the services measure fell precipitously from its initial value of about 25 percent before stabilizing in the later years at just above 5 percent. While the data's incomplete coverage of countries and services makes it difficult to ascribe too much precision to the services share levels, the dynamics of the services market share are remarkably similar to those of the goods market share. This finding rules out the argument that a U.S. industry shift from manufactured goods exports to services exports explains the drop in the U.S. share of merchandise exports.[5]

Commodities. A useful way of decomposing the above 3.5% fall in the goods export share is to express it as the sum of changes across product categories (s) as a ratio of the change in world exports:

$$\frac{\Delta X_{US}}{\Delta X_{WORLD}} = \sum_s \frac{\Delta X^s_{US}}{\Delta X_{WORLD}} \tag{1}$$

Using bilateral industry-level trade flows from National Bureau of Economic ResearchUnited Nations [NBER-UN] Trade Data, as compiled by Feenstra et al. (2005), Figure 2 depicts the contributions to the change in aggregate export share for each 1 digit SITC code over the period from 1984 to 2008.[6]

We observe that virtually every sector registered a decrease in market share over the period from 1984 through 2008. The sector that contributed the most to the overall decline in share was machinery and transportation equipment, which alone accounted for half of the decrease in the U.S. export share over that period. This large contribution in part reflects the fact that machinery and transportation-related products represent almost half of U.S. exports. Within that sector, the declines in the U.S. share of office machine and computer exports are particularly striking, dropping from about a third of total world sales to just under one-tenth. The vast majority of the remaining share losses were recorded in commodities categories, which account for approximately a quarter of U.S. export sales over the twenty-five years examined. For instance, the contributions of crude materials (a category that includes, among other things, metals and minerals with low levels of processing) and

[5]The limited data availability on the services trade forces us to focus exclusively on merchandise trade.
[6]Robert Feenstra kindly furnished a preliminary version of an updated data set running through 2008.

food and live animals added up to about 1.5 percentage points, accounting for 43 percent of the overall change in the U.S. share.[7]

The importance of commodities for the decline in the U.S. share offers our first reason to resist interpreting aggregate export share statistics as direct evidence of declining competitiveness. Commodity prices fell over most of the period under consideration and, since the exports of the United States are relatively commodity-intensive, it follows that U.S. revenue from commodity sales (and hence the U.S. share of world exports) would fall as well. This point is reinforced by price trends for those individual products within the commodities categories that contributed the most to the share decline. For instance, the prices of corn and soybeans fell in the late 1990s and then remained at this lower level until 2006, when they began to rise. This pattern of prices corresponds closely to the rapid decline in the U.S. export share at the beginning of the past decade and its leveling off in the middle of the decade. Thus, it appears likely that movements in the U.S. export share partly reflect commodity price fluctuations (as opposed to being driven entirely by changes in U.S. competitiveness).

Commodity price effects aside, the importance of food for explaining the overall decline in the U.S. export share is still somewhat surprising given foods relatively small share in U.S. exports. However, the decline in the U.S. aggregate share reflects both a decline in market share within each sector (the intensive margin), and a decline stemming from changes in the size of each category relative to world exports (the extensive margin). For instance, corn contributes to the decline in U.S. aggregate share both when the United States captures a smaller proportion of the corn-specific export market and when corns share of overall world exports declines. Intensive margin changes are more closely related to competitiveness, since they gauge the size of the slice of the pie held by U.S. exporters, whereas extensive margin changes relate to the size of a given product or sector (that is, they measure the size of the pie itself without regard to how it is split among competing exporters). If we adhere to a definition of competitiveness that focuses on the intensive margin, it does not matter whether a country gains market share in slow- or fast-growing sectors, but only that it increases its market share. Arguably, a country would prefer to specialize more deeply (and gain market share) in faster-growing sectors. That said, over our relatively short period of analysis, it is probably reasonable to assume that the sector composition of exports by any given country does not change that much.

These arguments are supported by Figure 3, where we use constant market share analysis[8] to separate the change in aggregate market share into a commodity (extensive) effect and a competitiveness (intensive) effect, defined as follows:[9]

$$\frac{\Delta X_{US}}{\Delta X_{WORLD}} = \underbrace{\sum_s \frac{X^s_{US}}{X^s_{WORLD}} \cdot \left(\Delta \frac{X^s_{WORLD}}{X_{WORLD}}\right)}_{\textit{Commodity (Ext.) Effect}} + \underbrace{\sum_s \left(\Delta \frac{X^s_{US}}{X^s_{WORLD}}\right) \cdot \frac{X^s_{WORLD}}{X_{WORLD}}}_{\textit{Competitiveness (Int.) Effect}}$$

[7]Another third of a percentage point is accounted for by miscellaneous manufactured products, which primarily includes footwear, clothing, apparel, furniture, and certain scientific or photographic apparatus, and manufactured goods classified by material, which includes material-intensive products such as textiles, metal and mineral manufactures, pulp, paper, and rubber.

[8]Constant market share analysis is beset by a number of well documented theoretical problems (see Richardson (1971) for an overview and ECB, 2005 for a detailed description). However, the approach remains illustrative and simple to implement even if interpretation is complicated by relative price changes and other issues.

[9]The constant market share approach often includes an additional "market effect" related to the geographical pattern of trade. For ease of exposition we have focused only on the commodity effect, in a sense wrapping the market effect into our measurement of the competitiveness effect. With declining trade costs it is likely that the market effect has become a less pronounced determinate of aggregate share in any case.

The commodity effect measures the effect of composition on the change in the aggregate export share, by weighting the change in the composition of world exports by the initial composition of the U.S. export bundle. The competitiveness effect measures the portion of the change in the aggregate share that is due to changes in the within category share of U.S. exports.

As we can see, both the food and live animals sector and the crude materials sector have large negative extensive margin effects. Thus, the large negative contributions of the two sectors for the most part reflect the declining importance of these goods in world merchandise exports, although U.S. exports also suffered a negative intensive effect in each case. In contrast, the negative overall contributions of machinery and transportation, miscellaneous manufactured products, and chemicals can be completely attributed to a decline in U.S. competitiveness, because these sectors increased their weight in world exports over the time frame under consideration.

In sum, we have seen that compositional effects make it difficult to attribute all of the observed decline in U.S. export share to the nation's faltering competitiveness. However, the United States also experienced large declines in share in machinery, transportation products, miscellaneous manufactures, and chemicals that no doubt reflected ground lost to competitors within those sectors. In the case of these export sectors, the evidence of a fall in U.S. competitiveness is more compelling.

Output shares. One possible explanation for the decline in U.S. export share is simply that the U.S. now accounts for a smaller share of global output. As China and other emerging economies expand rapidly and become more integrated into the global economy, it is natural that the U.S. share of world exports would fall without necessarily indicating any decline in the productivity of U.S. exporters. As shown in Figures 4 and 5, the U.S. GDP share, like its export share, was fairly steady leading up to the year 2000. Subsequently, the fall in the U.S. share of global exports of about 3.5 percentage points through 2008 corresponded to a decrease in the U.S. share of global GDP of about 4.5 percentage points.

The relatively tight correlation between export share and GDP share holds true for many other countries as well. Among the Group of Seven countries, France, the United Kingdom, Italy, Canada, and Japan have experienced declines in export share that broadly match their declining share of world output. The biggest exception to this pattern is Germany, which has more or less maintained export share even as its share of world output has declined. Turning to the export-intensive Asian economies, we note that, in percentage terms, the export share growth of both China and India has moved upward in tandem with their GDP shares.

Figures 4 and 5 strongly suggest that changes in market share may be conflating competitiveness effects with income dynamics. Specifically, country characteristics such as size may be influencing market share but have little to do with the underlying ability of a country's exporters to compete. To control for such characteristics, we use a derivative of the gravity equation. Previous studies such as Baier and Bergstrand (2001), and more recently Whalley and Xin (2009) and Novy (2011), use gravity to decompose the levels of bilateral trade flows into contributions from income, trade costs or otherwise. Each finds that exporter and importer income plays a substantial, even dominant, role in explaining trade. In this section, we extends this logic to the case of relative trade performance, where the gravity equation is 'folded' by dividing through by a reference exporter. In the particular case where the reference country is the entire world, the gravity equation converts neatly into an expression for market share in terms of relative exporter size, relative geographic characteristics and relative multilateral resistance, encompassing the relative productivity of countries.

To be concrete, define T_s^{lh} as country l's exports to country h in sector s:

$$T_s^{lh} = D^l D^h r_s^l r_s^h \rho_s^{lh} \phi \tag{2}$$

Equation (2) corresponds to a generic gravity model, where bilateral trade is a function of country size (D), latent country-specific multilateral resistance (r), geographic characteristics (ρ) and global shocks (ϕ). Exploiting the multiplicative form of the equation, we cancel out importer-specific terms by dividing through by total exports to country h in industry s.

$$\frac{T_s^{lh}}{\sum_l T_s^{lh}} = \frac{D^l r_s^l \rho_s^{lh}}{\sum_l D^l r_s^l \rho_s^{lh}} \tag{3}$$

The intuition for this reduced form is that the change in a given importer's income or multilateral resistance will affect the level of that country's imports but not how the new imports are allocated across exporters. Moreover, a global shock affecting all exporters will not affect their relative performance and hence the ϕ terms cancel out as well. The method of taking ratios of the gravity equation has three ostensible benefits. First, for our purpose of relating the share of U.S. exports to underlying productivity measures, equation (3) is expressed in the correct units of share owing to income, trade costs and productivity. Second, the size of the data matrix used in the estimation is reduced by folding in the importer-specific terms. Third, multilateral resistance terms (as defined in Anderson and van Wincoop (2003)) associated with importers cancel out, sparing the need to approximate them using fixed effects.[10]

Denoting the geometric mean of a given variable by $\overline{X} = \prod_{l=1}^{N} \left(X^l\right)^{\frac{1}{N}}$, taking logs, and allowing for a mean-zero perturbation (ε), we can rewrite the above expression as:[11]

$$\ln \frac{T_s^{lh}}{\sum_l T_s^{lh}} = \ln \frac{1}{n_s} + \ln \frac{D^l}{\overline{D}} + \ln \frac{\rho_s^{lh}}{\overline{\rho}_s^h} + \ln \frac{r_s^l}{\overline{r}_s} + \varepsilon_s^{lh} \tag{4}$$

This specification is isomorphic to a standard gravity model, though specified in relative terms, with the log of country l's market share in destination market h being a positive function of its relative income, its geographic proximity and the relative multilateral resistance term.

Equation (4) is brought to data using the bilateral trade flows described above, as well as nominal GDP data from the Penn World Table. The latter are converted into international dollars at PPP exchange rates.[12] We run the gravity regression at the SITC 4-digit level and our estimator is OLS on the log-linear specification of (4). As well as country-pairs[13] and year fixed effects, which soak up secular trends in n, dummies for post-NAFTA and post Euro years are included, for the appropriate countries, to control for large policy changes which cannot be viewed as endogenous to competitiveness. Finally, a dummy for China's WTO membership is also used. However, cognizant of the fact the this might tend to attribute

[10]Other examples of cancelling out the importer fixed effects in a gravity framework include: Head and Mayer (2000), Martin et al.(2008) and Head et al.(2010).

[11]Expression (4) imposes separability across right-hand side ratios with the assumption that $\ln \sum T = \sum \ln T$. In practice, this may have the effect of overestimating the share of each exporter (i.e., since the shares as decomposed on the right-hand side will add up to more than 1), but little impact on the relative size of the shares.

[12]We follow previous studies by truncating the data at $10,000 per annual bilateral flow to avoid potential distortions from errors of units in the data and implausibly small trade values. We constrain ourselves to products with over 1,000 exporter-importer-year observations.

[13]The exporter-importer FE is a static measure of trade costs which wipes out variation in border, distance and language, and arguably includes many more unmeasured (and unchanging) barriers to trade.

all of China's recent performance to its WTO accession, we report results with and without such control.[14]

Table 1 shows the estimates.[15] As expected, exporter GDP share is positively related to export share, with a 1 percent decrease in relative income decreasing export share by roughly 0.3 percent. The effect of NAFTA and the introduction of the euro are both positive and significant, while controlling for China's WTO membership decreases the GDP coefficient by a 25%.

An index of market share changes for the U.S., along with an index of model predicted values, is shown in Figure 6. The index in each year is a geometric mean of share changes across U.S. destination countries and products, where each change in share is weighted by the SITC-importer value in the year 2000.[16]

Overall, the model prediction tracks much of the decline in the U.S. market share. In 2008, at the end of the sample period, the model prediction is about 15 percent below its level in the year 2000, accounting for about half of the 30 to 35 percent drop in the U.S. share. The residual, our broad measure of competitiveness, accounts for the other half. However, while the model tracks the flat periods in the market share series (that is, 1994-2000, 2005-08), it misses the decline in U.S. share in the early 2000s. By contrast, the residual declined sharply in the beginning of the 2000s, an indication that relative productivity fell at that time, before stabilizing in the middle of the decade. Overall, Figure 6 shows that U.S. relative productivity, albeit in decline by this measure of revealed competitiveness, did not decline by nearly as much as the fall of the U.S. export share might suggest. Moreover, this result obtains broadly across product categories. Even in the categories of machinery and transportation, where U.S. share performance was particularly weak and exclusively driven by changes in the intensive margin, a significant share of the decline can be accounted for by GDP and geographic factors.

Further, the percentage change in the residual for machinery and transportation was roughly equal to that for crude materials and food and live animals, categories that had much smaller intensive margin share declines.

In summary, both the descriptive and the econometric exercises reported in this section strongly supports the idea that exporter income shares are an important determinant of trade shares. Beyond that, however, it is difficult, without an underlying model specification, to know whether the gravity residual reflects the actual evolution in the productivity of exporters rather than other factors, such as evolving trade costs. Therefore, in the following sections we take a structural approach aimed at identifying relative cost competitiveness across countries by modeling the micro-foundations of trade shares explicitly.

[14]Other factors, such as low wages, a peg to a weakening dollar and increasing processing trade, also had to do with China's export boom post-2000.

[15]As mentioned, the gravity regressions are run at the SITC 4-digit level for specifications (i)-(v) and at the ISIC 2-digit level for specification (vi). In the table, due to computational constraints on such a large dataset, we present aggregate control variables estimated without product fixed effects. As such, the coefficients can be interpreted as simple averages across SITC products, or in the case of specification (vi), ISIC products.

[16]For the sake of comparability, the predicted and actual market share changes are aggregated over exactly the same SITC-destination pairs. The index of share change does not exactly match that in Figure 1, since: (a) it is a geometric index, whereas simply adding up share across products as in Figure 1 is analogous to an arithmetic mean, and (ii) because the index is matched in each period (i.e., the trade flow had to occur in both time t and t-1 for it to be included), the composition of items in the Figure 2 index will be a subset of those in Figure 1. Overall, the magnitude of the drop of the geometric index seems reasonably close to the aggregate drop and the dynamics of contractions in the early 1980's and 2000's parallel one another.

3 Structural analysis

3.1 Theoretical framework

Consider S industries (indexed $s = 1, \ldots, S$) active in N countries, indexed $l = 1, \ldots, N$. Each country-industry is endowed with given amounts of labor L_s^l and capital K_s^l and the output of each industry is horizontally differentiated in a large (continuum) set of varieties indexed by $i \in \Theta_s$.

Firms compete in a monopolistic market and each variety is supplied by one and only one firm. Firms in a given sector share the same (Cobb-Douglas) technology but are heterogeneous in terms of Unit Input Requirement (UIR) c, defined as inverse 'total factor productivity' (tfp) (i.e. $c = \frac{1}{tfp}$). c is used to identify the firm. Accordingly, the marginal cost faced by a generic firm c active in country l and sector s is:

$$m_s^l(c) = \omega_s^l \; c \tag{5}$$

where $\omega_s^l = B \prod_{x \in X} \left(w_{x,s}^l / \beta_{x,s}\right)^{\beta_{x,s}}$ denotes the Unit Input Cost (UIC), with $w_{x,s}^l$ and $\beta_{x,s}$ denoting input x's cost and share (in country l - sector s) respectively, and $X = \{k, l, m\}$ (i.e. capital, labour, and intermediates) and $\sum_{x \in X} \beta_{x,s} = 1$. B is the bundle of parameters associated with the Cobb-Douglas.[17]

National markets are segmented but firms can export and, as production faces constant returns to scale, they independently maximize the profits earned in different destination countries. Exporting firms incur a per-unit trade cost, encompassing not only carriage in a strict sense, but all those "impediments to trade" whose amount is related to the quantity exported. For each delivered unit from country l to country h, $\tau_s^{lh} > 1$ units have to be shipped. Moreover, we also allow for costly trade within a country with $\tau_s^{lh} > \tau_s^{ll} \geq 1$.

Firm heterogeneity enters the model as follows. In order to start producing, each firm has to make an irreversible investment in terms of labor and capital. This "sunk cost of entry" amounts to $F_s^l \equiv \omega_s^l f_s^l$. At this stage, firms are only partially aware of their marginal costs. While the (exogenous) country-sector specific UIC ω_s^l is in fact known ex ante, c is revealed only once the sunk costs has been payed. This phase is modeled as a firm level draw from a known Pareto distribution $\left[\frac{m_s^l(c)}{\max(m)_s^l}\right]^{\gamma_s}$, with the support $[0, max\,(m)_s^l]$ varying across sectors and countries.

Consumers maximize a 'two-tiered' utility function. In the first step, they allocate a constant fraction σ_s^l of their income $Y(i)^l$ to goods produced in each sector according to

$$U(i)_s^l = \prod_{s=0}^{S} \left[u(i)_s^l\right]^{\sigma_s^l} \qquad \text{with} \quad \sum_s \sigma_s^l = 1. \tag{6}$$

In the second step, they allocate $\sigma_s^l Y(i)^l$ among the different varieties in sector s by maximizing (Ottaviano et al., 2002) the following quasi-linear utility function with quadratic sub-utility

$$u(i)_s^l = \alpha_s \int_{i \in \Theta_s} d_s^l(i) di - \frac{1}{2} \upsilon_s \int_{i \in \Theta_s} \left[d_s^l(i)\right]^2 di - \frac{1}{2} \eta_s \left(\int_{i \in \Theta_s} d_s^l(i) di\right)^2 \tag{7}$$

[17] Equation (5) expresses the marginal cost associated with a standard Cobb-Douglas production function

$$Q(c)_s^l = c^{-1} \prod_{x \in X} (M_x)^{\beta_{x,s}}$$

where M_x denotes the amount of input x utilized.

subject to

$$\int_{i\in\Theta_s} p_s^l(i)\ q_s^l(i)di = \sigma_s^l Y(i)^l \tag{8}$$

where $d_s^l(i)$ represents the individual consumption level of variety i of good s. The demand parameters α_s, η_s, and γ_s are all positive. For each differentiated good s, increases in α_s and decreases in η_s both shift out the demand for the differentiated varieties. The parameter γ_s indexes the degree of product differentiation between the varieties of good s. In the limit when $\gamma_s = 0$, consumers only care about their total consumption level over all varieties of that good, $D_s^l = \int_{i\in\Theta_s} d_s^l(i)di$. Such varieties are then perfect substitutes. The degree of product differentiation increases with γ_s as consumers give increasing weight to the distribution of consumption levels across varieties.

With this type of preferences, marginal utilities are bounded, and utility maximization yields the following expression for the individual demand of a generic variety i

$$d_s^l(i) = \frac{\lambda_s^l[\max(p)_s^l - p_s^l(i)]}{\upsilon_s} \tag{9}$$

where

$$\lambda_s^l = \upsilon_s \frac{\sigma_s^l\ Y(i)^l}{N_s^l \left[\max(p)_s^l\ \bar{p}_{1,s}^l - \bar{p}_{2,s}^l\right]} \tag{10}$$

in which λ_s^l is the Lagrange multiplier, $\max(p)_s^l = \alpha_s - \upsilon_s D_s^l$ denotes the price level above which the demand of a generic variety in a given country-sector is positive, $\bar{p}_{1,s}^l$ and $\bar{p}_{2,s}^l$ represent the first and the second moment of the price distribution of the N_s^l varieties available in the country. In this setting, each firm is negligible to the market and does not compete directly with the other firms. However, given the demand structure, firms interact indirectly through an aggregate demand effect, as the total output of the industry has an influence on firms' profit.

Only those firms whose cost draw is good enough to enable them to sell to market h at a price below $\max(p)_s^h$ earn non-negative profits and can afford to serve that market. Let m_s^{hh} denote the marginal cost inclusive of trade frictions faced by a producer in country h-industry s that is just indifferent between serving its local market or not. Then, the zero profit condition $m_s^{hh} = \max(p)_s^h$ has to hold true. As a consequence, a firm, wherever located, can serve market h only provided that its delivered cost does not exceed m_s^{hh}. In other words: firm c producing in country l is able to target market h when $\tau_s^{lh} m_s^l < m_s^{hh}$, it is not able to target market h when $\tau_s^{lh} m_s^l(c) > m_s^{hh}$, it is indifferent between serving or not market h when $\tau_s^{lh} m_s^l(c) = m_s^{hh}$. Thus, m_s^{hh} measures the (domestic) 'cutoff cost' in country h-industry s, with the export cutoff amounting to $m_s^{lh} = m_s^{hh}/\tau_s^{lh}$.

From profit maximization, aggregate demand and aggregate price for the variety sold in country h by firm c, producing in country l, are respectively given by

$$q_s^{lh}(c) = \frac{\lambda_s^h\ L^h}{2\upsilon_s}[m_s^{hh} - m_s^{lh}(c)] \tag{11}$$

and

$$p_s^{lh}(c) = \frac{1}{2}[m_s^{hh} - m_s^{lh}(c)] \tag{12}$$

where $m_s^{lh}(c) = \tau_s^{lh} m_s^l(c)$ and L^h is the population level in the destination country.

Using (10), aggregate bilateral trade flows from country l to country h in sector s can be expressed as:

$$\begin{aligned} T_s^{lh} &= N_{E,s}^l \int_0^{m_s^{lh}=m_s^{hh}/\tau_s^{lh}} p_s^{lh}(c)\; q_s^{lh}(c)\; d\left(m_s^l(c)/\max(m)_s^l\right)^{\gamma_s} = \\ &= \Upsilon_{1,s}\; N_{E,s}^l\; [\max(m)_s^l]^{-\gamma_s}\; \rho_s^{lh}\; \left[m_s^{hh}\right]^{\gamma_s+2} (P_s^h)^{-(\gamma_s+2)}\; D_s^h \end{aligned} \tag{13}$$

where: $\Upsilon_{1,s} \equiv \frac{1}{2(\gamma_s+2)}$ is a bundling sectoral parameter playing no role in subsequent analysis, $N_{E,s}^l$ denotes the number of entrants in country l - sector s, $\rho_s^{lh} \equiv (\tau_s^{lh})^{\gamma_s} \in (0,1]$ is a measure of trade freeness between country l and country h in sector s, $P_s^h \equiv \left[N_s^h \left(\max(p)_s^h\; \bar{p}_{1,s}^h - \bar{p}_{2,s}^h\right)\right]^{\frac{1}{\gamma_s+2}}$, and $D_s^h \equiv \sigma_s^h\; L^h\; Y(i)^h$.

It is worth noting the different role played by $\max(m)_s^l$ (i.e. exogenous cutoff) and m_s^{hh} (i.e. endogenous cutoff) as determinants of the export flows of country l: on the one hand, a higher $\max(m)_s^l$ (i.e. high input costs and low tfp) reduces the export performance of a country, as in traditional trade models; on the other hand, a high m_s^{hh} in the destination country reduces the export capacity of country l. While the former is *exogenously* given, the latter is *endogenously* determined by a selection process fostered by the degree of international competition. Moreover, since under the Pareto hypothesis $\overline{m}_s^h = \frac{\gamma_s}{\gamma_s+1} m_s^{hh}$, cross country differences in endogenous marginal cost cutoffs (m_s^{hh}) translate one to one into cross country differences in average marginal costs ($\overline{m}_s^h$). Therefore, for each sector, the vector of the N endogenous cutoffs provides us with a country ranking in terms of the effective ability to sell good s at relatively low prices to the international market.

3.2 Revealed Marginal Costs (RMC)

Equation (13) allows us to derive an analytical expression that can be used to infer marginal costs from observed bilateral trade flows. To this aim, we start by noting that only T_s^{lh} and D_s^h are observable. Thus we first of all need to purge (13) of the unobservable terms. However, consider that the terms in (13) are specific to both the origin and the destination country [i.e. ρ_s^{lh}], or either to the former (i.e. $[\max(m)_s^l]^{-\gamma_s}\; N_{E,s}^l$) or the latter (i.e. $\left[m_s^{hh}\right]^{\gamma_s+2} (P_s^h)^{-\gamma_s+2}\; D_s^h$) only. To isolate the cost cutoff, we can therefore use country l's exports to a reference country f (UK in the application), to transform equation (13) into a prediction of relative (instead of absolute) trade flows:

$$\frac{T_s^{lh}/D_s^h}{T_s^{lf}/D_s^f} = \frac{\rho_s^{lh}}{\rho_s^{lf}} \left[\frac{m_s^{hh}/P_s^h}{m_s^{ff}/P_s^f}\right]^{\gamma_s+2} \tag{14}$$

Expression (14), in which measurable terms are grouped on the left hand side, expresses measurable (relative) trade flows as a function of (relative) trade freeness and cost cutoff, both in relative terms. Using a tilde to indicate that a variable is expressed in relative terms ($\tilde{\rho}_s^{lh} = \rho_s^{lh}/\rho_s^{lf}$; $\tilde{D}_s^h = D_s^h/D_s^f$; $\tilde{m}_s^{hh} \equiv \frac{m_s^{hh}}{m_s^{ff}}$), relative average marginal costs in a given country-sector can thus be written as

$$\frac{\tilde{\overline{m}}_s^{hh}}{\tilde{P}_s^h} \equiv \left(\frac{\tilde{T}_s^{lh}}{\tilde{D}_s^h}\frac{1}{\tilde{\rho}_s^{lh}}\right)^{\frac{1}{\gamma_s+2}} \tag{15}$$

where we also used the fact that, under the Pareto assumption, $\overline{m}_s^h = \frac{\gamma_s}{\gamma_s+1} m_s^{hh}$, and thus $\tilde{\overline{m}}_s^{hh} \equiv \tilde{m}_s^{hh} \equiv \frac{m_s^{hh}}{m_s^{ff}}$.

Bilateral trade costs - or more precisely the degree of trade freeness $\tilde{\rho}_s^{lh}$ - are however unknown. To deal with this issue, we derive - as suggested by Novy (2011) - a very simple form for bilateral trade freeness, which exploits the structure of the reference model without the need to estimate a gravity equation. From (14), bilateral trade freeness between country l and country h can be in fact expressed as

$$\tilde{\Omega}_s^{lh} \equiv \frac{\tilde{T}_s^{lh}\ \tilde{T}_s^{hl}}{\tilde{T}_s^{ll}\ \tilde{T}_s^{hh}} = \frac{\tilde{\rho}_s^{lh}\ \tilde{\rho}_s^{hl}}{\tilde{\rho}_s^{ll}\ \tilde{\rho}_s^{hh}}. \tag{16}$$

where $\tilde{T}_s^{ll} = T_s^{ll}/T_s^{lf}$.

The intuition behind (16) is (Novy, 2011) straightforward. If bilateral trade flows between two countries increase relative to domestic trade flows, it must have become relatively easier for the two countries to trade with each other. This is captured by an increase in $\widetilde{\Omega}_s^{lh}$, and vice versa.

Assuming $\tilde{\rho}_s^{lh} = \tilde{\rho}_s^{lh}$, (16) can be plugged into (15) in order to obtain the following measure of Revealed Marginal Costs (henceforth RMC)[18]:

$$RMC_s^h \equiv \frac{\tilde{\bar{m}}_s^{hh}}{\tilde{P}_s^h} = \left(\frac{\tilde{D}_s^h\ \widetilde{\Omega}_s^{lh}}{\tilde{T}_s^{lh}}\right)^{-1}. \tag{17}$$

Equation (17) represents the basis of our analysis. This formulation has two main advantages. First, it does not require econometrics. Second, it allows comparison overtime, not possible using traditional gravity estimates (cfr. Novy, 2011). According to the formula, for given trade freeness and country size, competitiveness in country h increases if imports from country l shrinks (in the period under consideration), compared to the reference country's imports from the same country.

Note that, although $\widetilde{\Omega}_s^{lh} = \widetilde{\Omega}_s^{hl}$, $\tilde{T}_s^{lh}$ normally differs from $\tilde{T}_s^{hl}$. Thus, what equation (17) suggests is that the difference between $\tilde{T}_s^{lh}$ and $\tilde{T}_s^{hl}$ has to be traced back to differences in (real) marginal costs $(\tilde{\bar{m}}_s^{hh}/\tilde{P}_s^h)/(\tilde{\bar{m}}_s^{ll}/\tilde{P}_s^l)$ and market size $\tilde{D}_s^h/\tilde{D}_s^l$. Given the latter, and given sectoral price differentials, an increase in country h's imports from country l suggests a decreasing competitiveness in country h if it is associated with a less than proportional increase in the degree of trade freeness between the two countries.

Four comments are in order.

First, it is worth noting how the idea of "revealed" competitiveness associated with (17) is more general than more conventional measures of aggregate total factor productivity (tfp). To see this, consider equation (5), in which firms' "marginal costs" are shown to consist of a composition of "inverse tfp" (c) and input costs ($w_{x,s}^l$), as well as input shares ($\beta_{x,s}^l$). A high tfp (i.e. low c) might not be enough for a country-sector to be competitive in the international market, as a consequence of relatively high input costs.

Second, according to (17), our RMC measure equal the ratio of the sectoral average marginal cost to the sectoral price index. As a consequence, an increased revealed competitiveness might be driven by increasing prices in a given country-sector.

Third, the relevance of tfp as a measure of competitiveness decreases with the degree of international fragmentation of the production process.[19] For given tfp, international

[18] Since the exponent $\frac{1}{\gamma_s+2}$ plays no role in determining the country rankings, as it only entails a re-scaling by sector, it will be omitted hereinafter.

[19] By definition, tfp is meant to measure the output differences which are not explained by different input choices and occurs, instead, through marginal product increases. Due to this *physical* nature, firms' tfp (and thus a country's tfp) is invariant to different choices concerning whether to outsource phases of the production process and whether to buy intermediates domestically or abroad. Whilst tfp is not affected by these choices, marginal costs are.

outsourcing can increase a country's market share through marginal costs reduction (which entails increased ability to target foreign markets at relatively low prices). By being expressed in units of marginal costs, our measure of competitiveness is more "naturally" linked to the concept of Domestic Value Added content of exports.

Last but not least, an important feature of (17) is that it can be calculated on the basis of external and internal trade flows. No other data is required.

3.3 Data and specification

Following equation (17), which derives country h's RMC from its bilateral trade flows with a given country l, we compute, for each country h (and industry s), as many RMC_s^h as the number of countries for which bilateral trade flows with country h are available. For each sector, a final value is then obtained as the simple average.[20] With this specification, zeros-missings in bilateral trade do not translate one-to-one into zeros in RMC_s^h, with the latter occurring only in the event of complete unavailability of a country's imports or, more likely, of missing internal trade flows.

In the analysis, we are interested in the evolution of the average RMC across two periods: 1980-1991 and 1992-2004. The choice of the time span is data driven, as information on internal trade is only available up to 2004 in our data (see below). The break is chosen in such a way to have homogenous trade flows for USSR and Germany in both periods.

Our focus is first of all on the following decomposition of U.S.'s RMC, derived by taking logs and first differences of (17)

$$\Delta ln(RMC_s^h) = \Delta ln(\tilde{T}_s^{l,h}) - \Delta ln(\tilde{D}^h) - \Delta ln(\tilde{\Omega}_s^{l,h}) \quad (18)$$

where $\Delta ln(X) \equiv ln(\bar{X}_{92 \text{ to } 04}) - ln(\bar{X}_{80 \text{ to } 91})$. According to (18), country h's RMC growth rate from the early (1980-1991) to the late (1992-2004) period can be traced back to that part of the variation in imports from country l which is not explained by the observed variation in bilateral trade costs and market size. The intuition is as follows. Assume e.g. an increase in trade freeness between Mexico and the U.S. For given U.S. market size ($\Delta ln(\tilde{D}^{US}) = 0$), whether or not higher trade freeness results in lower RMC in the U.S. depends on the effect on U.S. imports from Mexico. An increase in the latter such that $\Delta ln(\tilde{T}_s^{Mex,US}) > \Delta ln(\tilde{\Omega}_s^{Mex,US})$ is interpreted by (18) as evidence of a decreasing competitiveness (increasing marginal costs) in the U.S., vis-à-vis Mexico.

Data on bilateral flows are obtained from the CEPII *TradeProd* database. Differently from other bilateral trade data (e.g. NBER-UN bilateral trade data from Feenstra et al., 2005), *TradeProd* reports detailed information on internal trade flows, which is essential to our analysis. Such information is available from 1980 only up to 2004 in *TradeProd*.[21]

TradeProd trade flows are provided in nominal dollars at the 3-digits level of the ISIC Rev.2 classification. We truncate the data at \$10,000 per annual bilateral flow. This has no remarkable effects on the results, but avoids potential distortions from errors of units in the data and implausibly small trade values.

For D_s^h, we use country h's total imports in sector s, inclusive of internal trade (T_s^{hh}).

[20] We also experimented with a weighted average in which each country is assigned its share in country h's total imports as weight. The country ranking is slightly affected by this choice, which however is somewhat arbitrary. We thus prefer to rely on unweighted averages.

[21] We tried to complement the information on domestic trade flows in *TradeProd* with that in UNIDO-IDSB (Industrial Demand-Supply Balance Database). However, i) the number of countries drops considerably, despite the less detailed sectoral disaggregation; ii) the difference between production and exports is negative in about six per cent of the country-sector combinations. We thus opted for less recent but more reliable results.

We set United Kingdom as the reference country, as it presents the higher number of observations as importer-exporter.

3.4 Results

Our main results are shown in Table 2, where the values of (18), together with export share percentage variations, are reported for each (2-digits ISIC Rev.2) industry of the U.S. economy.

While correlation among the three components is quite low, RMC's cross-sector variability is substantial, though much lower than the variability in the export share (20.99 in terms of standard deviation). The correlation between RMC and export share is also low (-0.18), as expected.

To make the analysis more informative, we report standardized values. In the standardization we considered G20 countries plus Hong Kong, Singapore and Taiwan. Sectoral results are then sorted with respect to the resulting RMC variation.[22]

The evolution of RMC suggests that the U.S. economy lost momentum with respect to the world economy, with the average increase in RMC amounting to 38.4%. The main responsible for the competitiveness loss is the reduction in market size (-60.5%). The theoretical explanation in our reference model is that, when consumers devote a lesser share of their income to a given sector, they cause a reduction in competition and, consequently, in that sector's average marginal costs (through selection). In some cases (Machinery, Non-ferrous metals, Industrial chemicals, Prof. and scient. equipment) the percentage variation in RMC is particularly high, and in all these cases a substantial decrease in the degree of trade freeness, as well as in market size, is registered. In particular, it is worth noting that there are key industries for the U.S. economy, like Prof. and scient. equipment and Miscellaneous petroleum and coal, in which the degree of trade freeness increased substantially. However, while in the Miscellaneous petroleum and coal market things evolved exactly as one would like them to evolve (i.e. D increased and T decreased respect to the world economy), the Machinery market shrank dramatically in size, compared to the other economies. This led to a huge decrease in RMC, even if U.S. imports went down in the last period. Something similar happened in the Machinery industry, for which the table reports the highest increase in RMC. Interestingly enough, the main results drawn in section , where sectors like Machinery - Transportation and Chemicals were found to suffer from competitiveness problems, despite an increasing weight in the world export, are broadly confirmed.

4 Conclusions

To what extent the recent decline in the U.S. share of world merchandise exports can be thought of as the consequences of a deteriorating productivity in the U.S.? To contribute to this debate, we proceeded in two steps.

First, we performed a preliminary investigation of the U.S. export shares, based on constant market share analysis and gravity estimations. This analysis suggests that the majority of the decline in export shares can be associated with the U.S. declining share of world income.

[22]The reason why the standardization is informative is straightforward. More than in the absolute values of the variations, we are interested in how the U.S. economy evolved compared to its main competitors. It is however worth noting that non-standardized RMC declined in almost all the U.S. industries (except for Machinery - TB - PE).

Second, we derived a computable measure of country-sector (relative) real marginal costs which, insofar it is inferred from actual trade flows, has been referred to as *revealed*. Brought to the data for the period 1980-2004, this measure suggests that most U.S. manufacturing industries are suffering from problems of competitiveness/productivity, relative to their main competitors. In fact, we find that U.S. RMCs have grown by more than 38% on average. At the sectoral level, the "Machinery" industry is confirmed to be the most critical, followed by "Non-ferrous metals", "Industrial chemicals", "Professional and scientific equipments". On the other hand, in sectors like "Petroleum and coal", "Plastic products", "Printing and publishing", reported RMCs decrease significantly.

Overall, our analysis suggests that market share performance is not a sufficient statistics for competitiveness, as witnessed by the very low correlation between our RMC measure and the export shares. Market size is definitively the main responsible for the dismal performance of the U.S. market share.

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Tables and Figures

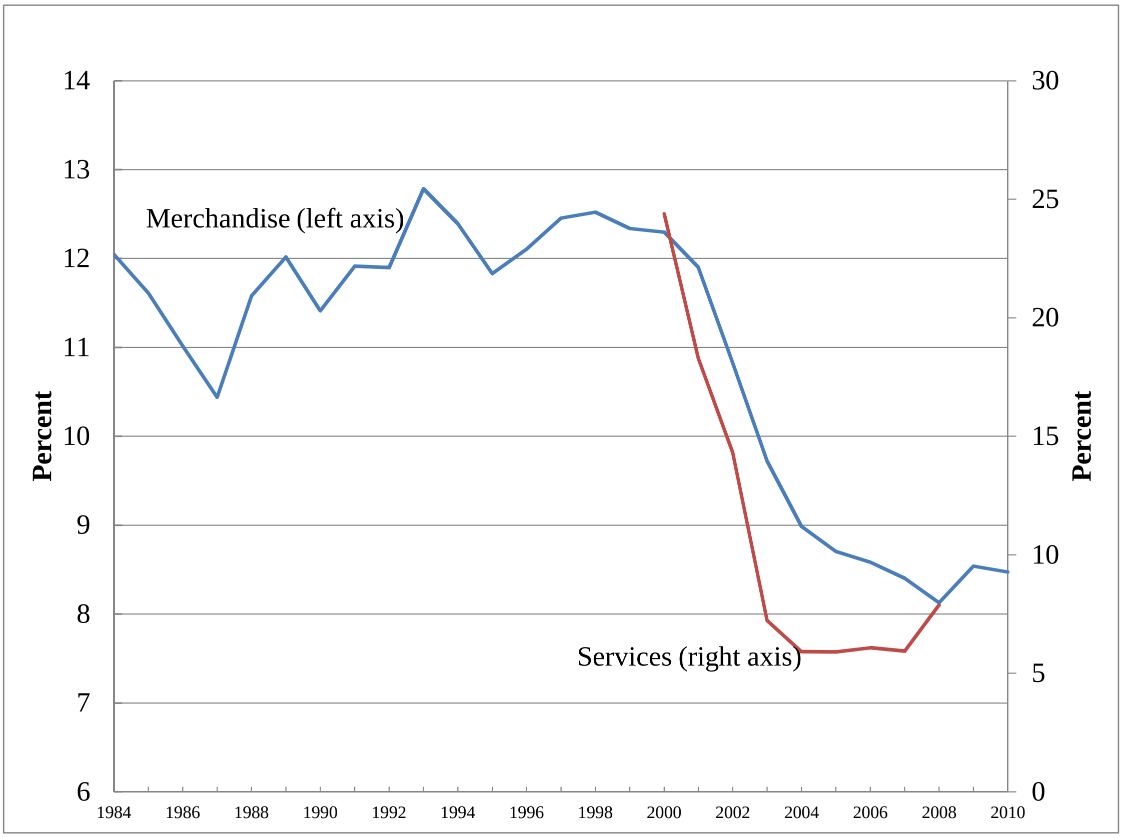


Figure 1: U.S. Share of World Exports

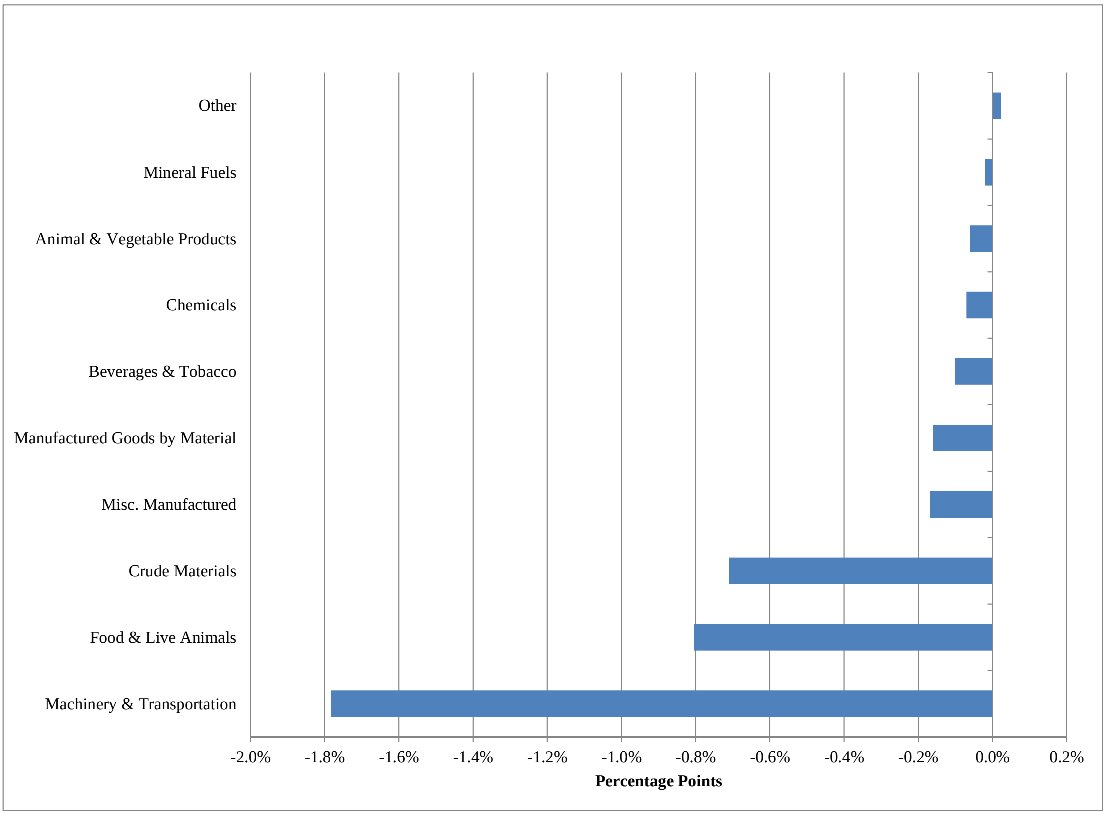


Figure 2: Sector Contributions to the Aggregate Share Decline (1984-2008)

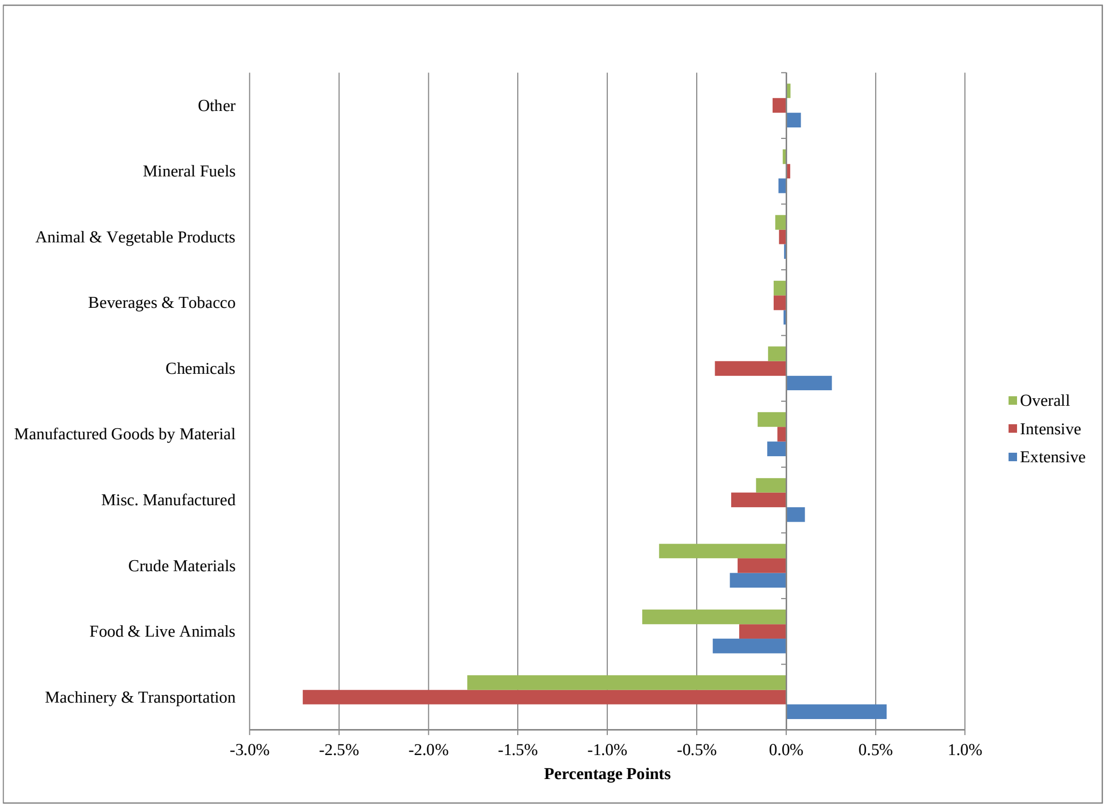


Figure 3: Intensive and Extensive Margin Contributions to the Aggregate Share Decline (1984-2008)

Figure 4: Export and GDP Shares

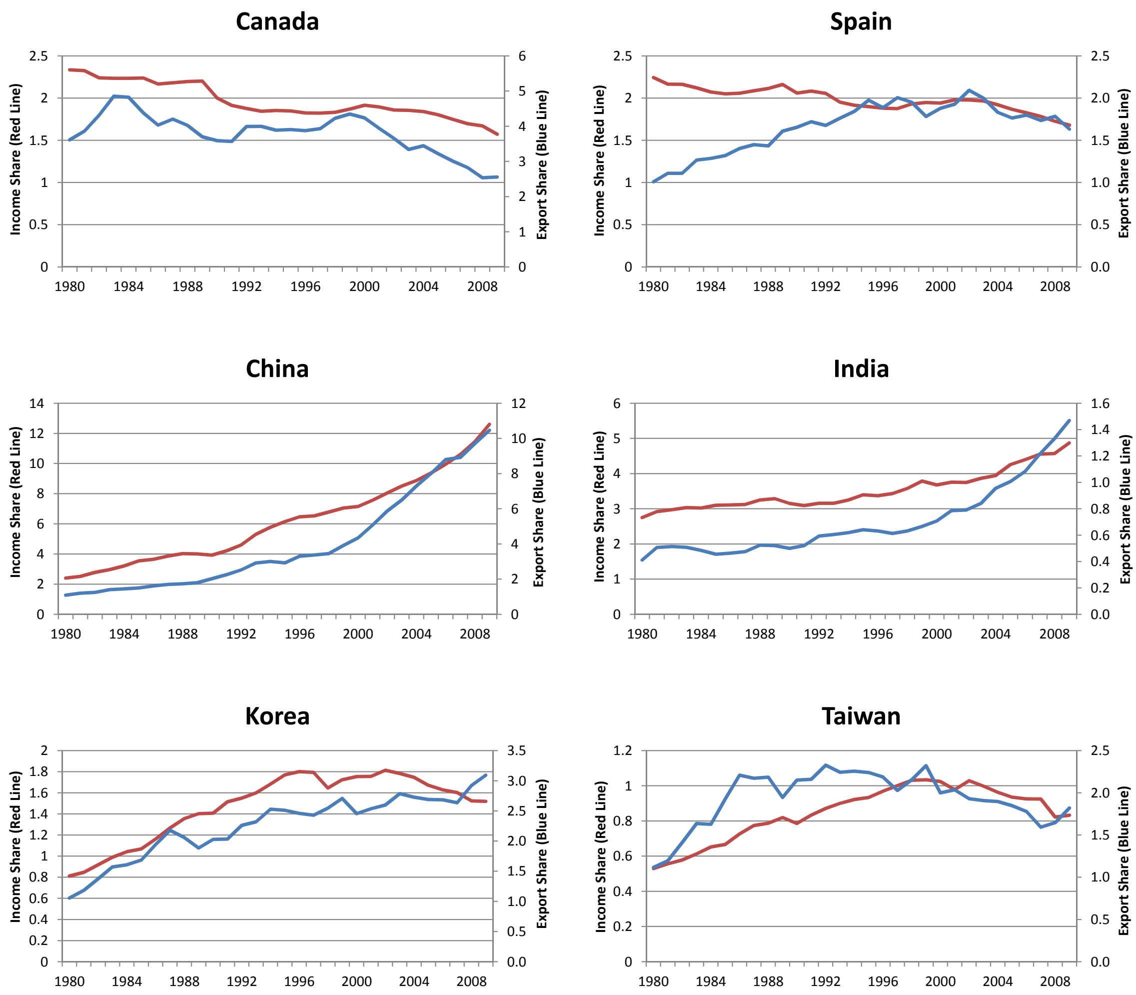
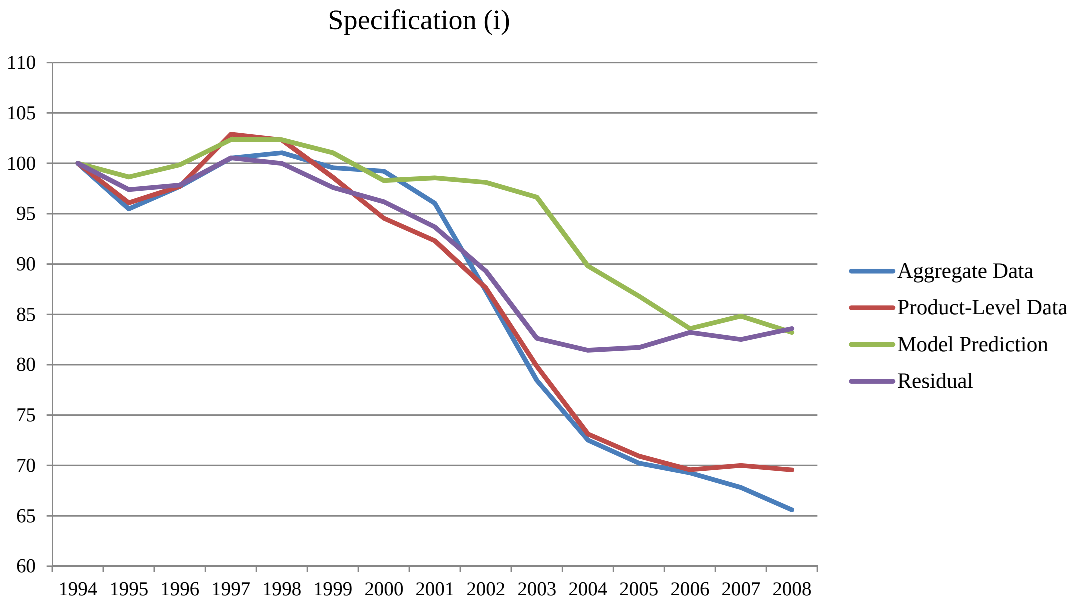


Figure 5: Export and GDP Shares



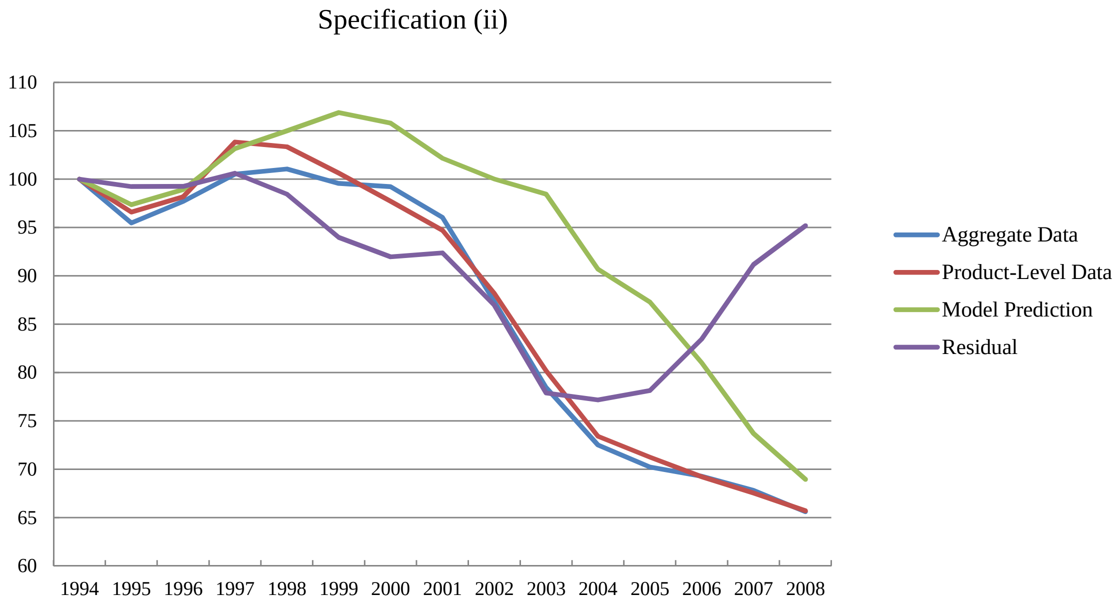


Figure 6: Predicted and Actual Market Share Indices

Table 1: Gravity regression.

Dependent Variable:	Export Share	Export Share
	(i)	(ii)
ln(Exporter GDP Share)	0.330	0.254
	(0.106)	(0.113)
NAFTA	0.807	0.807
	(0.238)	(0.238)
EMU	0.483	0.484
	(0.091)	(0.091)
China (WTO memb.)	-	0.226
		(0.198)
Constant	-1.223	-1.588
	(0.505)	(0.536)
Year FE	yes	yes
Exporter-Importer FE	yes	yes

Table 2: Decomposition of U.S. RMC growth rates from early (1980-1991) to late (1992-2004) period. % values.

Sector	Sector Short	*RMC*	*T*	*D*	Ω	*Export Share*
Misc. petrol./coal	PC	*-120.9*	*-18.2*	*32.1*	*70.7*	*-45.7*
Plastic products	PL	*-120.7*	*-149.6*	*-11.2*	*-17.7*	*52.0*
Printing and publishing	PP	*-106.5*	*-84.6*	*-13.5*	*35.3*	*0.0*
Footwear	FT	*-82.7*	*-98.0*	*-48.7*	*33.4*	*-14.9*
Wood products except furniture	WO	*-82.3*	*-23.5*	*-6.5*	*65.3*	*-29.7*
Paper products	PA	*-80.4*	*-96.2*	*-45.2*	*29.4*	*-45.5*
Fabricated metal products	MP	*-79.8*	*-111.5*	*-24.5*	*-7.2*	*15.5*
Tobacco	TB	*-69.2*	*-27.8*	*-0.2*	*41.6*	*-61.7*
Rubber products	RU	*-59.9*	*-78.6*	*-20.3*	*1.5*	*-7.8*
Furniture except metal	FU	*-39.3*	*-13.4*	*2.5*	*23.5*	*11.7*
Other chemicals	OC	*-33.7*	*-69.9*	*-18.8*	*-17.4*	*-58.8*
Glass products	GL	*-25.0*	*-48.9*	*-52.0*	*28.0*	*24.3*
Iron and steel	ST	*-24.4*	*-37.2*	*-33.7*	*20.8*	*22.3*
Petroleum refineries	PE	*-19.5*	*-9.0*	*-47.8*	*58.4*	*18.5*
Electric Machinery	EM	*-14.6*	*-103.4*	*-66.7*	*-22.2*	*-13.4*
Food products	FD	*-9.2*	*-66.8*	*-44.8*	*-12.8*	*-2.4*
Other non-metal min. prod.	NM	*-5.6*	*-18.0*	*4.2*	*-16.6*	*-20.4*
Wearing apparel	AP	*-3.0*	*2.3*	*-31.7*	*37.1*	*72.6*
Pottery china earthenware	PT	*-1.0*	*-9.1*	*-33.0*	*24.8*	*19.3*
Beverages	BV	*0.0*	*6.8*	*-50.9*	*57.7*	*-45.7*
Other manufactured products	OT	*15.2*	*-33.5*	*-95.5*	*46.8*	*-32.3*
Leather products	LT	*32.0*	*-28.7*	*-51.8*	*-8.9*	*35.8*
Transport equipment	TR	*44.5*	*-13.3*	*-61.9*	*4.2*	*-71.4*
Textiles	TX	*47.8*	*56.6*	*9.1*	*-0.3*	*43.3*
Prof. and scient. equipment	PS	*79.8*	*-10.2*	*-157.5*	*67.5*	*-50.1*
Industrial chemicals	IC	*122.8*	*51.1*	*-52.4*	*-19.2*	*-35.2*
Non-ferrous metals	NF	*125.4*	*17.0*	*-59.6*	*-48.8*	*-55.4*
Machinery except electrical	MA	*129.3*	*23.0*	*-77.7*	*-28.7*	*-58.6*
Average	avg	*38.4*	*-27.3*	*-60.5*	*-5.2*	*-35.4*