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Ayçil YÜCER

UMR DIAL 225
Place du Maréchal de Lattre de Tassigny 75775 • Paris Cedex 16 •Tél. (33) 01 44 05 45 42 • Fax (33) 01 44 05 45 45
• 4, rue d'Enghien • 75010 Paris • Tél. (33) 01 53 24 14 50 • Fax (33) 01 53 24 14 51
E-mail : dial@dial.prd.fr • Site : www.dial.prd.fr

BRAZILIAN STATES' DOMESTIC-FOREIGN EXPORT CAPACITIES AND MARKET ORIENTATIONS IN THE 1990s

Ayçil Yücer
LEDa, UMR DIAL-Université Paris-Dauphine
aycily@gmail.com

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Abstract:

We analyze the integration of Brazilian states into domestic and foreign markets from the point of view of their supply conditions. The study period takes in the country's fast liberalization process with its two sub-periods (1991 and 1997-99). We estimate the states' domestic and foreign market export capacities by a gravity model of trade in keeping with the work of Redding and Venables (2004a, 2004b). Results show that the states with better foreign export capacities are not necessarily the same as those that perform better on the domestic market, where domestic market trade is measured in terms of inter-state trade.

Key words: Trade Integration, Brazil, Gravity Model.

Résumé

On analyse l'intégration des états brésiliens au marché domestique et international du point de vue de leurs capacités d'offre dans les années d'ouverture commerciale. Les données disponibles permettent de caractériser l'évolution entre 1991 (la seule année disponible pour le début de période) et les années 1997-1998-1999. Notre modèle de gravité, inspiré de Redding et Venables (2004a, 2004b), estime séparément les capacités d'exportation des états vers le marché domestique et international. Les résultats montrent que les états les mieux classés en termes de capacités d'exportation vers le marché international ne sont pas les mêmes que les plus performants sur le marché domestique, c'est-à-dire dans le commerce entre les états brésiliens.

Mots Clés : Intégration commerciale, Brésil, modèle de gravité

JEL Code: F10, F15, R10, R12

I. Introduction

The weak, uneven integration of Brazilian regions into both the world markets and their own national territory is a policy concern for the national authorities, which have historically perceived integration into the domestic and foreign markets in turn as rivals to and complementary forces for economic development. In the 1990s, Brazil sharply reduced its tariffs (the WTO reports that average tariff rates decreased from 45.6 in 1989 to 13.7 in 2010) in order to become integrated into the world markets. However; the trade openness of Brazil measured as (Export+Import)/GDP remained relatively low compared to other BRIC countries and similar sized countries. In 2010, Brazil posted some 23.29% behind China (55.22%), Russia (51.74%) and India (46.31%)[1].

Domestic market integration was the prime target in 1950s and remained so even when the policy measures for greater openness picked up speed in the 1990s. There is clearly a negative impact of high transport costs given Brazil's huge size and forest cover along with country's limited capital endowments. Another hindrance is the decentralized structure of political power across the 27 federative states characterized by concurring market and fiscal policies within the territory. Afonso & de Mello (2002) and de Mello (2007) discuss the impact of the states' diversified fiscal measures to attract investment to their domestic markets and mention that the different application of ICMS - a value-added tax levied, regulated and administered by the states' federal authorities - across the states creates distortions and extra costs in the domestic business environment.

Nevertheless, international trade theories and the empirical literature assume and estimate intra-country trade as the level of trade in a frictionless world and use it as a reference for "perfect integration" in order to evaluate the country's foreign trade integration level. In this regard, McCallum (1995) found trade between Canadian provinces to be 22 times higher than trade between provinces and US states in 1988. He called this the *Border Effect.* Further research has confirmed this effect for countries other than the US (for China: Poncet, 2003; for Brazil: Paz & de Mello Franco Netto, 2003; and for OECD countries: Wei, 1996; Helliwell, 1997), even though recent theoretical and empirical

[1] Trade Visualizer, World Bank.

studies (Anderson & van Wincoop, 2003; Balistreri & Hillberry, 2007) point to a narrower gap between domestic and foreign trade values. In reality, specialization and other trade drivers come into play in both external trade and domestic "trade" due to spatial non-uniformities, since production factors such as land and labor are not perfectly mobile even at national level. Many empirical studies find the national markets to be fragmented. Wolf (1997, 2000) posits that spatial production process clusters in the US are responsible for the high border effect and that this border effect extends even to sub-national level. Helliwell (1997) finds for Canada that intra-province trade is 2.1 times higher than inter-province trade.

Furthermore, intra-national trade and trade with the world markets are interrelated. The domestic market is one of the “trade” destination options among other foreign destinations and trade linkages among local entities can be relatively more or less directed towards domestic or foreign markets. Poncet (2003) finds that the greater global integration of the Chinese provinces in international trade goes hand in hand with domestic market disintegration. However, supply side conditions are important determinants of domestic and foreign oriented trade, and these conditions are also the channels that explain the interrelation between domestic and foreign exports. More successful domestic market exporters probably have more of a chance of also exporting to the foreign market and vice versa due to their better production and export conditions. Yet two kinds of marginal forces can place states in a relatively better or worse position on one market compared to other states. First, “substitution forces” will prompt domestic agents to make a trade-off between domestic and foreign market oriented production. For a given production possibility frontier, they will allocate their resources to the market (domestic or foreign) that offers the better trade opportunities in terms of higher trade profits, easier access due to better infrastructure, more advantageous tax and/or tariff policies and/or high demand for goods in which the exporter is specialized, etc. Second, any improvement in the supply conditions for exports on a given market, domestic or foreign, may be preceded by “complementary forces” that more or less improve the supply conditions on both markets due to positive externalities. For example, infrastructure investments may be beneficial to different destination markets even though they are made for a single given market. Similarly, enhanced vertical production channels across industries may decrease production costs irrespective of their market orientation.

Brazilian regions are highly diversified in terms of their infrastructure levels and factor endowments, elements that are behind their different economic development levels and specializations. Milanovic (2005) finds that Brazil had the highest level of regional income inequalities of the world's five most highly populated countries (China, India, USA, Indonesia and Brazil) over the 1980-2000 period. The clustering of demand in large centers in the south-east and the relatively poor transport facilities in the north and north-eastern regions have created unequal trade opportunities and market access across the territory. Daumal & Zignago (2010) focus on the sub-national structure of trade by measuring the state-specific border effects in Brazil and find that intra-state trade was considerably greater than inter-state and international trade in 1991, 1997, 1998 and 1999.

The Brazilian states' "trade" integration into the domestic and foreign markets depends then on a state's supply side conditions for these two markets – its production structure (factor endowments, infrastructure, etc.) and its average trade costs for the domestic and foreign markets (geographic location, transport facilities, policy-related costs, etc.) – and on the demand side, not forgetting the role of the destination markets. In this paper, we aim to quantify and compare the Brazilian states' integration into the domestic and foreign markets independently of the demand conditions on the destination markets. In other words, we explain their integration based on their own performance and not that of their trading partners.

We estimate the states' *Supply Capacities* using a gravity model of trade, in keeping with the theoretical and empirical work by Redding and Venables (2004a, 2004b), dividing export performances into their demand and supply side. In our study, supply capacities indicate the relative integration level of the Brazilian states on the domestic and foreign markets (*Domestic* and *Foreign Supply Capacities*), after controlling for the impact of destination markets and bilateral geographic distances. We then use these estimated measurements of domestic and foreign supply capacities - which we refer to as *domestic* and *foreign export capacities* in the rest of the paper - to identify the states' relative market orientations and find out which states have different market orientations to the general pattern in Brazil. Our use of the term *Export* instead of *Supply* is a semantic choice since we prefer to accentuate the *impact on exports,* which can differ on the domestic and foreign markets, rather than the absolute nature of *supply conditions.*

The empirical and theoretical framework provided by Redding and Venables (2004a, 2004b) is used mostly in the economic geography literature to evaluate the impact of supplier and market access on wages measured as the distance-weighted sum of supply capacities for the former and market capacities for the latter[2]. Escobar (2010) uses a gravity model whose structure is again inspired by Redding and Venables (2004a, 2004b) to decompose the Mexican states' trade performances on the US market into their demand and supply side conditions, and compares the supply side determinants of their export performance differences. However, the use of supply capacities to understand the integration structure on the domestic market and in interaction with the foreign market is a first in the literature to our knowledge.

Our work is also interesting in terms of the data period of the 1990s. The rapid liberalization of Brazil in the 1990s may have had an impact on the market orientation of the states by intensifying specialization due to economies of scale and easier access to new markets. This impact could be especially large for certain states with more or less of a net switch to the domestic or foreign markets. The existence of this shock in the period of analysis increases the number of possible outliers, where a trade-off between domestic and foreign market oriented production is more likely to occur given that the production possibility frontier curve is rigid in the short term.

We proceed as follows; in the next section, we present the theoretical work inspired by Redding and Venables (2004a, 2004b). Section III presents the empirical model and the computation method for the domestic and foreign export capacities. In section IV, we present our results and compare the states in terms of their domestic and foreign export capacities. We also look at how they have changed over the two periods spanning four years for which our data are available (1991 for *Period 1*; and 1997-1998-

[2] Fally, Pillacar & Terra (2010) for Brazil; Knaap (2006) for the US and Hering & Poncet (2010) for the Chinese provinces show how wages differ at national level depending on access to market and supply centers.

1999 for *Period 2*). Section V focuses on the switch in states' market orientations in the 1990s and highlights those states whose orientation is different to the general trend in Brazil. Lastly, we summarize and conclude our results.

II. Theoretical Framework:

Redding and Venables (2004a, 2004b) use the Dixit-Stiglitz (1977) CES utility function under monopolistic competition to decompose bilateral exports into their demand and supply side conditions. The demand function calculated for each variety is then as follows[3];

$$x_{ij} = p_{ij}^{-\sigma} E_j G_j^{\sigma-1} \quad , \quad \sigma > 1 \qquad (i)$$

Where x_{ij} is j's demand for the good produced in *i*, E_j is *j*'s given total expenditure and σ is the elasticity of substitution between products. p_{ij} is the price of the good on market *j* and G_j is the price index in each country, which is an aggregate measure of individual prices multiplied by the number of varieties (n_i) produced in each *i* and exported to *j*.

$$G_j = \left(\sum_i^R n_i p_{ij}^{1-\sigma}\right)^{1/(1-\sigma)} \qquad (ii)$$

Thus, the value of total exports from *i* to *j* is

$$n_i p_i x_{ij} = n_i p_i^{1-\sigma} \left(t_i T_{ij} t_j\right)^{1-\sigma} E_j G_j^{\sigma-1} \qquad (iii)$$

Trade costs take the iceberg form and the market price in *j* is as follows,

$$p_{ij} = p_i t_i T_{ij} t_j \qquad (iv)$$

p_i is the production price and equal for all varieties produced in *i*, reflecting also the production technology of exporter *i* among its other production conditions. Iceberg trade costs include *ad valorem* cost factors (t_i and t_j) of getting the product to and from the border respectively in *i* and *j* and the cost of shipping T_{ij} . Redding and Venables (2004a, 2004b) consider the characteristics of *i* to be the

[3] Please see Redding and Venables (2004a, 2004b) for further details.

supply side conditions, calling them "supply capacity (s_i)", and the characteristics of j to be the demand side conditions, calling them "market capacity (m_j)".

$$; s_i \equiv n_i (p_i t_i)^{1-\sigma} \qquad m_j \equiv E_j \left(G_j / t_j\right)^{\sigma-1} \qquad \textit{(v; vi)}$$

Bilateral trade flows are therefore,

$$n_i p_i x_{ij} = s_i \left(T_{ij}\right)^{1-\sigma} m_j \qquad \textit{(vii)}$$

In the original work by Redding & Venables (2004a, 2004b), t_i and t_j are supply and market capacity elements and T_{ij} is the cost of transportation between borders. The authors use a gravity model of trade to estimate the parameters for the above bilateral trade equation (*vii*), in which transportation/shipping costs (T_{ij}) between borders are proxied by distance and contiguity. Therefore, the "iceberg" trade costs concern solely geographical determinants and the trade policy impacts, omitted from the theoretical model and empirical estimation, are assumed implicitly as the supply and market capacity elements.

III. Empirical Methods and Data:

The gravity model has become a workhorse in trade economics due to its great power in explaining bilateral trade flows and its well-developed foundation working under different theoretical underpinnings (Anderson, 1979; Deardorff, 1998; Eaton and Kortum, 2002; Anderson & van Wincoop, 2003). In line with the literature and Redding & Venables (2004a, 2004b), we also use a gravity model of trade in order to measure the Brazilian states' export capacities.[4]

Redding and Venables (2004b) use separate fixed dummies for the exporter and importer country in order to measure *supply capacities* and *market capacities*. These fixed effects estimate the impact of all, observable and unobservable, country specific characteristics such as economic size, infrastructure

[4] The use of the term "export capacities" instead of "supply capacities" is solely a semantic choice as discussed in the introduction. These capacities are measured empirically using a similar method to Redding and Venables (2004b).

and production structure, and internal trade cost elements such as internal geography conditions and transport facilities. They define the country's trade capacities with their different implications depending on whether the country is an importer or an exporter, or more precisely from the demand side or the supply side.

Their estimation model is as follows:

$$lnX_{ij} = \alpha_i + ln\ distance_{ij} + contiguity_{ij} + \ \alpha_j + u_{ij} \qquad \textbf{\textit{(Regression Eq. 0)}}$$

where X_{ij} is exports from i to j and α_i and α_j are dummy variables measuring the trade impact of exporter country *i*'s characteristics *(supply capacity* of *i)* and importer country j's characteristics (*market capacity* of *j*). u_{ij} is the error term.

In our study, we focus on the states' export patterns separately for domestic and foreign markets. We use a specific empirical structure, treating Brazilian states as if they were individual countries trading between each other and with other world countries. Hence, the domestic and foreign markets with their different trade conditions become possible destination choices for the exporter state where the heterogeneity of the states' characteristics responds relatively better or worse to the existing trade opportunities. For example, the industrial specialization of a Brazilian state may be more or less in line with the demand structure on the foreign markets than the domestic markets. In other words, the domestic and foreign market integration of the Brazilian states differs depending on the heterogeneity of their characteristics and the differences between the domestic and foreign destination markets.

To this end, we use real export values between 26 Brazilian states[5] and 118 countries. This gives us country exports to countries (118*117) and to states (118*26) along with Brazilian states' exports to other states (26*25) and to countries (26*118). Unfortunately, inter-state trade data are available only for 1991, 1997, 1998 and 1999, which we divide into two periods of analysis: 1991 for *Period 1* (early 1990s) and *Period 2* (late 1990s) from 1997 to 1999. Since we are concerned with the long-term

[5] Brazil today has 27 federal states, including Tocantins. However, Goias and Tocantins were part of the same administrative division through to 1989. Hence, we merge the two for a total of 26 states in our data.

equilibrium, export flows in *Period 2* are the average real exports of trade pair *ij* over three years (1997, 1998 and 1999). Therefore, the exporter dummy for *i* in our data structure can be either a state or a country and decomposed when the exporter is a Brazilian state in order to separately measure its domestic and foreign export capacities.

$$ln\, X_{ij} = \alpha_1 lnDist_{ij} + \alpha_2\, Contiguity_{ij} + \sum_{i\in coutries} \alpha_i + \sum_{i\in states} \alpha_i + \sum_{i\in states} \alpha_i{}^* + \sum_{j\in coutries} \alpha_j + \sum_{j\in states} \alpha_j + u_{ij}$$

(Regression Eq. 1)

We estimate *Regression Eq. 1* in cross-section for the two periods available (*Period 1* & *Period 2*). We introduce exporter fixed dummies for exporter countries *i* ($\alpha_i; i \in countries$) and states *i*. However, exporter fixed effects of states are decomposed by destination market for the foreign market ($\alpha_i; i \in states$) and the domestic market ($\alpha_i^*; i \in states$). X_{ij} is the real average export flow from country/state *i* to country/state *j*. $Dist_{ij}$ is the geodesic distance measured by the great-circle formula and $Contiguity_{ij}$ is a dummy variable taking the value 1 if the trade pair *ij* (state or country) shares a common border. Dummy α_i ($i \in countries$) takes the value 1 when the exporter is country *i* irrespective of the partner – state or another country – no need to decompose by destination since both partners are from international markets (e.g. Argentina-France or Argentina-São Paulo). Dummy $\alpha_i(i \in states)$ is equal to 1 when the exporter is a state *i* and the partner is a country (e.g. São Paulo-Argentina) and dummy $\alpha_i{}^*$ ($i \in states$) is equal to 1 when the exporter is a state *i* and the partner is another state. So the star exponent discerns inter-state trade (e.g. São Paulo-Rio de Janeiro). The importer fixed effects (α_j) of the countries ($j \in countries$) and states (α_j; $j \epsilon states$) control for the market conditions assumed to be equal for all trade partners (for all *i*), whether countries or states. Notice that Brazil does not come into the model as a single country, but through the trade of its 26 states.

Regression Eq. 1, in line with Redding and Venables (2004a, 2004b), measures the export capacities of states by exporter fixed effects, decomposed for the domestic and foreign markets. Empirically, the exporter fixed effects for the domestic market ($\alpha_i{}^*$; $i \in states$) will measure the impact of all the observable and unobservable characteristics of the Brazilian states on their exports to the domestic market. Likewise, the exporter fixed effects for the foreign market (α_i; $i \in states$) will measure the impact of all the observed and unobserved characteristics of the states on their exports to the foreign market. Therefore, the differences in the domestic and foreign export capacities of the Brazilian states are defined by their own characteristics, but their impact differs between the domestic and foreign markets.

We estimate *Regression Eq.1*, not in log-linear form, but in its multiplicative form using the PPML (*Poisson Pseudo Maximum of Likelihood*) estimator, which has been commonly used in the gravity literature since Santos Silva and Tenreyro (2006) put forward that estimating parameters by logarithmic transformation raises efficiency problems and increases inconsistency where the error terms are heteroscedastic, which is the case with gravity models. Known as *Jensen's inequality*, the expected value of the logarithm of a random variable depends on its mean, but also on its higher moments. Therefore, error terms are correlated with the model regressors since they are heteroscedastic. Second, the PPML estimator is a useful tool for dealing with zero trade values. The log-linearization returns zero trade values to missing data points, which can cause a bias in the estimation, especially when the zero trade outcomes are not randomly distributed. However, this estimator does not solve the heteroscedasticity problem itself, and Santos Silva and Tenreyro (2006) recommend estimating statistical inferences based on an Eicker-White robust covariance matrix.

The precise form of the stochastic model estimated with PPML is therefore as follows;

$$\mathrm{E}\left[X_{ij} \mid Dist_{ij},\ Contiguity_{ij}, \alpha_i, \alpha_i{}^*, \alpha_j\right] = exp\Big(\hat{\alpha}_1 lnDist_{ij} + \hat{\alpha}_2\ Contiguity_{ij} + \textstyle\sum_{i \in coutries} \hat{\alpha}_i + \sum_{i \in states} \hat{\alpha}_i + \sum_{i \in states}\ \alpha_i{}^* + \sum_{j \in coutries} \hat{\alpha}_j + \sum_{j \in states} \hat{\alpha}_j\Big)$$

(Regression Eq. 1 in stochastic form)

According to *Regression Eq. 1 in stochastic form,* the domestic and foreign export capacities of the states will be equal to the Naperian exponential of the exporter fixed effects. The model is estimated in cross-section separately for two periods.

Domestic Export Capacity of state *i* in *Period t;*

$$\widehat{XC}_{i \in st,t}{}^{*} = exp(\hat{\alpha}^{*}_{i,t}) \qquad where; \qquad i \in states$$

(1)

Foreign Export Capacity of state *i* in *Period t* ;

$$\widehat{XC}_{i \in st,t} = exp(\hat{\alpha}_{i,t}) \qquad where; \qquad i \in states$$

(2)

For comparison purposes, we also compute the *Export capacity* of country *i* in *Period t* for some countries:

$$\widehat{XC}_{i \in cty,t} = exp(\hat{\alpha}_{i,t}) \qquad where; \qquad i \in countries$$

(3)

As generally acknowledged in the gravity literature, the economic size of the partners (e.g. GDP) explains a large part of the bilateral trade and the export capacities are largely driven by the heterogeneity of their size. This impact is not individually regressed in *Regression Eq. 1.* It is captured by the exporter fixed effects along with the country/state's other unobservable characteristics. However, since size impact is the main determinant of exports, it dominates other state specific information explaining export side conditions. We also estimate the states' export capacities, controlled for size impact, to compare states. Nevertheless, in a cross-sectional gravity structure, fixed effects are collinear with size proxies, with any GDP, population or area, and it is not possible to estimate the size impact together with exporter fixed effects in a single model. Thus, we use a second stage regression in keeping with the existing empirical literature.[6]

In the second stage empirical model, we use real GDP values to measure economic size and we estimate the impact of size by regressing the *Export Capacities* ($\widehat{XC}_{i,t}$)[7] of the states and countries - these are already computed from the *Regression Eq. 1* estimates using ***(1)***, ***(2)*** and ***(3)*** - on the real exporter GDP values. *Regression Eq. 2* is estimated pooled for both periods (*Period 1* and *Period 2*) since the impact of size is assumed to be constant over time in keeping with trade theory[8]. The model is again estimated by the PPML estimator in its multiplicative form,

$$\widehat{XC}_{i,t} = e^{\hat{\delta}_0} e^{\hat{\delta}_1 lnGDP_{i,t}} e^{\hat{u}_{i,t}}$$

$$\mathrm{E}\left[\widehat{XC}_{i,t} \mid GDP_{i,t}\right] = exp\left(\hat{\delta}_0 + \hat{\delta}_1 lnGDP_{i,t}\right)$$

(Regression Eq. 2)

$lnGDP_{i,t}$ is the logarithm of exporter *i* (country or state) real GDP values. $\hat{\delta}_0$ is the coefficient of the constant term and $\hat{u}_{i,t}$ is the error term. The share unexplained by real GDP values gives us the export capacities controlled for size impact.

GDP-controlled *Domestic Export Capacity* of state *i* in *Period t*:

$$\widehat{XC}_{i,t}{}^{GDP\ controlled^*} = \frac{\widehat{XC}_{i,t}{}^*}{exp\left(\hat{\delta}_1 * lnGDP_{i,t}\right)} = exp(\hat{\alpha}^*_{i,t}) / \ exp(\hat{\delta}_1 * lnGDP_{i,t}) \quad \text{where; } i \in states$$

(1)

GDP-controlled *Foreign Export Capacity* of state *i* in *Period t*:

$$\widehat{XC}_{i,t}{}^{GDP\ controlled} = \frac{\widehat{XC}_{i,t}}{exp\left(\hat{\delta}_1 * lnGDP_{i,t}\right)} = exp(\hat{\alpha}_{i,t}) / \ exp(\hat{\delta}_1 * lnGDP_{i,t} \quad) \quad \text{where; } i \in states$$

[6] Head & Mayer (2000); Martinez-Zarzosa & Nowak-Lehmann (2003), Duc *et al.* (2008)
[7] Please note that $\widehat{XC}_{i,t}$ are predicted measures from *Regression Eq. 1*.
[8] They are also estimated separately. However, the results do not change a great deal over the two periods.

(2)

where $\hat{\delta}_1$ is the time-independent parameter of the real GDP impact and $\widehat{XC}_{i,t}{}^{*}$; $\widehat{XC}_{i,t}$ are the domestic and foreign export capacities of the states computed from the estimates of *Regression Eq. 1* and used as dependent variable values in *Regression Eq. 2*.

The Brazilian states' international trade flows are taken from *ALICEWEB*, which presents the export and import values of Brazilian states to and from each country. The export values of the 118 countries trading with one another are taken from the *Directory of Trade Statistics* (*DOTs*) published by the *International Monetary Fund*. Both sources concur and can be combined since they present similar total export volumes for all Brazilian trade with sample countries. Our empirical study also draws on Brazilian interstate export flows available for just four years: 1991, 1997, 1998 and 1999. The Brazilian authorities use the information from the *ICMS* tax accounts to measure interstate trade flows. The *ICMS* tax (*Imposto sobre Circulação de Mercadorias e Serviços*) is a type of value-added tax (VAT) collected by the exporting state. This information provided by the Brazilian Ministry of Finance is available in database form for 1997 (*Ministério de Fazenda*, 2000), 1998 and 1999 (Vasconcelos, 2001a, 2001b). The 1991 data come from *SEFAZ-PE* (1993), measured and extrapolated by the *Pernambuco Finance Ministry* on the basis of the 1987 interstate database. Unfortunately, the lack of data on recent time periods places limitations on the study.

The distance and contiguity variables are taken from *CEPII*'s Distances database. For the most part, the capital cities are the main unit of the distance measurements. However, the data occasionally also use the economic capital as the geographic center of the country. *The World Gazetteer* website furnishes the state capital's geographical coordinates, from which we have calculated the states' bilateral distances from one another and the other countries. The author has taken the information on state contiguity from the Brazilian map.

IV. Results:

Cross-section PPML estimates of the gravity model parameters from *Regression Eq. 1* are given in Table 1 for *Period 1* and *Period 2*. The results for the exporter fixed effects are presented only for Brazilian states in the main. However, readers can also find estimates for some landmark countries in the sample for information about the size of states' exporter fixed effects. In gravity models, the colinearity of the constant term with exporter and importer fixed effects is a well-known problem and the standard procedure is to drop one exporter and one importer fixed effect. However, since we are interested in precise measurements of exporter fixed effects, we have dropped one importer fixed effect and the constant term of the model instead. As mentioned in methodological section, the estimates of the exporter fixed effects are then used to compute domestic and foreign export capacities for the states.

Table 1 about here.

The estimated coefficients for $lnDist_{ij}$ and $Contiguity_{ij}$ do not change between periods and are concordant in size and sign with the literature. The coefficients of the states' exporter fixed effects for the domestic market ($\hat{\alpha}_i^*$; $i\epsilon states$) are higher than the states' exporter fixed effects for the foreign market ($\hat{\alpha}_i$; $i\epsilon states$) in both periods and for all states, reflecting the higher domestic market integration of states. This finding is in line with the *Border Effect* literature. On the other hand, the foreign export capacity estimates indicate that some states are even better off than many countries on the world markets (e.g. "Bottom Three Countries"). Only the state of São Paulo (SP) competes in its foreign export capacity with Argentina, which is the second leading member of MERCOSUR behind Brazil.

From *Period 1* to *Period 2*, we observe a decrease in the size of $\hat{\alpha}_{i,}^*$ for almost all the states. Nevertheless, the change is very small and does not yield a clear result on the evolution of states' domestic export capacities. The evolution of foreign export capacity (computed from $\hat{\alpha}_i$; $i\epsilon states$)

varies across the states and it is positive for some of them (Amazonas (AM), Goiás (GO), Mato Grosso (MT), Mato Grosso do Sul (MS), Paraná (PR), Rondônia (RO), Roraima (RR), and Santa Catarina (SC)) albeit slightly (except for Roraima).

However, the states' export capacities estimated by the exporter fixed effects in *Regression Eq. 1* are largely driven by their size and the results are almost mechanical. Change in export capacities from *Period 1* to *Period 2* is also highly dependent on the growth in states' sizes. Therefore, in the next step we control for a size impact on trade and concentrate on the states' GDP-controlled domestic and foreign export capacities. The second stage estimates (*Regression Eq. 2*) are used to control for GDP impact. Table 2 gives the results of the second stage estimation.

Table 2 about here.

As discussed above in the empirical methods, we compute export capacities not controlled for GDP calculated as the Naperian exponential of the exporter fixed effects in the gravity model (*Regression Eq. 1*) and GDP-controlled capacities as the GDP-uncontrolled values divided by the GDP impact estimated in *Regression Eq. 2* (0.566**lnGDPi*). In Table 3, the rankings and values of states' GDP-controlled and uncontrolled domestic and foreign export capacities are presented[9]. They are given for both periods and by Brazilian regions. The five regions of Brazil in the table are defined by the Instituto Brasileiro de Geografia e Estatística (IBGE) regional nomenclature. The IBGE endeavors to class the states with similar cultural, economic, historical and social characteristics in the same region as long as they are geographically clustered. Since there is a relative uniformity of characteristics across the states within the same region and they have easier access to each other's infrastructure and

[9] The export capacity values are entered as multiplication in the bilateral trade equation where export from *i* to *j* (Xij) is measured in real dollar terms. More specifically,

$$\hat{X}ij = \widehat{XC}i^{GDP\ uncontrolled}.Distij^{\hat{\alpha}_1}contiguity^{\hat{\alpha}_2}e^{\hat{\alpha}_j}$$

or equally,

$$\hat{X}ij = \widehat{XC}i^{GDP\ controlled}.gdp_i^{0.566}.Distij^{\hat{\alpha}_1}contiguity^{\hat{\alpha}_2}e^{\hat{\alpha}_j}$$

transport facilities due to geographic proximity, we can expect them to have similar product specializations and market orientations. Therefore, states acting dissimilarly in their region are of particular interest.

After controlling for GDP impact, the export capacity values fall sharply as exporter GDP explains a large share of the exports and hence their export capacities. The rankings constructed from the values of GDP-controlled export capacities, however, place the large states down a couple of ranks and upgrade the small states. The Rio de Janeiro (RJ)'s ranking changes considerably after controlling for size impact, suggesting that the high export capacities of Rio de Janeiro (RJ) on both markets are driven mostly by its large size. However, the change after controlling for GDP impact is not systematically the same (decreasing or increasing) for domestic and foreign export capacities; for example, Amazonas' ranking by domestic export capacity is higher after controlling for GDP, while its ranking by foreign export capacity becomes lower.

Table 3 about here.

Table 3 shows that the states in the South and South-East regions have relatively higher export capacities on both markets even after controlling for their size. This is not surprising given that their better infrastructure and good transport facilities give them access to large domestic markets and the international markets. On closer inspection, the south-eastern states are found to be individually better integrated into the domestic market compared to the southern states. However, the overall rankings of the two regions as defined by their average export capacities are close, since they are driven mostly by the high performance of São Paulo (SP).

The average domestic export capacity of the Northern region is higher than the North-East region over the period. Note, however, that this result is due mainly to the very high and surprising domestic export capacity of the state of Amazonas (AM). The high foreign export performance of the state of Pará (PA) in the Northern region is also considerable. Pará (PA) is a state specialized mostly in exports of primary products[10]. It also has an advantageous location at the mouth of the Amazon river (AM) with a large port (Port of Belém) giving direct access to international markets by sea. Yet these different results for the states of the Northern region may be due to the special tax regulations for the Free Trade Zone of Manaus (*FTZM*) implemented in the state of Amazonas (AM) to encourage exports to the domestic market[11]. It is possible that some goods produced in part in Amazonas may be re-exported to international markets after being transformed in part or finished in Pará (PA). However, further work is called for to trace the industrial linkages and production chains between these two states.

Table 4 about here.

In Table 4, we analyze the growth in states' export capacities from *Period 1* to *Period 2* based on the percentage changes in the states' export capacities and real average GDPs. Export capacities on both markets fell in general from *Period 1* to *Period 2*, despite positive GDP growth, and the downturn was sharper for GDP-controlled export capacities. At first glance, this result appears to contradict the increase in the total domestic and foreign export performances of the states over the period. However, these better performances appear to be driven mostly by increasing demand on the destination markets. Apparently, the positive GDP growth rates increased the states' market capacities and the same holds true for the international markets where world GDP also rose over the period.[12]

Yet exceptions exist, especially for the Center-West states whose foreign export capacities rose. During the period, the Center-West region specialized more in agricultural goods exported mainly to foreign markets (e.g. soya beans to China). Mato Grosso (MT) and Amazonas (AM) were the leading

[10] The ALICEWEB statistics calculate the exports of Pará (PA) in *Iron ores and concentrates, not agglomerated* at approximately 34% of its total exports in 1998 and the percentage share of *Aluminum not alloyed, unwrought* in the state's exports at 20%.

[11] Free Trade Zone of Manaus (*FTZM*) provides tax incentives for exports to the domestic market. Producers in the zone are exempt from the Imposto sobre Productos Industrializados (*IPI*) – a federal excise tax applying to manufactured goods – provided they sell their products to the domestic market.

[12] Redding and Venables (2004a, 2004b) found in their work that overall supply (export) capacity of Brazil decreased of 6.65% from the period 1982/85 to 1994/97 without controlling for the positive impact of GDP growth. Our estimate for Brazil calculated as $\widehat{XC}_{BRZ,t} = \sum_{i \in states} \widehat{XC}_{i,t}$ shows from 1991 to 1997/99 Brazilian overall foreign export capacity decreased of 4,7% which is in coherence with their findings.

states, followed by Mato Grosso do Sul (MS) and Paraná (PR), which also posted a considerable increase in their foreign export capacities[13]. These results can also be checked from their relatively higher ranks in *Period 2* presented in Table 3.

This evolution may be explained in part by Brazil's economic instability in the 1990s, which had a negative impact on the states' export capacities on both markets. Also of note are two main policy shocks in the Brazilian economy, which may imply different consequences depending on the destination market. The first shock concerned the change in Brazil's monetary policy in the mid-1990s. In 1994, Brazil introduced the *Plano Real* (Real Plan) and pegged the Brazilian real to the U.S. dollar in order to curb inflation, which was a great concern in early 1990s. The transition phase provoked the over-appreciation of Brazilian real and a loss in the competitiveness of Brazilian goods on the international markets. In January 1999, the Brazilian real was devaluated by 66% against the US dollar. The second shock involved Brazil's trade policy change in the 1990s. In 1991, Brazil started gradually decreasing its international and regional tariffs following the creation of MERCOSUR between Brazil, Argentina, Uruguay and Paraguay in March 1991. The fiercer competition faced by the Brazilian states on the domestic market could have reduced their capacity to export to the domestic market. Trade policy liberalization could also have pushed some states more in the direction of the foreign markets, which is indeed the case for some Brazilian states during the period.

We have seen from the gravity results that the states' domestic export capacities are considerably higher than their foreign export capacities. However, the extent of this relatively higher integration into the domestic market is not necessarily uniform across all the states. In the next section, we set out to identify the relative market orientations of the states and the linkages between their domestic and foreign export capacities in the 1990s. To this end, we will concentrate on the states' GDP-controlled domestic and foreign export capacities as estimated by PPML.

[13] However, the foreign export capacity of Roraima (RR) shot up in percentage terms over the period due to its initially very weak export performance. Roraima's total exports to the foreign market came to *$23,705* (0.00007% of the Brazilian states' total foreign exports) in 1991. Hence a small random increase in its export values prompts a large percentage change.

V. Market Orientation of the States and Domestic-Foreign Export Capacity Linkages

In the real world, exporters face the choice of exporting to different markets, domestic and/or foreign. Better exporters to the domestic market probably have a greater chance of also exporting to the foreign market due to their better supply side conditions. However, marginal differences can be found in the states' relative market orientations depending on the linkages between their domestic and foreign export capacities. In view of the production possibility frontier, a trade-off (substitution effect) may be made between resources allocated to production for the domestic and for the foreign markets. Yet positive externalities and vertical production channels between production industries targeting the domestic and foreign markets can also work as complementary forces and strengthen the positive relationship between domestic and foreign export capacities. These forces in play hence form the source of differences in the states' relative market orientations and define their trade patterns.

Figure 1 shows the Brazilian states' domestic-to-foreign market integration levels, measured in terms of their relative export capacities. These are also presented by region, since infrastructure advantages such as transport facilities make states of the same region more accessible and a relative uniformity of characteristics is found within Brazilian regions, as discussed above. The statistical indicator used is the ratio of domestic-to-foreign export capacities[14]. Our cross-state comparison points up the states' relative market orientations and how they change from *Period 1* to *Period 2*. However, our indicator is measured in natural logarithm form since the export capacity explanatory factors interact multiplicatively in the theoretical equation, which leads to more variation for the large values. The logarithmic scale reduces the differences between domestic and foreign export capacities for the states whose ratios are larger by squeezing them together and stretching them out in the inverse case.

[14] Note that the domestic-foreign ratio of GDP-controlled export capacities is similar to the GDP-uncontrolled figure. This is not surprising, since the denominator ($\exp(\widehat{\alpha}_1 * \ln GDP_i)$) is equal for both market destinations computed by the GDP of state *i*.

Figure 1 about here.

In Figure 1, the domestic-to-foreign integration levels for all the states are greater than 2 in log natural form. This means that the domestic export capacities of the states are at least 7 times higher than their foreign export capacities. Hence, as expected, the states are better integrated into the domestic market. More striking than the extent of ratios (approximately from 2 to 8 in log natural form, even after ignoring the high value for Roraima -RR) is that the market orientations differ considerably across the states. Figure 1 also shows that the South and South-East regions' export capacities are more balanced between domestic and foreign markets than the other three regions. These two regions are where Brazil's large rich states are located. So they may well respond to different markets with a wider range of products and varieties supported by better infrastructures that help them to access even remote world markets.

The change in ratios from *Period 1* to *Period 2* is almost always towards the foreign markets, except in the case of Acre (AC), which is a very isolated state in the north of Brazil. This suggests that Brazil's liberalization policies in the 1990s succeeded in improving the states' integration into the world markets, even though their foreign export capacities generally decreased in absolute terms as discussed in the previous section. This swing towards the foreign markets is largest for the Center-West states of Mato Grosso (MT) and Mato Grosso do Sul (MS). These states are followed by Paraná (PR) in the South-East and the state of Amazonas (AM). Amazonas' swing towards the foreign markets is especially remarkable, coming as it does in a period of tax incentives for domestic market production.

In the next step, we trace the dominant pattern of domestic-to-foreign export capacities in Brazil by looking at their log-linear relation for 26 states. We use GDP-controlled export capacities, which we believe to provide a better measurement of integration into both markets.[15] This is expected to be positive, since the states' supply side conditions will generally define their capacity to export to both destinations. The possible outliers are states whose market orientations are significantly different to the average pattern, as discussed above, driven by complementary or substitution forces. We proceed with the same analysis for both data periods (*Period 1* and *Period 2*) to see how the general pattern of these linkages and the outliers changes over time. Rapid liberalization during the period may have prompted the states to become more specialized due to economies of scale and the possibility of low-cost imports from world markets in the case of expensive local production. This would have stepped up the substitution between domestic and foreign market oriented production. However, export capacities could have grown on both markets due to increased market efficiency, positive externalities and better infrastructure.

Graph 1 about here.

Graph 1 shows the fitted regression line for the states' foreign export capacities over their domestic export capacities for *Period 1* with the relevant confidence intervals. The equation coefficient is significantly different from zero and positive. Thus, states with good domestic market export capacities also have good foreign market capacities and vice versa. Confidence intervals indicate outliers with relatively more of a domestic or foreign market orientation compared to the average pattern in Brazil. The export capacities of Maranhão (MA), Pará (PA), Espírito Santo (ES), Minas Gerais (MG) and Amapá (AP) are significantly greater than expected for their given domestic export capacities and lower for Amazonas (AM), Sergipe (SE), Distrito Federal (DF) and Roraima (RR).

[15] The results for GDP-uncontrolled export capacities are also available from the author. Aside from the greater explanatory power of the model for GDP-uncontrolled export capacities, the results are consistent with the GDP-controlled results presented in the paper.

The existence of rich natural resources appears to determine those states with a foreign market orientation. Maranhão (MA) and Pará (PA) are Brazil's leading raw aluminum exporter states for the period. However, Espírito Santo (ES) has a more diversified specialization structure; iron and steel products, chemistry, coffee, etc. The Port of Vitória – the largest port in the state – provides access to international markets, but is also well-connected with the rest of the country. Hence, there appears to be a trade-off between the foreign market-oriented and domestic market-oriented industries, possibly driven in part by rich natural resources. Amapá (AP) posts very poor domestic export capacities, whereas its 1991 exports were almost exclusively industrial with approximately 70% in manganese minerals.[16] The Port of Macapá in Amapá (AP) is also an important port for the state's access to international markets and the other Northern region states. Minas Gerais (MG) also has large iron reserves and produces a large amount of iron ore.

Conversely, Amazonas (AM), Distrito Federal (DF), Sergipe (SE) and Acre (AC) are more domestic market oriented. Distrito Federal (DF) is an artificially planned state built in 1960 as the country's capital. Its economy is driven mostly by the service sector meeting the demand of the local population employed in administrative and bureaucratic institutions. The domestic market orientation of Amazonas (AM) can be explained by the existence of the Manaus FTZ, as mentioned above. In Sergipe (SE), a trade-off between domestic and foreign market destination production seems to be at work. The large domestic-to-foreign export capacity ratios of Roraima (RR) and Acre (AC) may be due to the fact that their weak economies form a greater hindrance to their entering the international markets than the domestic market.

In *Graph 2*, we trace the log-linear relation of foreign-to-domestic export capacities for *Period 2*. The coefficient of the model is decreasing: states' foreign export capacities in *Period 2* increase by 1.01% as opposed to 1.18% in *Period 1*, with an increase of 1% in their domestic export capacities. The flattening in the slope of the line reveals that the growing foreign market orientation during the liberalization period, as discussed above in Figure 1, was not uniform across the states. States' foreign

[16] The precise name of the product in the Brazilian Merchandise Nomenclature (NBM) is "QQ.OUT.MINERIO DE MANGANES,N/AGLOMERADO,E CONCENTRADOS".

export capacities converged to each other. The more domestic market-oriented the states in *Period 1,* the more foreign market oriented they became in *Period 2*.

Graph 2 about here.

In *Period 2* , as opposed to *Period 1*, we observe that Mato Grosso (MT) and Paraná (PR) states are new outliers with significantly higher foreign export capacities to domestic export capacities than they should have compared to the Brazilian average. In other words, they are significantly more foreign market oriented than other states. This result points up that the higher foreign export capacity of Mato Grosso (MT) in *Period 2,* driven by the change in product specialization, also prompted a significant change in its market orientation with a re-specialization in foreign market-oriented products substituting for the domestic market products. Paraná (PR) is an important agricultural state, but it also boasts diversified industrial production ranging from computers to cosmetics and especially car manufacturing. Thus, the foreign export capacity of Paraná (PR) appears to have benefited from the new trade opportunities created by the Brazilian liberalization process, while its domestic market export capacity appears not to.

VI. Conclusion:

After controlling for demand side conditions in keeping with Redding and Venables (2004a, 2004b), we measured the integration of Brazilian states into the domestic and foreign markets. Our domestic foreign export capacity measurements were estimated by a gravity frame for the two periods concerned by the trade data available spanning four years (1991 for *Period 1,* and 1997-1998-1999 for *Period 2*). We also controlled for GDP impact using a second-stage regression, which otherwise dominates the states' trade pattern. All regressions, first and second stage, were estimated by the PPML estimator inspired by Santos Silva and Tenreyro (2006).

First, we used export capacities to define the states and regions of Brazil with relatively better domestic and/or foreign market integration. The Southern and South-Eastern regions are relatively more integrated into both markets compared to other regions. However, the South-Eastern states are individually more integrated into the domestic market compared to the Southern states, with the exception of the high performance of São Paulo (SP). In the Northern region, Amazonas (AM) has strikingly high domestic export capacities while Pará (PA) performs better on the foreign market compared to other states in the region. From Period 2 to Period 1, the states' export capacities to domestic markets decreased as did, on the whole, their export capacities to foreign markets. However, the Brazilian states' trade performances actually rose in the 1990s. This happened because the decrease in the states' export capacities was offset by growth in the destinations' market capacities. Yet there were exceptional states whose foreign export capacities increased such as Mato Grosso (MT), Amazonas (AM), Mato Grosso do Sul (MS) and Paraná (PR).

In the next step, we looked at the states' market orientation measured by the domestic-foreign export capacity ratios. These fell for almost all the states in *Period* 2, pointing up that Brazil's liberalization policy drove increased foreign market orientation. However, a comparison between the states found relative differences between state orientations. The log-linear relation between the states' GDP-controlled domestic and foreign export capacities identified the states whose market orientation differs compared to the general pattern in Brazil. Namely, the states of Amapá (AP), Maranhão (MA), Pará (PA) and Espírito Santo(ES) are more foreign market oriented than the Brazilian state average, while Distrito Federal (DF), Amazonas (AM) and Sergipe (SE) are more domestic market oriented. We endeavored to identify plausible reasons for these different market orientations and found that states with rich natural resources are mostly foreign market oriented. In *Period 2*, Mato Grosso (MT) also became an outlier in terms of a shift in its specialization patterns towards products mostly exported to foreign markets.

Although the integration of countries into the world markets is largely discussed in the empirical and theoretical literature, there is relatively less work done on the internal integration of national markets. Brazil's high domestic market fragmentation and the period of available data, which coincide with the country's liberalization process, make for interesting insights on this issue. Our study takes a new approach by analyzing Brazil's domestic integration with a more detailed decomposition for each sub-national unit (states and regions) and in interaction with foreign market integration. Our measurement controls for demand side conditions. It hence compares the integration of states exclusively in terms of their own production and export conditions.

Future work could define which of the states' characteristics, in empirical terms, determine their relative domestic and foreign market performances. The strikingly high domestic market orientation of the state of Amazonas (AM) is also an ambitious focus for further work. The state's production is encouraged by the Free Trade Zone of Manaus (*FTZM*) tax incentives to export to the domestic market. Yet a look at the state's industrial linkages and production chains turns up that some goods produced in Amazonas may be re-exported to international markets after being transformed in part or finished in other states of the region or in the rest of Brazil.

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Tables, Figures and Graphs:

Table 1: PPML estimates of exporter fixed effects and gravity equation parameters (*Regression Eq. 1*)

Dependent Variable: X_{ij}	*Period 1* (1991)			*Period 2* (1997-1999)		
	$i \in states$		$i \in countries$	$i \in states$		$i \in countries$
	$\hat{\alpha}_i$	$\hat{\alpha}_i^*$	$\hat{\alpha}_i$	$\hat{\alpha}_i$	$\hat{\alpha}_i^*$	$\hat{\alpha}_i$
Brazilian States:						
Acre (AC)	13.673***	20.21***		12.075***	20.561***	
	(0.517)	(0.508)		(0.497)	(0.646)	
Alagoas (AL)	18.483***	22.379***		17.63***	21.078***	
	(0.481)	(0.446)		(0.351)	(0.320)	
Amazonas (AM)	17.503***	24.71***		17.996***	24.395***	
	(0.459)	(0.673)		(0.484)	(0.487)	
Amapá (AP)	16.762***	19.597***		16.413***	18.821***	
	(0.539)	(0.518)		(0.562)	(0.421)	
Bahia (BA)	20.04***	23.791***		19.839***	23.376***	
	(0. 455)	(0.572)		(0.372)	(0.375)	
Ceará (CE)	18.475***	23.461***		18.291***	23.025***	
	(0.484)	(0.417)		(0.389)	(0.311)	
Distrito Federal (DF)	14.356***	22.107***		13.776***	21.11***	
	(0.686)	(0. 493)		(0.763)	(0.392)	
Espírito Santo (ES)	20.333***	23.407***		20.219***	22.985***	
	(0.445)	(0. 404)		(0.333)	(0.297)	
Goiás (GO)	18.24***	23.192***		18.456***	22.946***	
	(0.587)	(0.456)		(0.544)	(0.293)	
Maranhão (MA)	18.95***	22.048***		18.771***	21.356***	
	(0.686)	(0.437)		(0.476)	(0.312)	
Minas Gerais (MG)	21.358***	24.678***		21.311***	24.186***	
	(0.467)	(0.432)		(0.381)	(0.329)	
Mato Grosso do Sul (MS)	17.563***	22.713***		18.011***	22.087***	
	(0.61)	(0.478)		(0.528)	(0.340)	
Mato Grosso (MT)	18.227***	23.306***		19.077***	22.136***	
	(0.611)	(0.566)		(0.623)	(0.334)	
Pará (PA)	20.117***	22.579***		19.936***	22.07***	
	(0.556)	(0.434)		(0.452)	(0.317)	
Paraíba (PB)	16.909***	21.929***		16.583***	21.672***	
	(0.538)	(0.418)		(0.369)	(0.332)	
Pernambuco (PE)	18.661***	23.978***		17.981***	23.168***	
	(0.474)	(0.417)		(0.386)	(0.318)	
Piauí (PI)	16.524***	20.477***		16.414***	20.407***	
	(0.509)	(0.441)		(0.366)	(0.357)	
Paraná (PR)	20.375***	24.563***		20.718***	23.597***	
	(0.508)	(0.559)		(0.435)	(0.423)	
Río de Janeiro (RJ)	20.339***	24.63***		19.874***	23.502***	
	(0.456)	(0.464)		(0.360)	(0.368)	
Rio Grande do Norte (RN)	17.256***	21.877***		17.068***	21.6***	
	(0.478)	(0.447)		(0.376)	(0.334)	
Rondônia (RO)	15.88***	21.536***		16.073***	21.468***	
	(0. 488)	(0.466)		(0.363)	(0.362)	
Roraima (RR)	8.982***	20.474***		13.006***	20.086***	
	(1.105)	(0.558)		(0.831)	(0.353)	
Rio Grande do Sul (RS)	21.05***	24.764***		21.025***	24.512***	
	(0.434)	(0.419)		(0.327)	(0.294)	
Santa Catarina (SC)	20.293***	24.345***		20.328***	23.808***	
	(0.454)	(0.416)		(0.342)	(0.296)	
Sergipe (SE)	16.157***	22.953***		15.871***	22.604***	
	(0.845)	(0.461)		(0.588)	(0.442)	
São Paulo (SP)	22.289***	26.334***		22.236***	26.094***	
	(0.435)	(0.415)		(0.398)	(0.296)	

Top Five Countries[a]:				
United States (USA)	-	25.739*** (0.418)	-	25.773*** (0.316)
Japan (JPN)	-	25.504*** (0.439)	-	25.262*** (0.336)
Germany (DEU)	-	24.571*** (0.431)	-	24.4*** (0.332)
Hong Kong (HKG)	-	24.149*** (0.464)	-	24.256*** (0.350)
China (CHN)	-	23.684*** (0.468)	-	24.206*** (0.318)
Bottom Three Countries[a]:				
Sierra Leone (SLE)	-	17.451*** (0.507)	-	13.622*** (0.520)
Comoros (COM)	-	16.407*** (0.621)	-	14.543*** (0.585)
Cape Verde (CPV)	-	14.29*** (0.785)	-	14.765*** (0.933)
MERCOSUR Countries:				
Argentina (ARG)	-	22.307*** (0.470)	-	22.5*** (0.399)
Uruguay (URY)	-	20.246*** (0.475)	-	20.126*** (0.397)
Paraguay (PRY)	-	19.538*** (0.530)	-	19.445*** (0.481)
Constant	*No Constant*		*No Constant*	
ln(Dist)ij	-0.706*** (0.034)		-0.723*** (0.029)	
(Contiguity)ij	0 .662*** (0.136)		0.722*** (0.109)	
Estimator	PPML		PPML	
Importer Fixed Effects	*Yes*		*Yes*	
Number of Observations	19379		19379	

[a] The rankings of the sample countries are determined by the value of their exporter fixed effects estimated for *Period 2*.
The constant term and importer fixed effect for Zimbabwe have been dropped due to colinearity issues. The robust standard errors are in parentheses: all inferences are based on a Huber-White sandwich estimate of variance. *** Significant at 1%.

Table 2: Estimates of GDP impact from *Regression Eq. 2*

Dependent Variable[a]: $\widehat{XC}_{i,t}$	**PPML**
constant	8.729*** (0.854)
lngdpi	0.566*** (0.854)
Observations	340
Pseudo-R2	0.4904

[a] $\widehat{XC}_{i,t}$ is the export capacities of the states and countries. They are computed as the Naperian exponential of exporter fixed effects estimated by *Regression Eq. 1* in Table 1.
*** Significant at 1%. The robust standard errors are in parentheses: all inferences are based on a Huber-White sandwich estimate of variance.

Table 3: States' Domestic and Foreign Export Capacities by Brazilian Regions

	GDP Uncontrolled Export Capacities ($XCi^{GDP\ uncontrolled}$ & $XCi^{GDP\ uncontrolled^*}$)				GDP Controlled Export Capacities ($XCi^{GDP\ controlled}$ & $XCi^{GDP\ controlled^*}$)			
	Period 1		*Period 2*		*Period 1*		*Period 2*	
A								

States by Region	*Domestic Export Capacities*	*Rank*	*Domestic Export Capacities*	*Rank*	*Domestic Export Capacities*	*Rank*	*Domestic Export Capacities*	*Rank*
Region Average NORTH[a]	10714231263	3	7800440817	3	29278	3	17484	3
Acre (AC)	598639417	25	850266170	23	6096	24	6266	20
Amazonas (AM)	53932009130	3	39323573083	3	130933	1	76462	1
Amapá (AP)	324270953	26	149249506	26	2979	26	1055	26
Pará (PA)	6396264596	16	3844733013	16	13944	17	7324	18
Rondônia (RO)	2254783959	22	2106050017	19	12000	19	8038	16
Roraima (RR)	779419524	24	528773113	25	9716	22	5763	21
Region Average NORTH-EAST[a]	9829811656	4	5699769203	4	23761	5	11264	4
Alagoas (AL)	5239751969	17	1426143807	22	20727	16	4625	23
Bahia (BA)	21498521451	9	14189952774	8	30295	13	16059	11
Ceará (CE)	15454251802	10	9996191426	10	35786	12	17220	8
Maranhão (MA)	3759793979	19	1883579890	20	13785	18	5427	22
Paraíba (PB)	3338274855	20	2583084334	17	11973	20	7529	17
Pernambuco (PE)	25926462443	8	11529214013	9	46358	7	16918	9
Piauí (PI)	781644038	23	728814646	24	3980	25	2827	24
Rio Grande do Norte (RN)	3170071564	21	2402558384	18	11860	21	7199	19
Sergipe (SE)	9299532807	14	6558383553	13	39088	10	23572	5
Region Average CENTER-WEST[a]	9087301352	5	4681193719	5	25772	4	9398	5
Distrito Federal (DF)	3989413242	18	1472606799	21	8087	23	2277	25
Mato Grosso (MT)	13239756552	12	4107457250	14	45460	8	10015	14
Mato Grosso do Sul (MS)	7314905846	15	3909400991	15	24014	15	9572	15
Goiás (GO)	11805129767	13	9235309834	12	25529	14	15728	12
Region Average SOUTH[a]	97466134198	1	68153005444	1	60257	1	30909	1
Espírito Santo (ES)	14635559696	11	9601642360	11	35868	11	17220	7
Minas Gerais (MG)	52204785298	4	31914937585	4	47507	6	22493	6
Río de Janeiro (RJ)	49725812429	5	16094122819	7	39181	9	10501	13
São Paulo (SP)	273298379368	1	215001319013	1	118473	2	73425	2
Region Average SOUTH-EAST[a]	46929904158	2	27922018766	2	57966	2	26285	2
Paraná (PR)	46538697139	6	17699814566	6	55674	5	16219	10
Santa Catarina (SC)	37396015565	7	21864059348	5	60054	3	27147	4
Rio Grande do Sul (RS)	56854999771	2	44202182383	2	58172	4	35491	3

B								
States by Region	*Foreign Export Capacities*	*Rank*	*Foreign Export Capacities*	*Rank*	*Foreign Export Capacities*	*Rank*	*Foreign Export Capacities*	*Rank*
Region Average NORTH[a]	102152947	4	90677231	4	251	4	188	4
Acre (AC)	867282	25	175517	26	8,83	24	1,29	26
Amazonas (AM)	39955624	17	65391968	15	97,00	20	127,15	16
Amapá (AP)	19039951	20	13428099	21	174,92	16	94,89	17
Pará (PA)	545165513	8	455064625	7	1188,47	5	866,87	6
Rondônia (RO)	7881352	23	9558200	22	41,94	23	36,48	22
Roraima (RR)	7962	26	444978	25	0,10	25	4,85	24
Region Average NORTH-EAST[a]	121440608	3	90622244	5	282	3	163	5
Alagoas (AL)	106489825	12	45346339	17	421,25	11	147,06	15
Bahia (BA)	505141931	9	412996634	9	711,83	8	467,40	9
Ceará (CE)	105590609	13	87852515	13	244,50	13	151,34	14
Maranhão (MA)	169854034	10	141922260	11	622,74	9	408,88	10
Paraíba (PB)	22058311	19	15924829	19	79,12	21	46,42	21
Pernambuco (PE)	127225289	11	64448692	16	227,48	14	94,57	18
Piauí (PI)	15010492	21	13446777	20	76,42	21	52,17	20
Rio Grande do Norte (RN)	31196922	18	25852038	18	116,72	19	77,47	19
Sergipe (SE)	10398062	22	7810113	23	43,71	22	28,07	23
Region Average CENTER-WEST[a]	52502875	5	90917535	3	151	5	202	3
Distrito Federal (DF)	1716744	24	961346	24	3,48	26	1,49	25
Goiás (GO)	83476023	14	103561894	12	180,52	15	176,36	12
Mato Grosso (MT)	82396210	15	192760684	10	282,92	12	469,98	8
Mato Grosso do Sul (MS)	42422524	16	66386216	14	139,27	17	162,54	13
Region Average SOUTH[a]	2007950486	1	1842678735	1	1496	1	1045	1
Espírito Santo (ES)	676883680	6	604057530	6	1658,86	3	1083,33	4
Minas Gerais (MG)	1885954697	2	1799383602	2	1716,23	2	1268,18	2
Río de Janeiro (RJ)	681004860	5	427831507	8	536,59	10	279,14	11
São Paulo (SP)	4787958705	1	4539442300	1	2075,56	1	1550,27	1
Region Average SOUTH-EAST[a]	914364089	2	1006731906	2	1102	2	944	2
Paraná (PR)	706108877	4	995046472	4	844,71	7	911,81	5
Rio Grande do Sul (RS)	1386321953	3	1351877224	3	1418,44	4	1085,47	3
Santa Catarina (SC)	650661438	7	673272023	5	1044,90	6	835,97	7

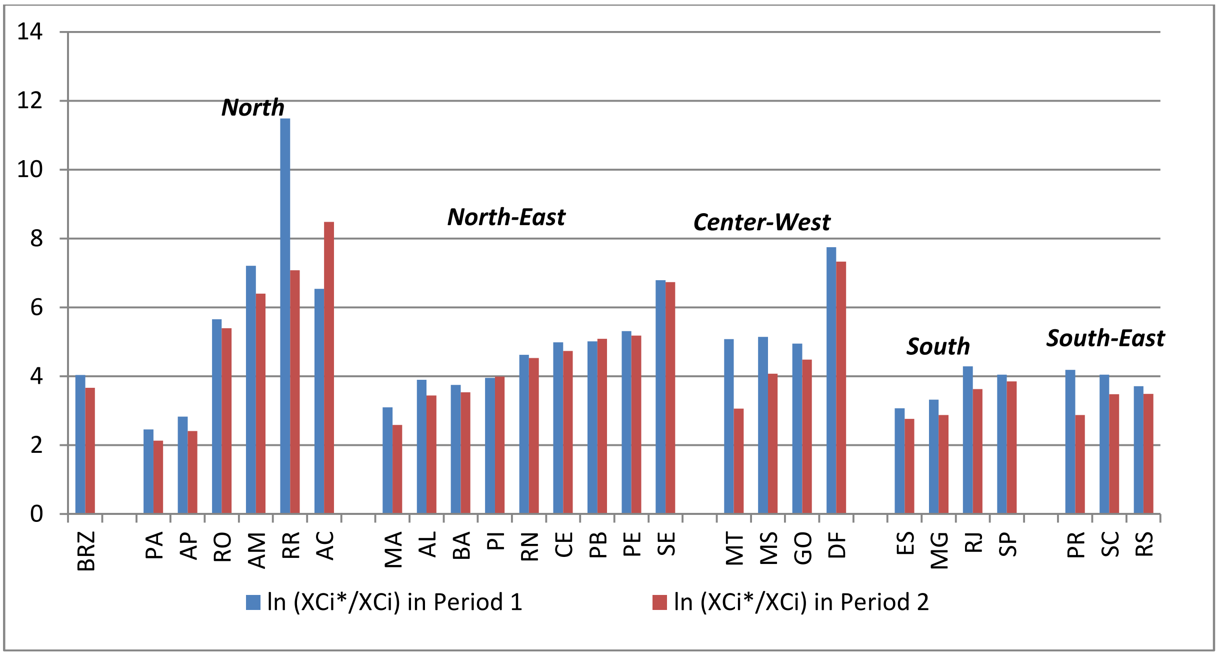
[a] The region average is calculated as the arithmetic mean of the export capacities of the states in that region.

Table 4: Growth in States' Domestic and Foreign Export Capacities (% change from *Period 1* to *Period 2*)

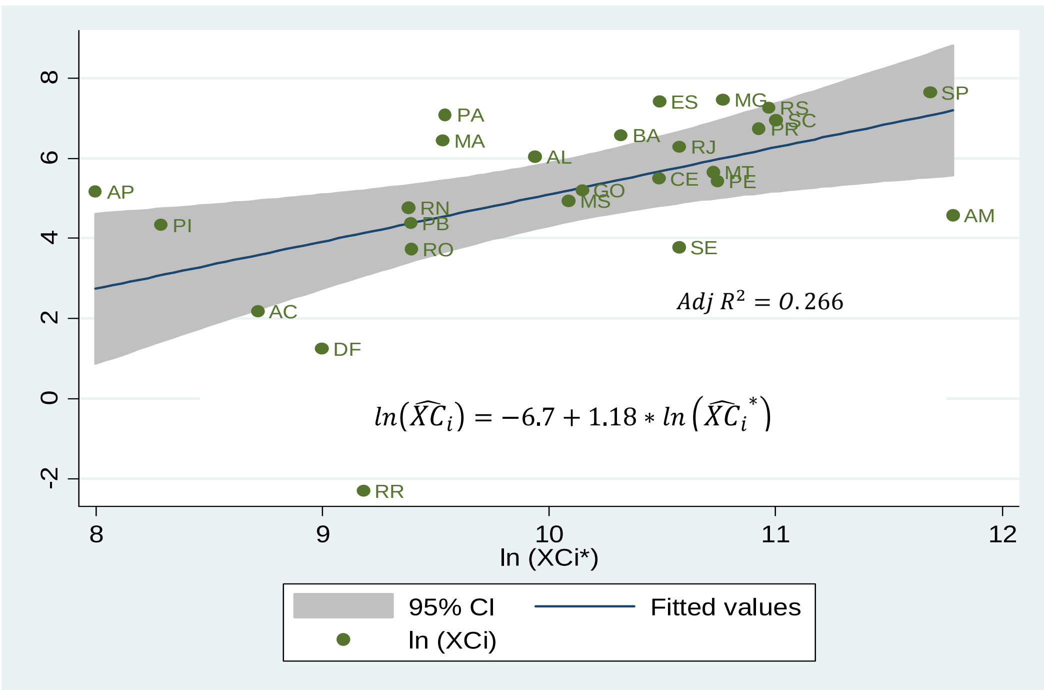
States	ΔGDPi [a] (%)	Uncontrolled for GDP impact		Controlled for GDP impact	
		ΔXC_i^* (%)	ΔXC_i (%)	ΔXC_i^* (%)	ΔXC_i (%)
Region Average NORTH	42.26	-27.19	-11.23	-40.28	-25.13
Acre (AC)	76.97	42.03	-79.76	2.79	-85.35
Amazonas (AM)	47.97	-27.09	63.66	-41.60	31.08
Amapá (AP)	58.91	-53.97	-29.47	-64.60	-45.75
Pará (PA)	26.88	-39.89	-16.53	-47.48	-27.06
Rondônia (RO)	79.81	-6.60	21.28	-33.01	-13.02
Roraima (RR)	26.77	-32.16	5488.92	-40.69	4786.15
Region Average NORTH-EAST	48.66	-42.01	-25.38	-52.59	-42.08
Alagoas (AL)	42.01	-72.78	-57.42	-77.69	-65.09
Bahia (BA)	47.26	-34.00	-18.24	-46.99	-34.34
Ceará (CE)	68.57	-35.32	-16.80	-51.88	-38.11
Maranhão (MA)	53.03	-49.90	-16.44	-60.63	-34.34
Paraíba (PB)	44.23	-22.62	-27.81	-37.12	-41.33
Pernambuco (PE)	41.74	-55.53	-49.34	-63.50	-58.43
Piauí (PI)	61.58	-6.76	-10.42	-28.95	-31.74
Rio Grande do Norte (RN)	47.97	-24.21	-17.13	-39.30	-33.63
Sergipe (SE)	31.83	-29.48	-24.89	-39.70	-35.77
Region Average CENTER-WEST	62.56	-48.49	73.17	-63.53	33.68
Distrito Federal (DF)	61.26	-63.09	-44.00	-71.84	-57.28
Goiás (GO)	52.46	-21.77	24.06	-38.39	-2.30
Mato Grosso (MT)	83.01	-68.98	133.94	-77.97	66.12
Mato Grosso do Sul (MS)	67.82	-46.56	56.49	-60.14	16.71
Region Average SOUTH	51.02	-30.07	-8.23	-48.70	-30.17
Espírito Santo (ES)	73.53	-34.40	-10.76	-51.99	-34.69
Minas Gerais (MG)	57.01	-38.87	-4.59	-52.65	-26.11
Río de Janeiro (RJ)	39.52	-67.63	-37.18	-73.20	-47.98
São Paulo (SP)	52.35	-21.33	-5.19	-38.02	-25.31
Region Average SOUTH-EAST	56.53	-40.50	-54.65	10.10	-14.35
Paraná (PR)	60.09	-61.97	40.92	-70.87	7.94
Rio Grande do Sul (RS)	53.40	-22.25	-2.48	-38.99	-23.47
Santa Catarina (SC)	57.48	-41.53	3.48	-54.80	-20.00

[a] The percentage differences are calculated on the basis of average real GDP for the entity in the two periods. For *Period 1*, the only available year is 1991. However, average GDP for *Period 2* is the arithmetic mean over the 1997-1999 period. For the regions, the percentage change is measured by the total average real GDP of all the states in the region from *Period 1 to Period 2*.

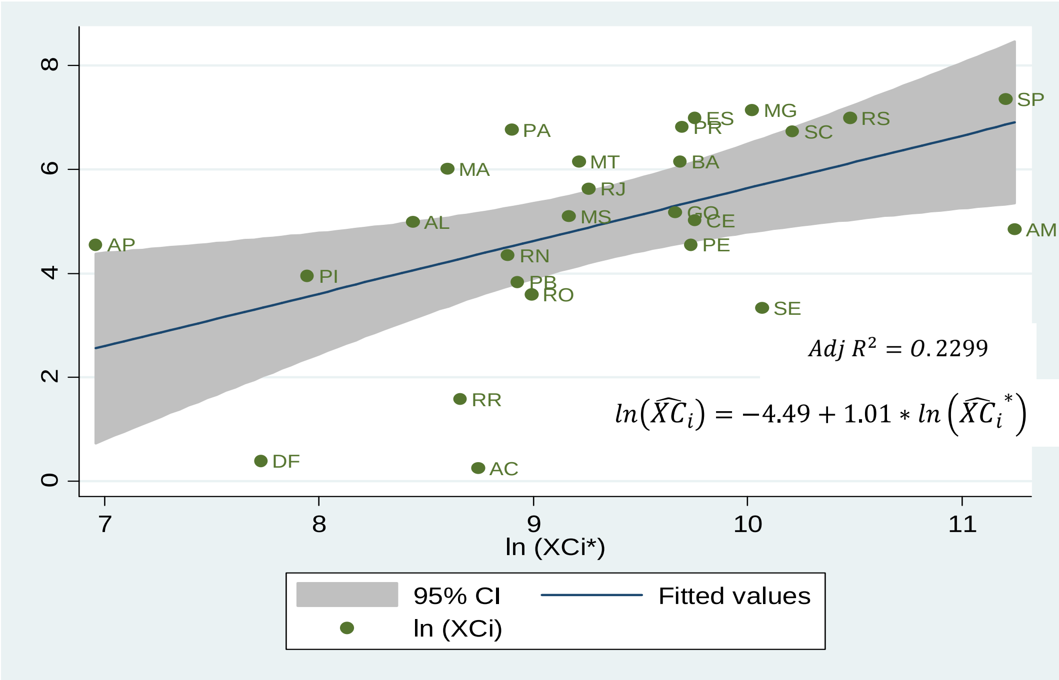
Figure 1: States' market orientation by region and change from *Period 1* to *Period 2*



Graph 1: Linear relation between GDP-controlled domestic and foreign export capacities in *Period 1*



Graph 2: Linear relation between GDP-controlled domestic and foreign export capacities in *Period 2*



Annex 1: Country List

Algeria (DZA)
Angola (AGO)
Argentina (ARG)
Australia (AUS)
Austria (AUT)
Bahamas, The (BHS)
Bahrain (BHR)
Bangladesh (BGD)
Barbados (BRB)
Belize (BLZ)
Benin (BEN)
Bermuda (BMU)
Bolivia (BOL)
Bulgaria (BGR)
Burkina Faso (BFA)
Cameroon (CMR)
Canada (CAN)
Cape Verde (CPV)
Central African Republic (CAF)
Chad (TCD)
Chile (CHL)
China (CHN)
Colombia (COL)
Comoros (COM)
Congo, Rep. (COG)
Costa Rica (CRI)
Cyprus (CYP)
Denmark (DNK)
Dominican Republic (DOM)
Ecuador (ECU)
Egypt, Arab Rep. (EGY)
El Salvador (SLV)
Ethiopia (ETH)
Fiji (FJI)
Finland (FIN)
France (FRA)
Gabon (GAB)
Gambia, The (GMB)
Germany (DEU)
Ghana (GHA)
Greece (GRC)
Grenada (GRD)
Guatemala (GTM)
Guinea (GIN)
Guinea-Bissau (GNB)
Guyana (GUY)
Haiti (HTI)
Honduras (HND)
Hong Kong SAR, China (HKG)
Hungary (HUN)
Iceland (ISL)
India (IND)
Indonesia (IDN)
Ireland (IRL)
Israel (ISR)
Italy (ITA)
Jamaica (JAM)
Japan (JPN)
Jordan (JOR)
Korea, Rep. (KOR)
Kuwait (KWT)
Lebanon (LBN)
Liberia (LBR)
Libya (LBY)
Madagascar (MDG)
Malawi (MWI)
Malaysia (MYS)
Mali (MLI)
Malta (MLT)
Mauritania (MRT)
Mauritius (MUS)
Mexico (MEX)
Morocco (MAR)
Mozambique (MOZ)
Nepal (NPL)
Netherlands (NLD)
New Zealand (NZL)
Nicaragua (NIC)
Niger (NER)
Nigeria (NGA)
Norway (NOR)
Pakistan (PAK)
Panama (PAN)
Paraguay (PRY)
Peru (PER)
Philippines (PHL)
Poland (POL)
Romania (ROM)
Portugal (PRT)
Qatar (QAT)
Rwanda (RWA)
Saudi Arabia (SAU)
Senegal (SEN)
Sierra Leone (SLE)
Singapore (SGP)
Spain (ESP)
Sri Lanka (LKA)
Sudan (SDN)
Suriname (SUR)
Sweden (SWE)
Switzerland (CHE)
Syrian Arab Republic (SYR)
Tanzania (TZA)
Thailand (THA)
Togo (TGO)
Trinidad and Tobago (TTO)
Tunisia (TUN)
Turkey (TUR)
Uganda (UGA)
United Arab Emirates (ARE)
United Kingdom (GBR)
United States
Uruguay (URY)
Venezuela, RB (VEN)
Vietnam (VNM)
Yemen, Rep. (YEM)
Zambia (ZMB)
Zimbabwe (ZWE)