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"Explaining Export Diversification: An Empirical Analysis"(*)

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Introduction

The secular concentration of Latin American exports in primary products has been highlighted as a major drawback for the development prospects of the region. Adverse and volatile terms of trade, slow productivity growth, and relatively low value added are some of the issues that have been raised against this primary product dependence since the seminal work of Prebisch (1959). In addition to reducing the dependence on fluctuating commodity prices, diversification into other sectors, especially those more intensive in technology, is prone to trigger knowledge spillovers from the exposure to international markets, management and marketing practices, and production processes.

This fascinating debate has anything but faded away since then, and has been picked up by the recent growth literature (see for instance Warner and Sachs (1995), Maloney (2002), and Lederman and Maloney (2003)). These and other papers have thoroughly studied whether export and factor endowment structures influence growth, and have presented case studies to understand why diversification strategies put in place in the last half century in our region have failed.

Though the relationship between concentration, volatility and low growth could be well founded, it does not mean that increasing levels of export diversification can guarantee by themselves higher levels of growth. Between the mid-1960s and the late 1990s, most Latin American countries diversified their export structure (see Table 1 below and World Bank (2002)), but yet they were unable to achieve considerable levels of GDP expansion.

In particular, some of the recent studies have challenged the "resource curse" view, as became known the negative relationship between natural resource abundance and growth. Based on a cross-country analysis, Ng (2005) argues that natural resource abundance is beneficial for economic development showing a positive relationiship between resource abundance and output level. Lederman and Maloney (2003) find evidence in cross-section that what reduces growth prospects is concentration in export revenues and that there is no evidence that natural resource abundance is detrimental to growth.

Case studies run in the same direction: Resource based activities can sustain growth over long periods. Wright and Czelusta (2002) study the mineral abundance in the United States as a historical example of resource-based growth. Blomström and Kokko (2003) describe how Sweeden and Finland reached a more diversified economic structure by adding technology into their natural resource-based production.

But there are successful stories outside the OECD as well. Herzen and Nowark-Lehman (2004), analyzing the Chilean experience, investigate the hypothesis that export diversification is linked to economic growth trough externalities of learning activities related with exporting and conclude that export diversification on the basis of natural resources has a positive influence on growth.

Though the conclusions of these studies could not be easily generalized, they should call the attention of Latin American countries which base their competitive advantages on natural resource abundance. Nowadays, natural resources have higher technology content and are able to generate the development of upstream and downstream activities (Bonaglia and Fukasaku, 2003).

Although many papers have dealt with the relation between trade structure and economic growth, much less attention has been paid to the underlying determinants of export diversification[1], an exercise that should provide valuable research and policy recommendations regarding the room for active government interventions and their expected outcomes. To fill this gap, this project aims to investigate this issue by: (1) employing econometric techniques on a cross-country database; (2) analyzing, as a case study, firm-level export diversification in Argentina. As a result of the pronounced real devaluation of the peso in 2002-2004, this country offers a nice quasi-natural experiment to examine whether relative prices might influence export diversification and to observe whether diversification is a between- or within-firm phenomenon.

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[1] An exception is World Bank (2002), where it is shown that trade liberalization and regional integration helped to reduce export concentration in the great majority of Latin American countries in the nineties and also that the quality of domestic institutions is positively correlated with export diversification.

The cross-country exercise revolves around a Herfindahl index using export data disaggregated at 2-digit SITC into 69 sectors. The Herfindahl index equals the sum of the squared proportional exposures to each sector and hence has a maximum of 1 when the country is completely focused on one sector, so lower values of the index indicate more diversification. Information is available on 56 countries with annual data for 1962-2002.[2]

To motivate our subsequent investigation, Figure 1 displays the simple average of the Herfindahl index for the complete sample, where it is apparent that diversification has consistently going up until the mid-1990s. Breaking down the sample by region, such downward trend has taken place in all cases but the European Union and North America. These two regions appear to have Herfindahl indices well below the world average in 1970 as well as in 2000, without much variation over the three decades.

Figure 1

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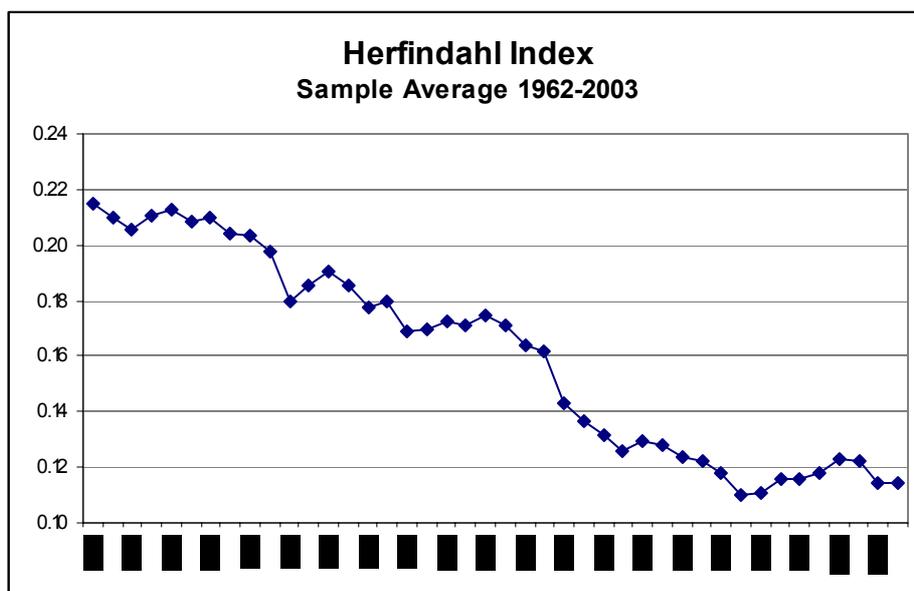
[2] The countries in the sample, grouped by region, are: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela (South America); Canada, Mexico and the United States (North America); Austria, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, United Kingdom and Belgium (European Union); Turkey, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland and Slovakia (other European countries); China, Hong Kong, Indonesia, Japan, South Korea, Malaysia, Singapur, Thailand and Taiwan (East Asia); Algeria, Egypt, Kenya, Morocco, South Africa and Tunisia (Africa); Australia, India, New Zealand, Brunei, Costa Rica and Vietnam (other countries).

Table 1

Region	No. of countries	Herfindahl Index in 1970	Herfindahl Index in 2000
Total Sample	56	0.203	0.123
South America	10	0.354	0.204
North America	3	0.073	0.07
European Union	14	0.076	0.063
Other European countries	9	0.163	0.124
East Asia	9	0.151	0.108
Africa	6	0.268	0.20
Other countries	5	0.365	0.092

Other remarkable patterns emerge from the inspection of time series by region, as shown in Figures 2 to 8. Most prominently, we observe a convergence process whereby countries having disparate diversification indexes at the start of the sample period gradually began, with particular intensity since the 1970s and early 1980s, to attain similar values within regions (but not always between regions, as suggested by the last table). Most countries lie in the 0.05-0.15 range by the early 2000s. Even though there are outliers in all regions (Mexico, Venezuela, Indonesia, Malta, Algeria) and the downward dynamics is uneven across regions (for instance, NAFTA, East Asia and the smaller South American countries have more stable indexes across time than the other regions), by and large some commonality is apparent. We will claim later on that this trend is to a great extent explained by common domestic macroeconomic developments (economic growth, increased trade openness), but the international context also has some bearing (as captured by annual dummy variables).

Figure 2
Herfindahl Index: EU-15, 1962-2003

Figure 3
Herfindahl Index: NAFTA, 1962-2003

Figure 4
Herfindahl Index: East Asia, 1962-2003

Figure 5
Herfindahl Index: Rest of Europe, 1962-2003

Legend: Tur, Est, Hun, Lat, Slov, Cyp, Lit, Pol, Malt

Figure 6
Herfindahl Index: Africa, 1962-2003

Legend: Arge, Ken, Moro, Sud, Egy, Tun

Figure 7
Herfindahl Index: Latin America, 1962-2003
Big countries

Legend: Arg, Bra, Chi, Col, Mex, Ven

Figure 8
Herfindahl Index in Latin America: 1962-2003
Small Countries

The paper is structured as follows: In Section 1 a theoretical background is advanced and applied to the econometric cross-section analysis. Section 2 presents some robustness checks. Section 3 is devoted to the recent Argentine case. Some conclusions and recommendations close.

1. Theoretical considerations and cross-country results

Although the benefits of a diversified export base has been well-established in the literature, there exists no unified theoretical framework to rely on when it comes to uncover the macroeconomic drivers of export diversification. Furthermore, trade research treats export diversification from a social, aggregate standpoint, while the decision to diversify is made by individual firms from the private sector (provided the government has no decisive influence on export markets, as it is the case in most countries). One intuitive, but utterly misleading, approach would be to extrapolate the principles of financial diversification to export diversification. In the former case, any given firm or individual can purchase at low cost financial assets to construct a portfolio with a better expected risk and/or return performance. Conversely, in the latter case, even though the firm can still have a belief about future international prices, exchange rates and other relevant parameters, the return to the new export project will depend in the end on the ability of the very firm to profitably produce the good, which in turn responds to both micro and macroeconomic conditions. Likewise, risk is heightened by

the irreversibility of some productive investments, a problem absent from the much more liquid financial markets.

From this perspective, it is actually unclear whether any given firm will find it appealing to diversify into new exportable goods or services. On one hand, pursuing profit stability and growth may lead firms to invest in new undertakings, especially those whose revenues are poorly correlated to the current productive menu. But, on the other hand, a strategy of focusing on one or few projects may allow the company to exploit economies of scale and to move along the learning curve. In this sense, the company's behavior in export markets depends on the existence of constant returns to scale (as assumed in the traditional trade theory) or increasing returns to scale (as assumed in the new international economics literature) –see Wong (1995) on this debate. Moreover, even when the firm aims to mitigate its overall risk, this does not necessarily imply that the firm will move toward new export goods. For instance, an exporting firm may well prefer to expand into non-tradeable production (and vice versa) to smooth out the effect of real exchange rate movements. Equally important, diversification may be restricted by diseconomies of scope, the country's structural comparative advantage and the own company´s degree of international competitiveness. Finally, uncertainty creates a high cost discovery in developing countries (see Hausman, Hwang and Rodrik (2005)).

In this light, the research question to be tackled in this study is how the macroeconomic environment may foster or inhibit export diversification, as measured by the Herfindahl index.[3] A priori, diversification will certainly be linked to prospective competitiveness (return) and risk with a diversified productive base vis-à-vis a focused one, but these two variables are correlated with the macroeconomic setting in a rather complex way, which thus calls for an empirical approach to the problem. The first explanatory variable is the Exports to GDP ratio. This indicator reflects, among other things, the country's competitiveness in and the integration to international markets. From here, two opposite effects may be expected, as higher overall productive efficiency helps developing new lines of production but, at the same time, it may imply a better knowledge of the

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[3] The firm-level analysis goes beyond the scope of this work, as it would require detailed microeconomic data. Anyhow, the discussion is shortly picked up in Section 3 in the context of the recent Argentine experience.

country's comparative advantage and the exploitation of increasing returns to scale via export specialization. Per capita GDP is another variable a priori linked to diversification. Richer economies tend to be economically and institutionally more stable, and such environment mitigates the business risks perceived by domestic producers, thus making diversification less imperative. Nevertheless, as these economies are characterized by higher total factor productivity and a better business climate, entrepreneurs may find it more appealing to broaden their productive mix. The access to credit, the quality of infrastructure, the gross investment ratio and the level of foreign direct investment are indicators of macroeconomic efficiency and strength that may likely enhance the growth prospects of firms, even though the implications for export diversification remain an open theoretical question.

The impact of the observed export composition is examined by including the shares of fuel, manufactures and agricultural exports in total exports. The expected sign on the fuel exports share is positive, as fuel exporters enjoy substantial rents that potentially downplay the long-run benefits of export diversification –a syndrome sometimes referred to as Dutch disease.[4] Since the industrial sector is the one offering a wider menu of alternative products vis-à-vis other sectors, a negative sign is expected for the manufactures exports share. A high reliance on agricultural exports may bring about either lower diversification –because of the rather limited possibilities of diversifying within this sector- or higher diversification –because agricultural exporters may be willing to diversify away the volatility and downward trend observed in the price of primary products-. Annual time effects are also included in the regressions to capture any time trend unrelated to economic fundamentals.

Table 2 displays the baseline regressions and our main findings. The usable sample comprises 1,180 observations covering the 1970-2002 period. Explanatory variables are one-year lag values under the sensible presumption of a delayed impact on diversification.[5] Fixed and random effects results are shown in the table.[6] Results do not

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[4] Besides this country-level factor, it is possible that trade surplus and the corresponding low real exchange rate reduce the productive incentives for non-oil exporters.

[5] The use of lagged explanatory variables also helps to deal with their potential endogeneity provided that future values of the Herfindahl index have no influence whatsoever on the control set. While there are no strong reasons to believe on reverse or simultaneous causation, the use of proper instruments is always advisable to avoid any suspicion of endogeneity, but this approach is extremely difficult, if not impossible, to implement in most econometric applications.

change much from one method to the other, but a Hausman test suggests that the fixed effects estimator is preferred on consistency grounds. Goodness of fit, as reflected in the R Squared and the Wald and F Statistics of joint statistical significance, is quite satisfactory. An overall reading of the evidence supports the notion that richer, more efficient, more stable and more open countries tend to focus rather than to diversify exports. As revealed by the econometric outcome, variables typically associated with good macroeconomic performance (exports, GDP, investment rate, credit, infrastructure) have positive and highly significant loadings, meaning that they act in favor of more concentration rather than more diversification. This finding, yet quite robust, clashes against the common knowledge that export concentration should attenuate over the process of economic development. This belief comes from the normative observation that concentration in primary products has pervasive effects on trade and economic growth, while the results of this paper have more to do with private business incentives, which seem to encourage domestic firms to focus in order to take advantage of specialization-based economies of scale and, conversely, to diversify more intensely when macroeconomic risks are more evident. Along with this, manufactures exporters appear to be more diversified, in marked contrast to fuel exports. Time dummies (not reported) confirm that diversification has been on a systemic rise since the 1970s, regardless of idiosyncratic national factors. These dummy variables help reconciling the summary statistics in the Introduction –which showed a generalized move towards diversification- with the macroeconomic estimates. At first sight, the increase in diversification seems at odds with the focus-promoting effect of total exports and GDP, two variables that have gone up over the last decades. However, the advantage of multivariate regressions is that it isolates the independent effect of different variables. In the present case, the global bias toward diversified exports appears to be explained by global rather than by national factors.

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[6] The inclusion of the lagged Herfindahl index may be warranted on inertia considerations, in which case the presence of country fixed effects would render the employed methods inconsistent, forcing to resort to GMM-based or related estimators. However, autocorrelation is sometimes merely the consequence of omitting the underlying fundamentals. To check this, the inclusion of the lagged Herfindahl index in several (unreported) random and fixed effects, as well as GMM, regressions, yielded a significant estimate close to 1, but turned all the control variables not statistically significant. This suggests a serious multicolinearity drawback, explained by the likely empirical relationship of the lagged Herfindahl index with the lagged control set.

Table 2

	Reg.1	Reg.2
Explanatory Variables		
Trade Variables:		
Exports to GDP	0.0015489 (7.01)***	0.0014591 (5.86)***
Manufactures exports to total exports	-0.001258 (-6.08)***	-0.0006875 (-2.91)***
Fuel exports to total exports	0.0023888 (11.33)***	0.0019029 (8.63)***
Other Macroeconomic Variables:		
Per Capita GDP	0.00000229 (3.0)***	0.00000265 (3.5)***
Gross Fixed Capital to GDP	0.0019171 (5.06)***	0.0016043 (4.31)***
Credit to the Private Sector to GDP	0.0001616 (1.97)**	0.0001098 (1.35)
Telephone lines (per 1,000 people)	0.0000711 (2.05)**	0.0001997 (5.42)**
Net Foreign Direct Investment to GDP	-0.00003634 (-0.51)	-0.0002465 (-0.36)
Method	Random Effects	Fixed Effects
No. Observations	1180	1180
Year dummies	Yes	Yes
Wald (FE)/F (RE) Statistic (p-value)	820.52 (0.000)	23.02 (0.000)
Adjusted R Squared	0.551	0.165

***Significant at 1%, **Significant at 5%, *Significant at 10%

In the next table the sizable quantitative impact of the statistically significant variables under the fixed effects estimation is presented. A one-standard-deviation increase in the explanatory variables explain changes in the Herfindahl index that in no case fall below 16.1% from the average Herfindahl index of 0.158:

Table 3

Explanatory Variable	Average for the whole sample	Standard Deviation for the whole sample	Associated change in the Herfindahl index	Percentage change from the average Herfindahl index
Gross Fixed Capital to GDP	23.8	6.4	0.01	16.1%
Per Capita GDP	8975	7314	0.019	30.5%
Telephone lines (per 1,000 people)	220.8	197.3	0.039	62.1%
Manufactures exports to total exports	47.5	30.8	-0.021	-33.4%
Fuel exports to total exports	13.2	23.5	0.045	70.3%
Exports to GDP	29.4	21.1	0.031	48.4%

2. Robustness Checks

A number of additional specifications were carried out to evaluate the robustness of the results just displayed. Such tests proved to be quite reassuring of the above findings, even though some surprising estimates came out along the way. Regional dummies were included in the first column of Table 4 in a random effects regression taking as an arbitrary benchmark the European Union. Except for North America, regional dummies have a positive and significant explanatory power over and above country fundamentals. In particular, these dummies account for nothing less than 19.7 and 18.5 percentage points in the Herfindahl index for South American and African countries. In any case, the fact that the control set estimates show no noticeable changes and that the R Squared goes up only moderately reinforces the confidence in the empirical model. Also, unreported regressions alternatively excluding the European Union and North America and including only these countries show that total exports and per capita GDP remain highly significant, although the latter lose significance when entered jointly with exports. In Column (2) the Manufactures export share is replaced by the Agricultural export share -they are not entered jointly due to multicolinearity. The observed positive

coefficient is in line with the hypothesis that this kind of exports is less prone to diversification.

The last regression drops the countries in the top quartile according to per capita GDP and adds the squared GDP to assess the presence of non-linearities. From the estimated coefficients, it seems that diversification increases at low income levels (up to $11,036 based on the regression) and that concentration is a prevalent feature in richer countries. The increasing complexity of the economic structure as the country goes from an agriculture-intensive production to a more balanced one is probably behind this temporal dynamics.[7] But this argument tacitly implies a monotonic relationship rather that the U-shaped pattern unveiled by the data. Consistent with the discussion of Section 1, a suitable rationale needs to take into account that there is a broad array of pro- and against-diversification factors, and that incentives in one or the other direction supposedly change over the development process. The present evidence points to the preference for diversifying away productive risks in low-income (and likely high-volatility) countries and for the exploitation of scale economies in rich and stable nations.

Quite interestingly, this finding coincides with independent work by Imbs and Wacziarg (2003), who characterizes sectoral diversification as per capita GDP grows. Using employment and value-added measures for 99 countries over 1969-1997, they find that productivity diversification rises at low GDP levels and declines later on.[8]

Other unreported regressions were run. In order to pick up any possible exchange rate effect, we loosely calculated a proxy for the real exchange rate (the nominal exchange rate to the consumer price index), but it was not significant. Additionally, we rerun the baseline regressions using 5-year averages instead of yearly data. This time frequency could be helpful in case that fundamentals have a greater delayed impact on diversification than the one assumed under the original, annual database. Even though some coefficients do change, the total exports and GDP effects remain strong. Finally,

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[7] By the way, the below average Herfindahl index of European and North American countries at the beginning of the sample period can be understood from their relatively high GDP levels at the time.
[8] Their interpretation goes along similar lines to that of Section 1, but they add another incentive for diversification: in the presence of high trading costs and consumer preference for product variety, countries will broaden their productive menu as long as income and demand grows.

we included different measures of macroeconomic volatility, such as the inflation rate and the coefficient of variation of the nominal and the real exchange rate in the three previous years, without detecting any significant effect neither for the whole sample nor for the developing countries or the poorest countries (in the lowest income quartile) group. Two alternative reasons can be invoked to justify this result: on one hand, volatility is negatively correlated to other macroeconomic regressors, so it is hard to isolate its incidence; but, on the other hand, Figures 2 to 8 above taught us that, in spite of different situations in terms of macroeconomic stability, a majority of countries moved toward lower Herfindahl indexes as time went by. Based on this, one could conjecture that it was not volatility per se the key factor leading undeveloped countries to diversify but the desire to unburden themselves from the primary product dependence.[9]

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[9] See footnote 8 for another rationale.

Table 4

	Regional Dummies	Agricultural Exports	Non linearity for GDP (*)
Explanatory Variables			
Trade Variables:			
Exports to GDP	0.0013596 (6.22)***	0.0015622 (6.42)***	0.0016715 (5.11)***
Manufactures exports to total exports	-0.0006425 (-2.96)***		-0.0005411 (-1.84)*
Fuel exports to total exports	0.0024769 (12.0)***	0.0024769 (12.0)***	0.0021234 (8.03)***
Agricultural Exports to Total Exports		0.0010053 (4.28)***	
Other Macroeconomic Variables:			
Per Capita GDP	0.00000268 (3.57)***	0.00000300 (4.13)***	-0.0000213 (-3.16)***
(Per Capita GDP)^2			0.0000000000965 (2.96)**
Gross Fixed Capital to GDP	0.0017534 (4.68)***	0.0015773 (4.35)***	0.0018299 (3.89)**
Credit to the Private Sector to GDP	0.0000974 (1.19)	0.0000987 (1.23)	0.0003809 (2.92)***
Telephone lines (per 1,000 people)	0.0001411 (4.0)***	0.0002023 (5.5)***	0.0002871 (4.31)***
Net Foreign Direct Investment to GDP	-0.0003273 (-0.47)	-0.0005127 (-0.75)	
South America Dummy	0.196704 (7.48)***		
North America Dummy	0.0311319 (0.91)		
Non EU European countries Dummy	0.0525172 (2.06)**		
Oriental Asia Dummy	0.0624618 (2.2)**		
Africa Dummy	0.1854285 (6.22)***		
Other Countries Dummy	0.0692758 (2.18)**		
Method	Random Effects	Fixed Effects	Fixed Effects
No. Observations	1180	1170	879
Year dummies	Yes	Yes	Yes
Wald (FE)/F (RE) Statistic (p-value)	953.17 (0.000)	23.57 (0.000)	18.25 (0.000)
Adjusted R Squared	0.664	0.1602	0.4195

***Significant at 1%, **Significant at 5%, *Significant at 10%
(*) For GDP<$12,860 (fourth quartile excluded)

3. Some data and reflections on Argentina

The purpose of this section is to study export concentration approaching the recent Argentine experience. Given the sharp devaluation of early 2002, the crisis represents an interesting natural experiment to assess changes in export patterns following macroeconomic adjustment[10]. More specifically, we try to find out if the change in the economic situation after the steep devaluation of early 2002 constitutes a new environment that favors export diversification among Argentine firms and, especially, if this diversification process occurs across or within firms. This is a relevant issue for economic policy because if export diversification occurs across firms, it is necessary new firms to enter the export business; conversely, if export diversification is a within-firm phenomenon, eventual supporting policies should be targeted towards existing exporting firms.

As mentioned in Section 1, from a theoretical point of view, it is not clear whether firms should diversify or concentrate their export supply. That is why this question must be addressed on the basis of empirical work. To undertake the analysis two main databases of Argentina are used: The figures on aggregated exports are taken from INDEC[11], while the firm-level exports come from DGA.[12] The latter records the export value for all exporting firms. For the purpose of the present analysis, six-digit level was used for 1998, 2001 (pre-devaluation) and 2004. [13]

The first part of this section describes changes in the real exchange rate and export concentration in Argentina after the crisis and the second part discusses export diversification at the firm level.

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[10] The descriptive analysis carried on here covers a short time period for a specific country case, so it cannot be strictly compared with the long run cross-country econometric analysis of the previous section.
[11] Instituto Nacional de Estadísticas y Censos (National Institute of Statistics and Census).
[12] Dirección General de Aduana (General Direction of Customs).
[13] The disaggregation level is six and eight-digit Harmonized System, respectively, for 2001 and 2004. So, in order to make possible the comparison, a six-digit (that is, subheading) level was used for the analysis. This includes 4,200 products exported by Argentina in 2004.

3.1 Relative prices and export diversification after the crisis

Argentine devaluation took place at the very beginning of 2002 after more than ten years of fixed exchange rate. The value of the dollar increased by 266% between December 2001 and July 2002. After that, the dollar showed a downward trend and stabilized during 2004 at a value 196% above the pre-devaluation level.
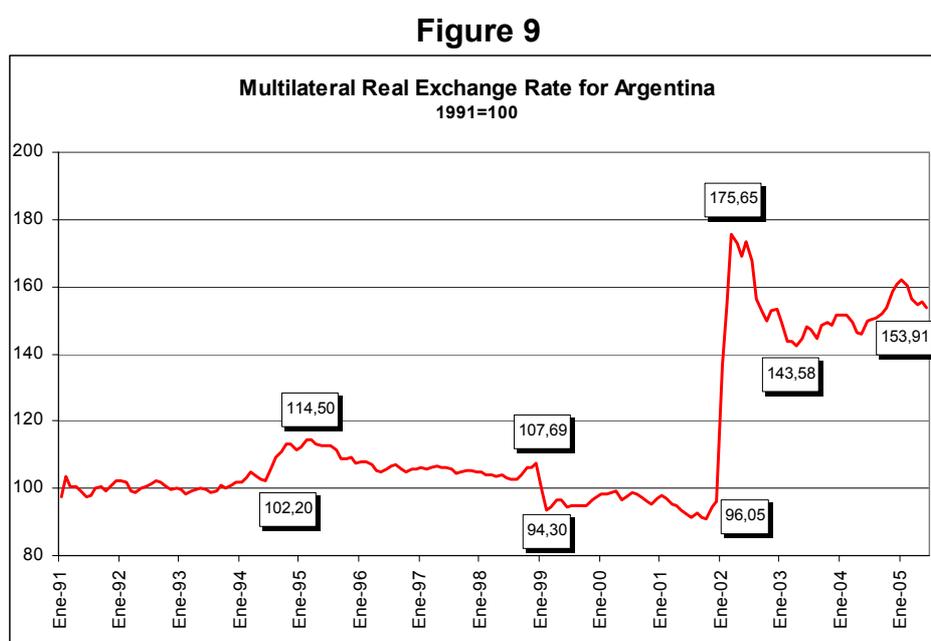
Figure 9

Source: Centro de Economía Internacional

Figure 2 gives a better idea of the relative price adjustment in Argentina by presenting the evolution of the multilateral real exchange rate (a measure of competitiveness against Argentine trading partners)[14] since 1991, the very year of implementation of the fixed exchange rate regime. This variable increased by as much as 81% between December 2001 and June 2002. Even though the peso revaluated since then, the average level in 2004 was still 61.5% above the average registered in 2001.

When these figures are taken into account, there is no doubt that there was a big change in relative prices that stimulated a shift in resources to tradable production. That change was the main driver of a rapid increase in exports: between 2001 and 2004, the value of

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[14] The index consists in adjusting the nominal exchange rate using wholesale prices and weighting each trading partner according to its share in Argentine exports.

the goods sold abroad increased by 30%, from US$ 26,600 millions to US$ 34,550 millions[15,16].

Digging into diversification trends, an interesting but still unexplored issue is to what extent the export expansion is explained by an increase in the volume of the pre-crisis exporting basket and/or by new goods within a more diversified export supply. Table 5 shows that, according to data at a six-digit Harmonized System level, export concentration slightly increased between 2001 (pre-devaluation) and 2004 (pos-devaluation), with the Herfindahl index going up by just 3%. However, the aggregate numbers hide sector-specific patterns, which actually show huge disparities. In fact, only Industrial Manufactures and especially Fuels and Energy tended to diversify their export supply.

Table 5

Herfindahl Index in Argentina, 1990-2004

By Type of Good

Sector/Period	1991-2000	2001	2004
Primary Products	0.108	0.125	0.147
Agri-manufactures	0.088	0.133	0.133
Industrial Manufactures	0.017	0.014	0.012
Fuels and Energy	0.476	0.331	0.225
Total	**0.025**	**0.029**	**0.033**

Source: Own elaboration based on INDEC database

To try to understand the impact of the crisis on export diversification at the level of firms, two kinds of questions are addressed in what follows: (a) Has export diversification patterns change after the 2002 crisis among the top exporters in business both in 2001 and 2004? These firms represent about 82% of total Argentine exports in 2004; and (b) Has export diversification occur across firms or within firms?

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[15] During the same period, quantities exported increased by 13%.
[16] It is worth to mention that in 2002 the Argentine Government introduced changes in export taxes. The average level for these type of tax is 5,3%. The tax for Primary products (8,8%) is greater than for Agri-manufactures (5,8%) and Industrial Manufactures (5,1%).

The next step is to analyze within-firm and across-fim diversification for the top exporters who exported in each and every of the following years: 1998, 2001 and 2004[17]. In order to measure within-firm diversification, a Herfindahl index for each of the firms of the sample is calculated for the three years. To get an aggregate idea of diversification, both a simple and a weighted (by export volume) average are computed. A similar procedure was employed to measure across-firm diversification.

Table 6
Diversification for top 500 exporters in Argentina
Herfindahl Index

		Simple average		Weighted average	
	Total	Across firms	Within firms	Across firms	Within firms
1998	0,032	0,802	0,601	0,394	0,418
2001	0,035	0,795	0,606	0,409	0,477
2004	0,048	0,783	0,576	0,355	0,457

Source: Own elaboration based on DGA database

As Table 6 shows, across and within-firm Herfindahls went down between 2001 and 2004, both for simple and weighted averages. This means that, after the 2002 devaluation, product supply became more diversified among the top 500 exporting firms.[18]

Nevertheless, the first column in Table 6 indicates that, taking the top 500 exporters as a whole, the level of concentration increased between 2001 and 2004, thus confirming the previous finding on aggregate exports. In view of the claims from the previous paragraph, this finding might be puzzling. However, a plausible explanation is that devaluation makes profitable for a wide set of firms to sell abroad products that, before the change in relative prices, could only be exported by a few firms that were able to compete in international markets. In that way, firms diversify their export menu (within-

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[17] The top 500 exporting firms in 2004 that also exported in 2001 account for 442 firms in 1998.
[18] The inter-year differences are statistically significant at 5% according to their respective mean difference tests.

firm diversification). At the same time, these products are exported by more firms (across-firm diversification). However, since some of these products also gain more weight in the total exports basket, the aggregate Herfindahl index goes up as well.

Conclusions

Based on data for 56 countries over 1962-2002, this study has unveiled a number of regularities regarding the determinants of export diversification around the world, namely:

- Diversification has been increasing in most countries
- Against common knowledge, good macroeconomic performance appears to stimulate export concentration rather than diversification.
- The development-export diversification nexus, though, appears to be governed by a U-shaped pattern, whereby diversification increases at low income levels and concentration prevails at high income levels.
- Exporters of primary products tend to have more focused export structures than exporters of manufactures, everything else equal.
- South America and Africa display levels of export concentration higher than other regions, which are not explained by measurable macroeconomic factors.

When the particular post-2002 crisis case of Argentina is examined, an increase in focus is recorded, along with more diversification when looking at average across- and within-firm Herfindahl index. This observation has probably to do with a massive switch of many firms toward new some profitable exportable products, which by itself increased the number of exporters (across-firm diversification) and the number of exported goods (within-firm diversification).

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[19] We use a classification of the INDEC that comprises Primary products, Agri-manufactures, Industrial manufactures and Fuels and Energy.

[20] As figure 3 shows concentration in Primary Products is high even for historical standards. The Herfindahl index is 40% higher than in the nineties. A similar change is observed in the case of Agri-manufactures.

[21] This data corresponds to a two-digit Harmonized System level. There are 97 chapters. Note that this classification to the one used in previous sections, and so Herfindahl indexes are not comparable.

[22] Small exporters are defined as those firms which annually export less than 1 million dollar.

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