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## **DO SOVEREIGN DEFAULTS HURT EXPORTERS?**

BY

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## **Abstract<sup>\*</sup>**

This paper uses a difference-in-difference methodology similar to the one originally proposed by Rajan and Zingales (1998) to test whether defaulting hurts the more export-oriented industries. Strong support for this hypothesis was found, but contrary to the findings of previous studies, our estimations suggest that the effect of defaults is short-lived.

**JEL Codes:** F34; F10

**Keywords:** Sovereign Debt, Default, Trade

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## 1. Introduction

A clear understanding of the principles on which the sovereign debt market operates remains elusive. The legal framework is not as complete and transparent as in the case of private debts, and the enforceability of creditor rights remains untested or unreliable. Absent dependable legal rights, investment in sovereign debt instruments is based on the expectation that governments will make a faithful effort to service their debts even in trying circumstances. In an often-quoted judgment of 1875, a British judge stated “These so-called bonds amount to nothing more than engagements of honour.” Economists tend to see the decision to service government bonds from a somewhat different perspective: they view it as the result of comparing the cost of servicing interest and principal of the debt with the adverse consequences that would follow from defaulting on those payments—that is, the costs of default. This is why understanding the costs of default is a critical part of understanding the working of the sovereign debt markets.

The literature on the costs of sovereign default has traditionally focused on two channels: reputation and international trade. There is considerable debate, conceptually and empirically, on the validity and quantitative importance of each of them.<sup>1</sup> This paper focuses on the trade channel and applies an empirical technique that is novel to the sovereign debt literature but that has been used elsewhere to test for the significance and magnitude of the alleged harmful effects of sovereign defaults on international trade. The empirical technique is the difference-in-difference approach of Rajan and Zingales (1998), which is applied more broadly here to include cross-country effects as well. We find evidence to support a statistically significant and economically sizeable effect of defaults on trade.

There are two main mechanisms through which trade may be affected: direct import sanctions or restrictions, and damage to the creditworthiness of exporters. The evidence for direct trade sanctions is not abundant. There are not many recorded cases where countries have applied quotas, tariffs or trade embargoes in retaliation for non-compliance in debt service. Yet, it is possible that in those cases where trade sanctions were likely to be applied, debtor countries made an extra effort to avoid default. From a theoretical perspective, trade sanctions are probably not “renegotiation proof” in the sense that creditor countries would be reluctant to apply them ex

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<sup>1</sup> We will not review this literature here. For recent reviews, see Sturzenegger and Zettelmeyer (2005), Tomz (forthcoming), and Obstfeld and Rogoff (1996).

post because they would also suffer from the trade loss.<sup>2</sup> Moreover, an action of this type could be controversial because it would benefit one group (the investors) to the detriment of others (firms engaged in international trade and consumers in general) and might also be inconsistent with the general strategic interest of the creditor country that may consider them.

We find a more solid basis to the case for trade finance as a mechanism that hurts a defaulting country in almost every case. When a country is in a situation of external financing distress, it often resorts to exchange controls or capital outflow restrictions of various sorts. This affects the repayment capacity of all private debtors, and the effect would be stronger in the case of short-term credit such as export-linked credits. In fact, international credit rating agencies like Moody's and Standard and Poor's recognize that the credit rating of any private debtor is affected by the probability of a sovereign default because a sovereign default raises the possibility of imposition of exchange controls that would impair the debt service ability of private debtors.

Systematic empirical research on the trade consequences of debt defaults has only started recently. Rose (2002) examines how debt restructurings granted by the Paris Club of official lenders have affected bilateral trade flows. He finds that defaults have strong and persistent effects on bilateral trade, with the implication that the nonpayment of financial obligations with a given official creditor affects trade mostly with that country.

This paper looks for a more general effect and focuses on the performance of export-intensive industries following episodes of sovereign default. This would be consistent with a number of channels including, for example, credit quality deterioration of exporters even when no trade action is taken by any country. We find that the effect is significant. Our estimates suggest that a more export-oriented industry (in the 75th percentile of the distribution) would see its growth drop by two percentage points relative to a less export-oriented industry (in the 25th percentile of the distribution) in each year in which the sovereign is in default. In contrast to Rose (2002), however, we find that the effect is short-lived, since we find little evidence of any residual effect after the sovereign emerges from default.

The paper is organized as follows. Section 2 explains the estimation methodology in detail. Section 3 provides details of the data that were utilized. Sections 4 and 5 present the

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<sup>2</sup> A commonly cited case is the non-default by Argentina in the 1930s, when the country had most of its debts and a large fraction of its exports with England. Tomz (forthcoming), however, questions the validity of this interpretation.

econometric results for aggregate debt, and for a disaggregation of bank and bond debts, respectively. Section 6 offers some conclusions.

## 2. Empirical Methodology

To test whether sovereign default is particularly costly for exporters, we use a difference-in-difference approach similar to the one originally used by Rajan and Zingales (1998) and examine whether export-oriented industries experience more severe output loss at time of default. One key difference with the work of Rajan and Zingales (1998) is that, instead of focusing on a cross-section of industries-country, we follow the same strategy adopted by Dell’Ariccia, Detragiache and Rajan (2005) and use panel data at the industry-country-year level.<sup>3</sup> Specifically, we use industry-level data for the manufacturing sector to estimate the following regression:

$$\begin{aligned} VAGR_{i,j,t} = & a_{i,j} + b_{i,t} + c_{j,t} + \alpha SHVA_{i,j,t-1} + \\ & + (\beta DEF_{i,t} + \delta dRER_{i,t} + \gamma GDPGR_{i,t}) * EXPOU_{i,j} + \varepsilon_{i,j,t} \end{aligned}$$

where  $VAGR_{i,j,t}$  measures real value-added growth for industry  $j$  in country  $i$  at time  $t$ ;  $a_{i,j}$  denotes a set of country-industry fixed effects,  $b_{i,t}$  a set of country-year fixed effects, and  $c_{j,t}$  a set of industry-year fixed effects. This set of fixed effects controls for all the country-specific, industry specific, and time-invariant country-industry specific shocks. This specification is in line with Rajan and Zingales (1998) and captures most of the factors—other than the variable of interest—that are likely to affect the performance of a given industry and greatly attenuate problems of omitted variable bias.  $SHVA_{i,j,t-1}$  is the share of value added in industry  $j$  country  $i$  measured at time  $t-1$ . This variable is mainly introduced to control for convergence and mean reversion effects. Thus, we expect  $\alpha$  to be negative.  $EXPOU$  is an index of export orientation measured at the country-industry level (i.e., it does not vary over time but, unlike Rajan and Zingales’ 1998 index of financial dependence, it does vary across countries) and  $DEF$  is a dummy variable that takes a value of 1 during default episodes and 0 otherwise. The interaction between default and export orientation ( $DEF*EXPOU$ ) is the main variable of interest and tests whether sovereign defaults are particularly costly for export-oriented firms. In particular, a

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<sup>3</sup> Dell’Ariccia, Detragiache and Rajan (2005) use data on external financial dependence of industries to study how banking crises affect the economic performance of firms.

negative value of  $\beta$  implies that export-oriented firms are harmed by sovereign defaults more than other firms, and would support the idea that sovereign defaults generate costs that operate through international trade channels.

The regression includes two additional controls, the interaction between real exchange-rate depreciation and export orientation ( $dRER*EXPOU$ ) and the interaction between GDP growth and export orientation ( $GDPGR*EXPOU$ ). These additional variables are necessary to control for the sharp changes in the domestic economy that normally take place at the time of defaults. In the first case, defaults usually result in large real exchange-rate depreciations, which in fact benefit export-oriented industries strongly. That benefit would be reflected in a positive  $\delta$ . In the second place, debt crises are also usually underscored by sharp economic recessions (Sturzenegger and Zettelmeyer, 2005; Borensztein and Panizza, 2005; and Levy-Yeyati and Panizza, 2005 test the output cost of defaults). Since export-oriented firms rely essentially on external demand, we also expect export-oriented industries to be less affected by cyclical developments than industries that sell products in domestic markets. Hence, we expect the coefficient  $\beta$  to be negative. Controlling for these two interactions is particularly important because the real exchange rate and GDP growth are strongly correlated with default episodes.<sup>4</sup>

### **3. Data**

The main sources of industry-level data are the industrial statistics from UNIDO (2003 CD ROM) and trade data from Nicita and Olarreaga (2001). The main sources of country-level variables are the IMF's International Financial Statistics for the consumer price index and the exchange rate, the World Bank's World Development Indicators for real GDP growth, and Standard and Poor's for the history of default episodes.

Following the work of Dell'Ariccia, Detragiache and Rajan(2005), we use 3-digit ISIC level data from UNIDO and the CPI deflator from the IMF to compute industry-level real value-added growth for 28 manufacturing sectors for 24 countries over the 1980-2000 period. We impose three restrictions on our sample. First, we exclude all country-years for which we have less than 10 industries. The rationale for this exclusion is to guarantee sufficient within-country-year variation in the interaction between export orientation and default. Second, after calculating

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<sup>4</sup> For evidence of the correlation between default and the real exchange rate, see Calvo, Izquierdo and Mejía (2004). For evidence of the correlation between default and growth, see Sturzenegger (2004), Borensztein and Panizza (2005), and Levy-Yeyati and Panizza (2005).

industry-level value-added growth, we exclude outliers by dropping the top and bottom 2 percent of the distribution. This is a standard strategy with this data set, which tends to be rather noisy. Finally, we exclude all countries that did not have a default episode over the 1980-2000 period. This third exclusion is innocuous from the point of view of the estimation of our main parameter of interest (because in countries that never defaulted over the period, the variable DEF\*EXPOU is always equal to zero) and allows us to greatly reduce the number of parameters to be estimated (our reduced sample still requires the estimation of more than 1600 parameters).<sup>5</sup> These restrictions yield an unbalanced panel of 24 countries with a total of more than 9700 observations, with value-added annual growth data ranging from -55 percent to 140 percent and averaging 4.6 percent (the median is 1.8 percent, see Table 1).

We compute export orientation as the average ratio of exports over total sales (output in the UNIDO terminology) by industry and country. That is, for industry  $j$  in country  $i$  the index of export orientation is defined as:

$$EXPOU_{i,j} = \frac{1}{N} \sum_{t=1999-N}^{1999} \left( \frac{EXPORTS_{i,j,t}}{SALES_{i,j,t}} \right)$$

While data on exports are available for the 1976-1999 period, we found a large break in the exports-over-sales series for the period before 1982 and hence we focus on the 1982-1999 sample. Therefore, the maximum value of  $N$  is 18. The average value of EXPOU is 7 percent (median 3 percent) with a range between 0 and 96 percent (Table 1). Table A2 in the Appendix reports average values of EXPOU for our sample of 24 countries, and Table A3 reports average value for the 28 three-digit ISIC industrial sectors.<sup>6</sup>

Our main default variable, DEFB2, takes a value of 1 in the first two years of the default episode (i.e., in the year in which the country defaults and in the year immediately after that). We use this two-year window because it is hard to determine precisely in which year the default may have its strongest effect. If the default episode happens at the end of the year, the effects are likely to be felt in the following year except, of course, to the extent that it was widely

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<sup>5</sup> We need to estimate 588 country-industry fixed effects, 401 country-year fixed effects, and 639 industry-year fixed effects.

<sup>6</sup> Note that while Rose (2002) focuses on bilateral trade, we compute export orientation using total trade of industry  $j$ .

anticipated by the markets. In the estimation, we experiment with different lag structures. We use the default dates recorded by Standard and Poor's (2005), and include both defaults on international bank loans and defaults on sovereign bonds (in the robustness analysis we check whether there is a difference between these two types of default). The 24 countries included in our sample experienced 34 default episodes over the 1980-2000 period (one country, Iran, defaulted in 1978 and entered the sample period in default). Among these 34 episodes, 30 were defaults on international bank loans, three were defaults on sovereign bonds, and one was a joint bank-bond default (Table A4).<sup>7</sup>

#### **4. Regression Results**

Our basic results are reported in Table 2. Column 1 reports our baseline specification. As expected, we find evidence of convergence as indicated by a negative and statistically significant coefficient for the lagged share of value added. We also find that export-oriented industries tend to benefit from real depreciations (as indicated by the positive coefficient for dRER\*EXPOU) and tend to be less procyclical than industries oriented to the domestic markets (as indicated by the negative, albeit not statistically significant, coefficient for GDPGR\*EXPOU).

More interestingly for our purposes, we find that export-oriented industries are particularly affected by default episodes as indicated by the negative and statistically significant coefficient of DEFB2\*EXPOU. Besides its statistical significance, the impact of default is also quantitatively important, as it implies that moving from the 25th to the 75th percentile of the export-orientation distribution increases the impact of default on value-added growth by 1.7 percentage points (-0.017=0.218\*0.01-0.218\*0.09).

In Column 2 we experiment with a different lag structure. In particular, we create a default indicator variable that takes a value of 1 in the first period of the default episode (DEF\_ALL1) and four lags of this variable (DEF\_ALL2 to DEF\_ALL5). We find that the interaction of export orientation with all these variables has a negative coefficient (reaching a maximum in the year after the default), and three of them are individually statistically significant. More importantly, we find that the five variables are jointly significant as indicated by the F test reported in the bottom row of Table 2.

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<sup>7</sup> Unfortunately, limitations on the availability of data on value-added growth and export orientation did not allow us to include most of the bond defaults of the 1990s (such as Pakistan, Russia and Ukraine).

Next, we explore a default indicator that takes a value of 1 for every year in which a sovereign was rated as “selective default” by Standard and Poor’s. This means that if a sovereign went into default and took 20 years to restructure its debts and emerge from insolvency, the default indicator variable will take a value of 1 for all of these 20 years. We term this variable DEF\_ALL\_ALL, and report the coefficient on its interaction with export orientation in Columns 3 and 4. One would expect this variable to be less significant than the variables that measure the immediate impact of default because export-oriented firms probably find ways to adjust to the situation, and learn how to operate under this environment, even if the trade sanctions or credit access problems remain in full force throughout. When we include this variable together with DEF\_ALL1-DEF\_ALL5 (Column 3), we find that it has the right negative sign but a very small coefficient (-0.005) and t statistics; however, all default variables are still jointly significant in this case. In Column 4, where we drop DEF\_ALL1-DEF\_ALL5, we find that the coefficient of DEF\_ALL\_ALL increases (in absolute value) to 0.116 (about half the value of the coefficient for DEFB2), but remains statistically insignificant (although with a p value of 0.15). These results suggest that defaults have a large negative effect on export-oriented firms, but that this effect tends to die out for long-lasting default episodes.

Having established our basic finding that default episodes lead to lower growth in export-oriented industrial sectors, we now check whether our result is robust to changes in the sample or in the econometric specification.

One possible problem with our data has to do with the fact that in some country-industries we have very short series of data and while we dropped all countries with less than 10 industrial sectors, we did not impose any restriction on the number of yearly observations available for each given sector in a specific country. As a consequence, our sample includes 792 observations for country-sectors in which we have less than 10 years of data and 1816 observations for country-sectors in which we have less than 15 years of data. As a first robustness check, we re-estimated our model by dropping all country-sectors for which we have less than 15 years of data (we obtain identical results if we drop all country-sectors for which we have less than 10 years of data). While this restriction leads to a much smaller sample (the sample size drops to 7544), our basic result remains unchanged (Table 3). In particular, the coefficient of DEFB2\*EXPOU remains negative (with a coefficient which is basically identical to that of Column 1 of Table 2) and statistically significant, and the coefficients of

$\text{DEF\_ALL1}^*\text{EXPOU}$ - $\text{DEF\_ALL5}^*\text{EXPOU}$  remain negative (with the exception of  $\text{DEF\_ALL3}^*\text{EXPOU}$ , which is positive but close to zero) and jointly significant.

Our next robustness test focuses on the definition of the  $\text{DEF\_ALL2}$ - $\text{DEF\_ALL5}$  variables. Since these variables take the lagged value of  $\text{DEF\_ALL1}$  (which takes a value of 1 in the first year of default episode), it would be possible for these variables to take a value of 1 for countries that are no longer in default (this would happen if the resolution of the default episode takes less than four years). This approach may be justified because the default may still harm exporters even after the country has exited from default, since reputation issues may remain in financial and international trade markets. It seems nevertheless reasonable to check whether our results are robust to setting the  $\text{DEF\_ALL2}$ - $\text{DEF\_ALL5}$  variables equal to 0 for all the years after the sovereign has exited from default. Table 4 reproduces Columns 2 and 3 of Table 2 with this modified definition of  $\text{DEF\_ALL2}$ - $\text{DEF\_ALL5}$ , and shows that this alternative definition does not affect the basic results of Table 2.

After having explored whether our results are robust to different samples and different definitions of the default variables, we now check whether small changes in the set of controls affect our main result (for the sake of conciseness, we will focus this robustness analysis on the basic specification in Column 1).<sup>8</sup> We start by dropping the interaction between export orientation and GDP growth (Column 1 of Table 5). Given that growth tends to be low during default periods, and given our previous finding that export-oriented sectors are less procyclical than sectors that target the domestic market, we expect that estimating the model without  $\text{GDPGR}^*\text{EXPOU}$  should bias downward the estimate of  $\text{DEFB2}^*\text{EXPOU}$  (because this variable would capture the effect of  $\text{GDPGR}^*\text{EXPOU}$  and the effect of this variable goes in an opposite direction relative the effect of default). In fact, the coefficient of  $\text{DEFB2}^*\text{EXPOU}$  drops by approximately 20 percent (from -0.22 to -0.17), but we also find that that this variable remains statistically significant with a t-statistic of 2.22.

In Column 2 of Table 5, we drop the interaction between export orientation and changes in the real exchange rate. Also in this case, omitting the effect of the real exchange rate should lead to lower point estimates of the coefficient of  $\text{DEFB2}^*\text{EXPOU}$ . In fact, we find that neither the point estimate nor the significance of  $\text{DEFB2}^*\text{EXPOU}$  changes with respect to the baseline regression of Table 2. However, we find that in this specification,  $\text{GDPGR}^*\text{EXPOU}$  becomes

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<sup>8</sup> The results of Columns 2-4 of Table 2 are also robust to these alternative specifications.

statistically significant (with the expected negative sign). In Column 3, we drop both GDPGR\*EXPOU and DRER\*EXPOU. We find that the coefficient of DEFB2\*EXPOU drops to -0.168 but remains statistically significant at the 5 percent confidence level. In Column 4, we substitute the change in the real exchange rate with the *level* of the real exchange rate. While the coefficient on RER\*EXPOU has the expected positive sign but is not statistically significant (the p value is 0.15), we find that DEFB2\*EXPOU remains negative and highly significant (if anything, both the point estimate and the t statistics are higher than in the baseline case). In Column 5, we augment the baseline model with the lag of the change of the real exchange rate (lagdRER\*EXPOU). Again, this does not affect our basic result. Finally, in Column 6, we augment our regression with the interaction between export orientation and an external shock defined as average (weighted by trade shares) GDP growth of country's  $i$  trading partners to account for the evolution of demand for exports. Formally, we define the external shock as follows:

$$SHOCK_{i,t} = \frac{EXP_i}{GDP_i} \sum_j \phi_{ij,t-1} GDPGR_{j,t}$$

where  $GDPGR_{j,t}$  measures real GDP growth in country  $j$  in period  $t$ ,  $\phi_{ij,t}$  is the fraction of export from country  $i$  going to country  $j$ , and  $EXP_i/GDP_i$  measures country  $i$  average exports expressed as a share of GDP. The rationale for including this variable is that default episodes may happen at a time of a global economic slowdown, and hence the poor performance of exporters in country  $i$  might owe to the fact that its main trading partners are also in a period of low growth, rather than the default episode itself.<sup>9</sup> We find that EXTSH\*EXPOU has the expected (positive) sign but is not statistically significant. While controlling for demand in partner countries reduces the coefficient of DEFB2\*EXPOU (from 0.218 to 0.177), we still find that this variable remains a significant determinant of value-added growth.

So far we focused on defaults on international bank loans and sovereign bonds (as classified by Standard and Poor's) and did not consider Paris Club defaults, which are the focus of Rose's (2002) analysis. As a final robustness check, we look at what happens when we focus on Paris Club defaults (the last column of Table A4 shows that our sample includes 26 Paris

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<sup>9</sup> We would like to thank Kevin Cowan for suggesting this interpretation.

Club defaults).<sup>10</sup> In Columns 1 and 2 of Table 6, we reproduce our baseline specification replacing S&P defaults with Paris Club defaults (as we limit our sample to countries with at least one default episode, the regressions now include 15 countries and 5,223 observations). We find that the coefficient of DEFB2 is similar to that of our benchmark specification and is close to being statistically significant at the 10 percent confidence level (the p-value is 0.105). The second column of the table shows a large and negative coefficient in the year after default and no significant coefficients in the following and previous years. We also find that the coefficients are not jointly significant. In Columns 3 and 4, we repeat the experiment by including all types of default (both Paris Club and S&P), and our sample now includes 27 countries (with 56 default episodes) and 10482 observations. We find that the results are similar to those of our benchmark regressions in Table 2. In particular, we find that DEFB2 has a large and statistically significant coefficient and that the five lags of the default dummy are jointly significant with the largest effect in the year that follows the default episode.

## 5. Is There a Difference between Bond Defaults and Bank Defaults?

In the specifications of the previous section we did not differentiate between defaults on international bank loans and defaults on sovereign bonds. Yet, these two types of defaults may have different effects. For example, if the main channel through which exporters are affected is a retrenchment of trade finance, sovereign defaults on bank loans may have a stronger impact. Moreover, bond defaults tend to affect a much larger number of creditors (which often include domestic banks), and the harmful effects may affect export and non-export-oriented firms equally. In Table 7, we estimate the effect of these two types of default separately. In Column 1, our main explanatory variable is BANKDEFB2\*EXPOU. This variable is defined as DEFB2\*EXPOU but only considers episodes of defaults on international bank loans (there are 31 of these episodes in our sample). The results are very similar to those in our benchmark model, suggesting that bank defaults have a negative, large (at -0.197, the point estimate is just below that of the baseline regression) and statistically significant impact on the performance of export oriented sectors.

In Column 2 of Table 7, we estimate the effect of bond defaults (BONDDEFB2 is defined like BANKDEFB2 but only takes a value of 1 during defaults on sovereign bonds). We

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<sup>10</sup> In most cases, the Paris Club defaults are the same as the S&P defaults, with slightly different timing.

find that, although the effect of bond defaults is stronger than that of bank defaults (the point estimate is equal to -0.232), the coefficient is not even close to being statistically significant. The fact that our sample contains only a small number of bonded debt default episodes, however, does not give us a good basis from which to draw any strong conclusions on this issue.

## 6. Conclusions

This paper uses a difference-in-difference methodology similar to the one originally proposed by Rajan and Zingales (1998) to test whether defaulting hurts the more export-oriented industries. Strong support for this hypothesis was found, but contrary to the findings of previous studies, our estimations suggest that the effect of defaults is short-lived.

It should be clear that this paper cannot say anything on whether defaults affect total exports or total growth. For instance, it would be possible (albeit unlikely) that at time of default, non-export-oriented industries would pick up growth (or exports) and that this would more than compensate for the relative decline of export-oriented industries. While the Rajan and Zingales (1998) difference-in-difference methodology indicates how one sector moves relative to another, it does not provide any information on the global behavior of a country's output.<sup>11</sup> Furthermore, our data only cover the industrial sector and hence cannot shed any light on what happens to the service or agriculture sectors. With this caveat in mind, if one believes that the export sector is the economy's most dynamic sector and a source of important positive externalities (Hausmann and Rodrik, 2003), then any negative shock to this sector is likely to have important negative repercussions on overall welfare.

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<sup>11</sup> For instance, Cetorelli and Gambera (2001) use a methodology similar to the one used in this paper to estimate whether bank concentration affects value-added growth in industries that require more external financing (this was Rajan and Zingales' 1998 method of differentiating industries) and find conflicting results. On the one hand, they find that concentration promotes the growth of industries that require more external finance. On the other hand, they find that bank concentration leads to lower overall GDP growth.

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**Table 1. Summary Statistics**

|   | Mean  | Median | St. dev | 25 pctile | 75 pctile | Max   | Min   | N.Obs |
|---|-------|--------|---------|-----------|-----------|-------|-------|-------|
| Variables measured at the country-sector-year level |       |        |         |           |           |       |       |       |
| VAGR  | 0.046 | 0.018  | 0.29    | -0.10     | 0.21      | 1.40  | -0.55 | 9735  |
| SHAREVA   | 0.039 | 0.023  | 0.05    | 0.009     | 0.05      | 0.52  | 5e-06 | 9735  |
| Variables measured at the country-sector level      |       |        |         |           |           |       |       |       |
| EXPOU   | 0.07  | 0.03   | 0.11    | 0.01      | 0.09      | 0.96  | 0     | 639   |
| Variables measured at the country-year level        |       |        |         |           |           |       |       |       |
| RER   | 106.7 | 100    | 80.7    | 79.3      | 113.5     | 1435  | 8.40  | 386   |
| DRER  | 0.11  | 0.01   | 1.14    | -0.06     | 0.08      | 21.31 | -0.86 | 386   |
| GDPGR   | 0.03  | 0.04   | 0.05    | 0.005     | 0.06      | 0.19  | -0.13 | 386   |
| DEFB2   | 0.13  | 0      | 0.34    | 0         | 0         | 1     | 0     | 386   |
| DEF_ALL   | 0.48  | 0      | 0.50    | 0         | 1         | 1     | 0     | 386   |

**Table 2. Benchmark Regression**

|   | (1)                                       | (2)                                       | (3)                                       | (4)                                       |
|---|---|---|---|---|
| Lagged share in value added             | Real VA<br>growth<br>-2.892<br>(12.22)*** | Real VA<br>growth<br>-2.896<br>(12.22)*** | Real VA<br>growth<br>-2.896<br>(12.22)*** | Real VA<br>growth<br>-2.898<br>(12.20)*** |
| dRER*EXPOU                              | 0.201<br>(2.53)**                         | 0.199<br>(2.46)**                         | 0.199<br>(2.46)**                         | 0.201<br>(2.53)**                         |
| GDPGR*EXPOU                             | -1.137<br>(1.35)                          | -0.992<br>(1.14)                          | -0.992<br>(1.14)                          | -0.878<br>(1.04)                          |
| DEFB2*EXPOU                             | -0.218<br>(2.54)**                        |   |   |   |
| DEF_ALL1*EXPOU                          |   | -0.141<br>(1.07)                          | -0.137<br>(0.96)                          |   |
| DEF_ALL 2*EXPOU                         |   | -0.292<br>(2.82)***                       | -0.289<br>(2.75)***                       |   |
| DEF_ALL 3*EXPOU                         |   | -0.014<br>(0.14)                          | -0.012<br>(0.11)                          |   |
| DEF_ALL 4*EXPOU                         |   | -0.169<br>(1.70)*                         | -0.167<br>(1.63)                          |   |
| DEF_ALL 5*EXPOU                         |   | -0.181<br>(2.00)**                        | -0.179<br>(1.88)*                         |   |
| DEF_ALL_ALL*EXPOU                       |   |   | -0.005<br>(0.05)                          | -0.116<br>(1.44)                          |
| Constant                                | -0.123<br>(0.97)                          | -0.131<br>(1.16)                          | 0.102<br>(1.04)                           | 0.104<br>(1.05)                           |
| Observations                            | 9360                                      | 9360                                      | 9360                                      | 9360                                      |
| R-squared                               | 0.43                                      | 0.43                                      | 0.43                                      | 0.43                                      |
| F test def*EXPOU jointly<br>significant |   | 2.72                                      | 2.36                                      |   |
| Prob > F                                |   | 0.019                                     | 0.028                                     |   |

Robust t statistics in parentheses

\* significant at 10 percent; \*\* significant at 5 percent; \*\*\* significant at 1 percent

**Table 3. Robustness Analysis Using Country-Sectors with at Least 15 Years of Data**

|                                | (1)                  | (2)                  | (3)                  | (4)                  |
|--------------------------------|----------------------|----------------------|----------------------|----------------------|
|                                | Real VA growth       | Real VA growth       | Real VA growth       | Real VA growth       |
| Lagged share in value added    | -3.636<br>(10.32)*** | -3.637<br>(10.31)*** | -3.647<br>(10.32)*** | -3.638<br>(10.31)*** |
| vardRER                        | 0.015<br>(0.14)      | 0.005<br>(0.05)      | 0.016<br>(0.14)      | 0.001<br>(0.01)      |
| GDPGR*EXPOU                    | -1.395<br>(1.55)     | -1.282<br>(1.36)     | -1.181<br>(1.30)     | -1.293<br>(1.37)     |
| DEFB2*EXPOU                    | -0.208<br>(2.33)**   |                      |                      |                      |
| DEF_ALL1*EXPOU                 |                      | -0.109<br>(0.81)     |                      | -0.062<br>(0.43)     |
| DEF_ALL 2*EXPOU                |                      | -0.287<br>(2.57)**   |                      | -0.256<br>(2.27)**   |
| DEF_ALL 3*EXPOU                |                      | 0.005<br>(0.05)      |                      | 0.034<br>(0.32)      |
| DEF_ALL 4*EXPOU                |                      | -0.133<br>(1.35)     |                      | -0.110<br>(1.07)     |
| DEF_ALL 5*EXPOU                |                      | -0.185<br>(2.27)**   |                      | -0.161<br>(1.79)*    |
| DEF_ALL_ALL*EXPOU              |                      |                      | -0.136<br>(1.67)*    | -0.059<br>(0.59)     |
| Constant                       | -0.175<br>(1.19)     | -0.089<br>(0.93)     | -0.081<br>(0.80)     | 0.029<br>(0.20)      |
| Observations                   | 7544                 | 7544                 | 7544                 | 7544                 |
| R-squared                      | 0.46                 | 0.46                 | 0.46                 | 0.46                 |
| F test def*EXPOU jointly sign. |                      | 2.60                 |                      | 2.17                 |
| Prob > F                       |                      | 0.024                |                      | 0.043                |

Robust t statistics in parentheses

\* significant at 10 percent; \*\* significant at 5 percent; \*\*\* significant at 1 percent

**Table 4. Robustness Analysis, Setting DEF\_ALL2-DEF\_ALL5=0 if DEF\_ALL\_ALL=0**

|                                      | (1)                                    | (2)                                    |
|--------------------------------------|--|--|
| Lagged share in value added          | Real VA growth<br>-2.900<br>(12.21)*** | Real VA growth<br>-2.900<br>(12.21)*** |
| dRER                                 | 0.203<br>(2.57)**                      | 0.203<br>(2.56)**                      |
| GDPGR*EXPOU                          | -0.933<br>(1.07)                       | -0.939<br>(1.07)                       |
| DEF_ALL1*EXPOU                       | -0.117<br>(0.88)                       | -0.104<br>(0.73)                       |
| DEF_ALL 2*EXPOU                      | -0.293<br>(2.40)**                     | -0.280<br>(2.12)**                     |
| DEF_ALL 3*EXPOU                      | 0.057<br>(0.50)                        | 0.070<br>(0.55)                        |
| DEF_ALL 4*EXPOU                      | -0.151<br>(1.14)                       | -0.139<br>(0.96)                       |
| DEF_ALL 5*EXPOU                      | -0.128<br>(1.28)                       | -0.119<br>(1.10)                       |
| DEF_ALL_ALL*EXPOU                    |  | -0.020<br>(0.18)                       |
| Constant                             | -0.135<br>(1.19)                       | 0.097<br>(0.98)                        |
| Observations                         | 9360                                   | 9360                                   |
| R-squared                            | 0.43                                   | 0.43                                   |
| F test def*EXPOU jointly significant | 2.13                                   | 1.81                                   |
| Prob > F                             | 0.059                                  | 0.092                                  |

Robust t statistics in parentheses

\* significant at 10 percent; \*\* significant at 5 percent; \*\*\* significant at 1 percent

**Table 5. Robustness Analysis, Different Controls**

|                      | (1)                                       | (2)                                       | (3)                                       | (4)                                       | (5)                                       | (6)                                       |
|----------------------|---|---|---|---|---|---|
| Lagged share in v.a. | Real VA<br>growth<br>-2.890<br>(12.18)*** | Real VA<br>growth<br>-2.897<br>(12.23)*** | Real VA<br>growth<br>-2.816<br>(12.37)*** | Real VA<br>growth<br>-2.906<br>(12.35)*** | Real VA<br>growth<br>-3.004<br>(11.28)*** | Real VA<br>growth<br>-2.891<br>(12.01)*** |
| dRER*EXPOU           | 0.221<br>(3.15)***                        |   |   |   | 0.203<br>(2.62)***                        | 0.212<br>(2.82)***                        |
| GDPGR*EXPOU          |   | -1.545<br>(1.90)*                         |   | -1.467<br>(1.77)*                         | -0.925<br>(1.05)                          | 0.222<br>(0.27)                           |
| RER*EXPOU            |   |   |   | 0.001<br>(1.44)                           |   |   |
| lagdRER*EXPOU        |   |   |   |   | 0.125<br>(1.32)                           |   |
| EXT_SH*EXPOU         |   |   |   |   |   | 1.404<br>(0.17)                           |
| DEFB2*EXPOU          | -0.179<br>(2.20)**                        | -0.228<br>(2.66)***                       | -0.168<br>(2.08)**                        | -0.239<br>(2.80)***                       | -0.232<br>(2.52)**                        | -0.177<br>(2.19)**                        |
| Constant             | -0.120<br>(0.95)                          | -0.007<br>(0.06)                          | -0.116<br>(1.18)                          | -0.303<br>(2.95)***                       | -0.780<br>(5.01)***                       | -0.363<br>(3.64)***                       |
| Observations         | 9360                                      | 9360                                      | 9651                                      | 9360                                      | 9020                                      | 8908                                      |
| R-squared            | 0.43                                      | 0.43                                      | 0.42                                      | 0.43                                      | 0.43                                      | 0.44                                      |

Robust t statistics in parentheses

\* significant at 10 percent; \*\* significant at 5 percent; \*\*\* significant at 1 percent

**Table 6. Paris Club Defaults**

|   | (1)<br>Real VA<br>growth | (2)<br>Real VA<br>growth | (3)<br>Real VA<br>growth       | (4)<br>Real VA<br>growth |
|---|--------------------------|--------------------------|--------------------------------|--------------------------|
|   | ONLY PARIS CLUB DEFAULTS |                          | PARIS CLUB AND S&P<br>DEFAULTS |                          |
| Lagged share in value added             | -2.177<br>(8.62)***      | -2.178<br>(8.59)***      | -2.698<br>(12.65)***           | -2.699<br>(12.65)***     |
| dRER*EXPOU                              | -0.091<br>(0.50)         | -0.086<br>(0.48)         | 0.167<br>(1.95)*               | 0.161<br>(1.83)*         |
| GDPGR*EXPOU                             | -2.061<br>(1.74)*        | -2.054<br>(1.72)*        | -1.475<br>(1.67)*              | -1.459<br>(1.62)         |
| DEFB2*EXPOU                             | -0.202<br>(1.62)         |                          | -0.230<br>(2.92)***            |                          |
| DEF_ALL1*EXPOU                          |                          | -0.006<br>(0.03)         |                                | -0.079<br>(0.72)         |
| DEF_ALL 2*EXPOU                         |                          | -0.367<br>(2.28)**       |                                | -0.338<br>(3.55)***      |
| DEF_ALL 3*EXPOU                         |                          | 0.117<br>(0.59)          |                                | 0.020<br>(0.17)          |
| DEF_ALL 4*EXPOU                         |                          | 0.123<br>(0.84)          |                                | -0.063<br>(0.70)         |
| DEF_ALL 5*EXPOU                         |                          | -0.036<br>(0.24)         |                                | -0.053<br>(0.65)         |
| Constant                                | 0.021<br>(0.08)          | -0.233<br>(0.88)         | -0.232<br>(1.86)*              | 0.078<br>(0.56)          |
| Observations                            | 5223                     | 5223                     | 10482                          | 10482                    |
| R-squared                               | 0.36                     | 0.36                     | 0.40                           | 0.40                     |
| F test def*EXPOU jointly<br>significant |                          | 1.68                     |                                | 2.72                     |
| Prob > F                                |                          | 0.137                    |                                | 0.019                    |

**Table 7. Bond and Bank Defaults**

|                             | (1)                                    | (2)                                    |
|-----------------------------|--|--|
| Lagged share in value added | Real VA growth<br>-2.891<br>(12.20)*** | Real VA growth<br>-2.902<br>(12.21)*** |
| dRER*EXPOU                  | 0.200<br>(2.52)**                      | 0.205<br>(2.67)***                     |
| realgdgpr*EXPOU             | -1.111<br>(1.31)                       | -0.750<br>(0.90)                       |
| BANKDEFB2*EXPOU             | -0.196<br>(2.24)**                     |  |
| BONDDEFB2*EXPOU             |  | -0.232<br>(0.73)                       |
| Constant                    | -0.123<br>(0.97)                       | -0.143<br>(1.26)                       |
| Observations                | 9360                                   | 9360                                   |
| R-squared                   | 0.43                                   | 0.43                                   |

Robust t statistics in parentheses

\* significant at 10 percent; \*\* significant at 5 percent; \*\*\* significant at 1 percent

**Table A1. Description of the Variables**

|         |   |
|---------|---|
| VAGR    | 3 digit ISIC manufacturing value-added growth in constant dollars. Calculated and deflated using CPI from the IMF International Financial Statistics  |
| SHVA    | Share of value added in sector $j$ over total manufacturing value added. Calculated (using data from UNIDO Industrial statistics 2003) as: $SHVA_{i,j,t} = \frac{VA_{i,j,t}}{\sum_j VA_{i,j,t}}$  |
| EXPOU   | Average share of exports over sales for country $i$ , sector $j$ . Data for exports are from Nicita and Olarrega (2001) and data for sales (output) are from UNIDO Industrial statistics 2003. The index is calculated as follow: $EXPOU_{i,j} = \frac{1}{18} \sum_{t=1982}^{1999} \left( \frac{EXPORTS_{i,j,t}}{SALES_{i,j,t}} \right)$ , We use data over the 1982-1999 period because the Nicita and Olarrega (2001) data-set ends in 1999 and data prior to 1982 are poor quality. As the data tend to be noisy, we drop the top and bottom 2 percent of observations for $\frac{EXPORTS_{i,j,t}}{SALES_{i,j,t}}$ |
| RER     | Real bilateral (with respect to the US) exchange rate index. 19??=100. A higher value indicates a depreciated exchange rate   |
| DRER    | Percentage change in RER  |
| GDPGR   | GDP growth calculated using real local currency data from the World Bank's World Development Indicators   |
| DEFB2   | Dummy variable that takes a value of 1 in the first and second year of a default episode. Source Standard and Poor's  |
| DEF_ALL | Dummy variable that takes a value of 1 whenever a country is in default. Source Standard and Poor's   |

**Table A2. Summary Export Orientation by Country**

| Country              | Mean         | Std. Dev.    | Freq.      |
|----------------------|--------------|--------------|------------|
| ARG                  | 0.024        | 0.025        | 28         |
| BGR                  | 0.095        | 0.086        | 27         |
| BOL                  | 0.064        | 0.091        | 27         |
| CHL                  | 0.043        | 0.046        | 28         |
| CMR                  | 0.049        | 0.061        | 26         |
| CRI                  | 0.097        | 0.077        | 28         |
| ECU                  | 0.029        | 0.032        | 28         |
| ETH                  | 0.025        | 0.067        | 22         |
| HND                  | 0.177        | 0.198        | 20         |
| IDN                  | 0.089        | 0.084        | 27         |
| IRN                  | 0.011        | 0.036        | 28         |
| JOR                  | 0.139        | 0.175        | 27         |
| KEN                  | 0.055        | 0.066        | 26         |
| MAR                  | 0.059        | 0.080        | 26         |
| MEX                  | 0.152        | 0.139        | 28         |
| MWI                  | 0.090        | 0.214        | 20         |
| PAN                  | 0.033        | 0.042        | 27         |
| PER                  | 0.024        | 0.040        | 28         |
| PHL                  | 0.100        | 0.100        | 28         |
| POL                  | 0.063        | 0.041        | 28         |
| TUR                  | 0.042        | 0.039        | 28         |
| URY                  | 0.055        | 0.045        | 28         |
| VEN                  | 0.031        | 0.052        | 28         |
| ZAF                  | 0.233        | 0.174        | 28         |
| <b>ALL COUNTRIES</b> | <b>0.073</b> | <b>0.108</b> | <b>639</b> |

**Table A3. Summary Export Orientation by Industrial Sector**

| <b>ISIC3 Product Classification</b>       | <b>Mean</b>  | <b>Std. Dev.</b> | <b>Freq.</b> |
|---|--------------|------------------|--------------|
| 313 Beverages                             | 0.015        | 0.022            | 24           |
| 342 Printing and publishing               | 0.019        | 0.027            | 24           |
| 369 Other non-metallic mineral products   | 0.025        | 0.045            | 24           |
| 354 Misc. petroleum and coal products     | 0.033        | 0.035            | 15           |
| 356 Plastic products                      | 0.034        | 0.039            | 24           |
| 341 Paper and products                    | 0.035        | 0.036            | 24           |
| 371 Iron and steel                        | 0.039        | 0.05             | 22           |
| 381 Fabricated metal products             | 0.039        | 0.04             | 24           |
| 314 Tobacco                               | 0.053        | 0.194            | 24           |
| 352 Other chemicals                       | 0.056        | 0.124            | 24           |
| 362 Glass and products                    | 0.058        | 0.064            | 22           |
| 353 Petroleum refineries                  | 0.061        | 0.08             | 20           |
| 355 Rubber products                       | 0.066        | 0.101            | 24           |
| 361 Pottery, china, earthenware           | 0.07         | 0.135            | 22           |
| 321 Textiles                              | 0.072        | 0.049            | 24           |
| 332 Furniture, except metal               | 0.081        | 0.134            | 24           |
| 383 Machinery, electric                   | 0.081        | 0.106            | 23           |
| 324 Footwear, except rubber or plastic    | 0.083        | 0.13             | 24           |
| 311 Food Products                         | 0.087        | 0.088            | 24           |
| 331 Wood products, except furniture       | 0.088        | 0.086            | 24           |
| 351 Industrial chemicals                  | 0.09         | 0.076            | 23           |
| 382 Machinery, except electrical          | 0.099        | 0.117            | 23           |
| 384 Transport equipment                   | 0.108        | 0.193            | 23           |
| 322 Wearing apparel, except footwear      | 0.109        | 0.091            | 24           |
| 390 Other manufactured products           | 0.136        | 0.127            | 22           |
| 385 Professional and scientific equipment | 0.137        | 0.165            | 20           |
| 323 Leather products                      | 0.14         | 0.133            | 24           |
| 372 Non-ferrous metals                    | 0.145        | 0.101            | 20           |
| <b>ALL SECTORS</b>                        | <b>0.073</b> | <b>0.108</b>     | <b>639</b>   |

**Table A4. Default Episodes Included in the Sample**

| Country      | Year | Standard and Poor's |               |           | Paris Club |
|--------------|------|---------------------|---------------|-----------|------------|
|              |      | Bank Defaults       | Bonds Default | All       |            |
| ARG          | 1982 | 1                   | 0             | 1         | 0          |
| ARG          | 1985 | 0                   | 0             | 0         | 1          |
| BGR          | 1990 | 1                   | 0             | 1         | 0          |
| BGR          | 1991 | 0                   | 0             | 0         | 1          |
| BOL          | 1986 | 1                   | 0             | 1         | 1          |
| BOL          | 1989 | 0                   | 1             | 1         | 0          |
| CHL          | 1983 | 1                   | 0             | 1         | 0          |
| CHL          | 1985 | 0                   | 0             | 0         | 1          |
| CMR          | 1985 | 1                   | 0             | 1         | 0          |
| CMR          | 1989 | 0                   | 0             | 0         | 1          |
| CRI          | 1981 | 1                   | 0             | 1         | 0          |
| CRI          | 1983 | 1                   | 1             | 1         | 1          |
| CRI          | 1989 | 0                   | 0             | 0         | 1          |
| ECU          | 1982 | 1                   | 0             | 1         | 0          |
| ECU          | 1983 | 0                   | 0             | 0         | 1          |
| ECU          | 1988 | 0                   | 0             | 0         | 1          |
| ECU          | 1999 | 0                   | 1             | 1         | 0          |
| EGY          | 1987 | 0                   | 0             | 0         | 1          |
| EGY          | 1991 | 0                   | 0             | 0         | 1          |
| ETH          | 1991 | 1                   | 0             | 1         | 0          |
| HND          | 1981 | 1                   | 0             | 1         | 0          |
| IDN          | 1998 | 1                   | 0             | 1         | 0          |
| IRN          | 1978 | 1                   | 0             | 1         | 0          |
| JOR          | 1989 | 1                   | 0             | 1         | 1          |
| JOR          | 1992 | 0                   | 0             | 0         | 1          |
| KEN          | 1994 | 1                   | 0             | 1         | 0          |
| MAR          | 1983 | 1                   | 0             | 1         | 0          |
| MAR          | 1986 | 1                   | 0             | 1         | 0          |
| MEX          | 1982 | 1                   | 0             | 1         | 0          |
| MEX          | 1983 | 0                   | 0             | 0         | 1          |
| MEX          | 1986 | 0                   | 0             | 0         | 1          |
| MEX          | 1989 | 0                   | 0             | 0         | 1          |
| MWI          | 1982 | 1                   | 0             | 1         | 1          |
| PAK          | 1981 | 0                   | 0             | 0         | 1          |
| PAN          | 1983 | 1                   | 0             | 1         | 0          |
| PAN          | 1985 | 0                   | 0             | 0         | 1          |
| PAN          | 1987 | 0                   | 1             | 1         | 0          |
| PAN          | 1990 | 0                   | 0             | 0         | 1          |
| PER          | 1984 | 1                   | 0             | 1         | 0          |
| PHL          | 1983 | 1                   | 0             | 1         | 0          |
| PHL          | 1984 | 0                   | 0             | 0         | 1          |
| PHL          | 1987 | 0                   | 0             | 0         | 1          |
| POL          | 1981 | 1                   | 0             | 1         | 1          |
| POL          | 1985 | 0                   | 0             | 0         | 1          |
| POL          | 1990 | 0                   | 0             | 0         | 1          |
| TTO          | 1984 | 0                   | 0             | 0         | 1          |
| TUR          | 1982 | 1                   | 0             | 1         | 0          |
| URY          | 1983 | 1                   | 0             | 1         | 0          |
| URY          | 1987 | 1                   | 0             | 1         | 0          |
| URY          | 1990 | 1                   | 0             | 1         | 0          |
| VEN          | 1983 | 1                   | 0             | 1         | 0          |
| VEN          | 1990 | 1                   | 0             | 1         | 0          |
| VEN          | 1995 | 0                   | 1             | 1         | 0          |
| ZAF          | 1985 | 1                   | 0             | 1         | 0          |
| ZAF          | 1989 | 1                   | 0             | 1         | 0          |
| ZAF          | 1993 | 1                   | 0             | 1         | 0          |
| <b>TOTAL</b> |      | <b>31</b>           | <b>5</b>      | <b>35</b> | <b>26</b>  |