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## Bargaining for Fiscal Control: Tax Federalism in Brazil and Mexico, 1870-1940\*

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**Abstract:** This paper studies the historical origins of the federalist institutions in Mexico and Brazil. Using a bargaining game model, I argue that the type of commodities each country produced by the end of the nineteenth Century determined the negotiation power of local governments. This led to the buildup of opposite federalist institutions in both countries, which have persisted until nowadays. The model shows that countries with regions with more autonomy to produce and trade their commodities increase the local power to collect more taxes. While in Brazil coffee was the most important commodity, Mexico relied on mining products. Coffee was produced by local landowners who became economically powerful and they were able that export taxes were collected locally with the proclamation of the 1891 Constitution. Empirical estimates show that, after 1891, exporter states increased significantly their own fiscal revenue. On the other hand, mining was capital and technology intensive, inputs that were domestically scarce in Mexico. To finance those activities foreign investment was promoted centrally, weakening the relative power of local elites.

**Keywords:** Institutions, Fiscal Federalism, Public Finance and Endowments.

**JEL Classification:** H71, H77, N46, N96.

**Resumen:** Este artículo estudia los orígenes históricos de las instituciones federalistas de México y Brasil. Utilizando un modelo de negociación, argumento que el tipo de bienes primarios que cada país producía a finales del siglo XIX determinó el poder de negociación de los gobiernos locales. Ello llevó a la construcción de instituciones federalistas opuestas, las cuales han persistido hasta la actualidad. El modelo muestra que países con regiones que tienen mayor autonomía para producir y comerciar sus productos incrementan el poder local, lo cual les permite recaudar más impuestos. Mientras en Brasil el café era el bien más importante, México dependía de productos mineros. El café era producido por terratenientes locales, los cuales se volvieron económicamente poderosos y lograron que los impuestos a la exportación fueran recaudados localmente, a partir de la proclamación de la Constitución de 1891. Estimaciones empíricas muestran que, después de 1891, los estados exportadores incrementaron significativamente sus ingresos fiscales. Por el otro lado, la minería era intensiva en capital y tecnología, insumos que eran domésticamente escasos en México. Para financiar esas actividades, la inversión extranjera fue promovida centralmente, debilitando el poder relativo de las elites locales.

**Palabras Clave:** Instituciones, Federalismo Fiscal, Finanzas Públicas y Dotación de Factores.

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## **I. Introduction**

Recently there have been a surge of studies that have explored the relationship among endowments, institutions and the provision of public goods (see, for instance, Acemoglu et al., 2001; Engerman and Sokoloff, 1997). These works have focused on the enforcement of property rights and, by their very nature tend to slight within-country differences. In this work, I focus on another institution -- fiscal federalism, or rules that allocate fiscal decision-making power between a central authority and smaller geographic sub-areas (for example, states).<sup>2</sup> Federalism has implications for the efficient allocation of resources – for example, between the public and private sectors or the development of national markets; and, as argued here, in variations in economic development within countries.

I study the evolution of fiscal federalism in two Latin American countries: Brazil and Mexico. Particularly, I study why both countries developed different federalist institutions, given their similarities in socioeconomic and institutional variables. Brazil has been more decentralized than Mexico throughout the twentieth Century and it has also collected consistently more public revenue. These differences in tax decentralization cannot be explained by standard cross-country determinants since there is not enough variance in the relevant variables (Treisman, 2006 and Panizza, 1999). This paper proposes an alternative historical explanation to account for these differences. As a large literature has pointed out recently (Acemoglu et al., 2001; Engerman and Sokoloff, 1997; Sokoloff and Zolt, 2006), economic institutions (such as fiscal ones) are product of long term historical, political and economic processes and, even more important, are very relevant to achieve high levels of development. The understanding of the origins of fiscal and federalist institutions in both countries is key to analyze the current problems of these institutions, as well as their consequences on welfare, growth and inequality. Moreover, this analysis may provide important insights about the historical constraints that countries have faced in the past and it is facing in the present to launch fiscal reforms that reallocate tax power between the Federation and Subnational governments. This is particular relevant for countries like Brazil and Mexico that have tried to change their tax systems, at least since the last two decades.

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<sup>2</sup> Other concepts used through this work very related to federalism are: decentralization, which “is viewed as a shift of authority towards local governments and away from central government” (Rodden, 2004, p. 482) and federal bargain refers about the rules and powers that define the interaction between the central government and the subunits.

As a framework to rationalize the tax federalist trends in both countries, I develop a game-theoretic model of fiscal federalism in which the players – a local and a federal government – bargain over tax and revenue sharing rules. How much bargaining power the local government has depends on a variety of factors, including the value of its factor endowments. If those endowments increase (exogenously) in value relative to those controlled by the federal government, the local government is able to extract concessions from the center – in the context of the model, the ability to “control” its own fiscal destiny.

Unlike Sokoloff and Zolt (2006), who argued that current Latin American tax institutions are product of the path dependence of colonial institutions, I argue that the making of federalist institutions was the result of important changes in the distribution of bargaining power between the “core” (the federal government) and the “periphery” (states) at the end of the nineteenth Century. The regional balance of power in Brazil and Mexico was modified by the high rates of economic growth enjoyed in the region. The economic expansion of both countries was based on the production of commodities for international consumption. The export growth was possible due to the industrialization and the developed countries’ income growth that pushed up the international demand for raw materials and commodities. In addition, technological innovations allowed the economic integration of the world as it reduced the transport costs between and within countries (see Cárdenas, et al., 2003).

The main argument of the paper is that differences in the type of endowments determined the commodities in which each country developed their competitive advantage in the global economy. I argue that the characteristics of the commodities, along with their regional distribution and the regional autonomy to trade them, are keys to understand the local elites bargaining power that was the engine of the changes in the division of fiscal responsibilities in both nations. The absence of a significant shock that would have altered the relative power between center and periphery provoke that federalist fiscal institutions persisted until nowadays.

For the Brazilian case, the model shows how the relative economic power between states and federal governments determined the division of fiscal responsibilities in the 1891 Constitution. A number of factors – some systematic, others serendipitous – led Brazil to draft a “decentralized” Constitution in 1891. First, there were (and are) significant differences in soil types and weather conditions across Brazil, creating region-based comparative advantages in certain crops. Second, in some of these crops, the most important of which was coffee, Brazil had effective international monopolies at the time. Third, the Brazilian state that traditionally had supplied much of the world

coffee demand happened to be the capital region – Rio de Janeiro – but Rio’s endowments could not keep pace with demand growth over time, and coffee production shifted away from the center to the “periphery” – São Paulo. Fourth, certain unforeseen political events – specifically, the sickness, overthrow and eventual death of the Emperor – created a unique opportunity to rewrite the “rules of the game,” that is, the Constitution. Newly enriched by the growth in the world coffee market, São Paulo’s elites took advantage of the situation to rewrite the federalist rules to the economic advantage of their region. The empirical contributions in this paper are based on newly collected archival data. Using state-level panel data I demonstrate that state public revenues per capita became closely aligned with exports per capita, but only *after* the 1891 Constitution had been enacted. This shows that the increasing of local bargaining power change the rules of the game and in the actual capacity of states to collect tax revenues.

On the other hand, Mexico was centralizing the collection of public revenue during the tenure of Porfirio Díaz (1876-1880 and 1894-1910). I argue that the centralization is explained by the lack of capacity of the states to exploit and trade their own economic resources by themselves. The scarcity of domestic capital to invest in mining (such as silver, zinc, gold) and railroads made local elites depend heavily on the decisions taken on the center of the country. The federal government was in charge of the decisions on the allocation of foreign investors on minerals and railroads, connecting production centers to ports and US border. These constraints made local elites very weak as their secession threat was not credible because their outside option was very low. The result was that Díaz could centralize not only the economy policy decisions but it also increased the control over the territory and fiscal resources. Unfortunately, data limitation at state level for Mexico unable me to perform an empirical strategy similar to the one presented for Brazil.

To the best of my knowledge, the only attempt to rationalize the federalist path of both countries is Díaz Cayeros (2006). My contribution is that I explore the sources of bargaining power that states elites in Brazil and Mexico had to negotiate for fiscal authority. In contrast to Díaz Cayeros, which analyze the federalist equilibriums along the twentieth Century, I argue that the main changes in these institutions happened in the end of the nineteenth Century as a product of trade shocks that changed the regional balance of power.

The remaining of the paper is organized as follows. Section 2 is devoted to examine whether the difference in federalist institutions between both countries could be explained by standard theories. Third section describes the analytical framework. Next two sections discuss the

experiences of Brazil and Mexico of fiscal federalism in the turn of the twentieth Century. Last part of the paper concludes and discusses possible further work in the topic.

## **II. Fiscal Decentralization in Brazil and Mexico**

### *Literature on Fiscal Decentralization*

An important branch of the literature on fiscal federalism holds that efficiency criteria should determine the allocation of fiscal and expenditure responsibilities among tiers of governments (Musgrave, 1959; Oates, 1972). In this tradition, the federal government is more efficient collecting taxes from mobile bases as it prevents multiple state tax rates; which makes difficult the integration of national markets for goods and inputs, it minimizes deadweight losses and increase public revenue. However, the cost of excessive centralization is the mismatch between public policies and people's preferences as local governments arguably have a better sense of the needs and likes of their own constituencies. However, there are not many scholars who still think that efficiency criteria are enough to explain the distribution of fiscal resources among the levels of government (Treisman, 2006). Derived from the belief that fiscal decisions are not taken based only upon the maximization of the social welfare, another school of thought has surged recently. They argue that public officers do not always make decisions thinking in the common good but considering their own political and personal objectives. They respond to incentives provided by the political institutions and the results of those interactions may create outcomes far apart from the optimal social solution.<sup>3</sup>

In a positive tradition, authors like Panizza (1999), Arzaghi and Henderson (2005) and Treisman (2006) explore empirically the determinants of decentralization. In sum, they find that countries that are ethnically more heterogeneous tend to have more decentralizing tax systems as they have different preferences about the amount and type of public goods they demand. The national government is less able to identify the localized demand for public goods and, furthermore, they cannot provide efficiently different levels of public goods across regions. A second factor is country size. Large and more populous countries are more decentralized because it is more expensive to satisfy local demands in areas far from the Center. Democracy is a third determinant as the design of public policies in democracies is closely link to the preferences of citizens who have more influence in the local sphere. There has also been found that economic development is correlated with levels of decentralization. As people become richer they participate more in local

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<sup>3</sup> For a discussion about the two views, see Weingast (2006).

public policy to improve the provision of public goods. Another variable which could be of importance to explain the degree of decentralization is the size of the government as percentage of GDP<sup>4</sup>. However, the relationship between public revenue and decentralization has not been well defined in the literature. On one hand, it is argued that more decentralized fiscal responsibilities (Bird, et al., 2004) are more efficient because the public goods provided by the governments are closer to the preferences of the citizens. This would boost the total tax collection because there would be more willingness to pay taxes and higher demand for public goods and services. However, great fiscal autonomy may lead to a competence among local governments, decreasing tax rates, tax income, and expenditures in order to attract investment and consumption. This mechanism is known as “Leviathan” (see Brennan and Buchanan, 1980). The analytical framework presented in the next section supports the idea that both variables are positively correlated because local governments have more incentives to collect public revenue if they have a high control on expenditure.

#### *Decentralization differences in Brazil and Mexico*

Brazil and Mexico has important differences in their tax structure. The public sector in Brazil collected around 40 percent of Gross Domestic Product (GDP) in 2004, while Mexico just collected around 25 percent (Table 2 in Appendix B).<sup>5</sup> Moreover, Brazil is far more decentralized than Mexico: while Brazil’s Federation collects around two thirds of the total public revenue, the Mexican central government collects more than 90 percent of the total public revenue. Once intergovernmental transfers are made, local governments have access to 40 percent of the total revenue in Brazil Mexico, compare to 20 percent in Mexico. The dependence of local governments to the federal transfers is by far lower in Brazil than in Mexico: while in Brazil 20 percent of the local governments’ budget is financed through intergovernmental transfers, this percentage is 80 percent in Mexico. Finally, the direct Brazilian taxes accounted for about two thirds of the tax revenue in 2004 (the other third is indirect taxes); in Mexico the distribution between both kinds of taxes is half and half.

Looking at the variables that explain fiscal decentralization in the literature, we find that there is no significant differences between these two countries that help us to understand to understand their fiscal asymmetries. For instance, Brazil and Mexico have similarities in

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<sup>4</sup> For a review about the determinants on fiscal performance, see Bird, et al. (2004).

<sup>5</sup> See IBGE (2001), Estatísticas do Século XX, [www.ibge.gov.br](http://www.ibge.gov.br) and Sexto Informe de Gobierno, (Mexico 2006).



urbanization rates, trade openness<sup>6</sup> and population density<sup>7</sup>; as well as in other socioeconomic indicators (see Table 1 in Appendix B), all factors associated in the literature to explain fiscal variables. Particularly, development and democracy are very similar in Mexico and Brazil, so they cannot explain the heterogeneity in fiscal decentralization. The main differences between both countries are the extension of the territory and perhaps the language fractionalization index (population's heterogeneity). Although Brazil's area is four times Mexico's, more than 75 percent (North and Center-West regions) of Brazil's territory is scarcely populated (around 13 percent of the Brazilian population with a 10 percent share of the GDP). Historically, most of the economic activities have been developed in the 30 percent remaining territory. If this would be our target territory, Brazil would be only 25 percent bigger than Mexico. Moreover, as it will be developed later, Brazil had periods of centralization (and Mexico of decentralization) in the nineteenth Century contradicting the large country explanation, as this is a constant variable for both countries in the studied period.<sup>8</sup> The language fractionalization can neither explain differences in decentralization, because it is more fractionalized in Mexico (and equal in the ethnic fractionalization index) and according to theory this would make it a more decentralizing country, but, again, it is not the case. Given that we are unable to explain tax differences with current determinants, we would like to see whether these asymmetries have an historical explanation.

Those key differences in their fiscal systems have persisted historically, at least, during all the twentieth Century. Consistently, Brazil has been more decentralized than Mexico (see figure 1 in Appendix B). The same graph shows that the respective trends began by the end of the nineteenth Century. Before that, both countries came from opposite positions: Brazil was a centralized Empire and Mexico was more decentralized. Restrictions in historical data prevent us of doing a comprehensive analysis of whether the explanatory variables identified in the standard literature that had changes in both countries could explain the differences in federalist structures. However, some estimation has been made for GDP per capita. This is a relevant variable because it

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<sup>6</sup> The degree of openness is usually measured as international trade as percentage of GDP. According to this ratio, Mexico trade twice as Brazil does, but Mexico's *maquila* concentrates around 35 percent of Mexican international trade due to his close location to the US market and low labor costs (Mexico, 2005). Anyway, tax determinants literature says that more openness should impact positively into the tax collection. In that case, Mexico is supposed to have a big state.

<sup>7</sup> Mexican population is thrice as concentrated as Brazil. However, the latter's territory is composed mostly by the Amazon forest; density in this area is only around 5 habitants per square kilometer. The other 165 millions of Brazilians live in the other regions, making the density being much similar to Mexico's: 73 habitants per square kilometer.

<sup>8</sup> In addition, the main Brazil's decentralization movements were located in states neighbors to the capital, disregarding the hypothesis that far from the Center provinces could push for more autonomy.

is correlated with most of the other indicators. What we can see is that the GDP per capita gap between Brazil and Mexico has consistently favored slightly the latter one (see figure 2 in Appendix B), contradicting the literature, which affirms that more developed countries have larger governments with higher participation of local and state governments. Territory extension does not seem to have played an important role, since they have not suffered relevant modifications in the last 150 years in both countries. Extensive democratization in both countries took place until the last decades of the last Century. Regarding the population heterogeneity, Mexico's racial composition has not had important changes during the last two Centuries. On the other hand, Brazil received migration waves from Europe during the last decades of the nineteenth Century and first of the last one, modifying the population characteristics. However, international migration was a consequence of migration policies instrumented by federal and state governments in order to assure labor supply for coffee plantations (Viotti da Costa, 1989; Holloway, 1980). Those are the same circumstances which, as it is argued here, led to decentralization in Brazil in 1891. Furthermore, the ones who promoted migrants were the planters, a key player in the policy making of the epoch, including the decisions over fiscal issues.

The historical approach to this puzzle has been little explored in the literature. Díaz Cayeros (2006) is one of the exceptions. He explores why four Latin American countries (including Brazil and Mexico) have had different federalism paths during the twentieth Century. His main concern though is how those countries were able to construct a credible transfer system between the Federation and States. According to Díaz Cayeros, Mexico has a national oriented local politician with high centralized revenue, while Brazil is the opposite in both dimensions.

I explore the hypothesis that regional distribution and control over the economic resources explains the bargaining power of local elites when negotiating by fiscal resources. This provides an alternative explanation about the contrasting patterns in both countries, and for which the standard literature is unable to offer an explanation, as well as the sources of local bargaining power. Finally, I also argue that federalist arrangements have their roots in the last half of the nineteenth Century.

### **III. A Game of Bargaining for Tax Revenue in a Federation**

The model focuses on the role of the economic incentives and conflict threat in fiscal federalist agreements. I argue that fiscal agreements contained strategic decisions aiming to the pursuit of economic benefits for the actors – Federation and States. Their strategies and outcomes were constrained by their economic power. The analytical framework borrows some features from the

literature on the role and credibility of secession threats (see Arzaghi and Henderson, 2005, Panizza, 1999, and Bolton and Roland, 1997). However, in this literature, the role of the states is residual, because tax share is a Federal Government's choice and local governments' strategic actions are missing in those works. In a framework where states bargain directly with the federal government, Díaz Cayeros (2006) focuses on the sustainability of the fiscal pact, presenting a principal-agent model where the equilibrium depends, similar to my work, on the economic capacity of the states. Yet my model highlights the sources of bargaining power of the players and the incentives of both levels of government to exert effort in order to realize production and tax revenue.

### *Setup of the game*

The model has two players: Federal Government (FG) and Local Government (LG). The country is divided in two regions: center and periphery. FG governs over both regions and LG only over the latter one. For the sake of simplicity, the model uses only one negotiating LG. Both governments have to decide whether to stay unified or to constitute separate countries. Both levels of government want to maximize their utility, which is a function of the tax revenue they collect. Tax revenue is determined by the tax base or the income of the country ( $ty$ ), where  $t$  is the tax rate<sup>9</sup> and  $y$  is the country's income. Potential production in both regions ( $K=k_F+k_L$ ) requires that both governments exert maximum effort. Thus, differences between actual and potential production is attributable to lower than maximum effort exerted by both governments. There are two forces that make effort to be different from the potential production one: it is costly to be exerted by both governments and the incentives that governments had given the tax share rule. This setup implies that a fundamental input for production to be realized depends on governments' performance. For instance, effort can be thought as provision of public goods such as infrastructure (roads, railroads, ports, etc.), negotiation for preferential tariffs in foreign markets, enforcement of property rights, protection against external threats and internal instability, enforcement of tax laws, among others. The better the governments performs, the better the markets function, the closer a country reaches

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<sup>9</sup> This model does not analyze the welfare of citizens as the tax rate is exogenous. A potential extension of the analytical framework may include a payoff function of the relevant citizens of the two regions depending on public and private goods in order to calculate the optimal tax rate. This obviously would be another dimension that players would bargain for. As the scope of the paper is the explanation of bargaining power from the economic dependence and relative strengthen between Federation and states, I leave out efficiency issues.

its economic potential and the more the government collects tax revenue. However, the fulfillment of these public responsibilities has a cost for governments.

Total tax revenue collection in the country is defined by:

$$(1) \quad T(e_F, e_L, K) = ty = t(k_L + k_F)[\theta e_F + (1 - \theta)e_L]$$

Both  $e_F$  and  $e_L \in [0,1]$ .  $\theta$  is the FG's marginal productivity and  $1-\theta$  is the LG one<sup>10</sup>. The relative marginal productivities also refer to the degree of "relative" autonomy of the players to produce on its territory. Suppose that a province that it is very well endowed in commodities but that it does not have the means to exploit them, since it does not have investment resources or adequate infrastructure to transport the goods as well as permission from other provinces (or FG) to trade them. In this case, the province would probably require help from the federal government to know how to produce and trade its resources. In this hypothetical example,  $\theta$  would be very high and local government production would depend highly from the Center. In addition, note that when both governments exert maximum effort (equal to 1) the actual production level will be equal to the potential production  $K = k_L + k_F$ <sup>11</sup>.

Before collecting tax revenues, parties have to decide whether they write a joint Constitution to define how the revenue will be distributed. The negotiating variable is the share of the collected revenue which will retain LG ( $0 \leq \alpha \leq 1$ ). The payoffs of the players are:

$$(2) \quad U_F = (1 - \alpha) * T(e_F, e_L, K) - \frac{e_F^2}{2} \quad \text{and}$$

$$(3) \quad U_L = (\alpha) * T(e_F, e_L, K) - \frac{e_L^2}{2}$$

for FG and LG respectively. Each government has a stock of effort normalized to 1.

Tax share variable is defined in the contract, while  $e_F$  and  $e_L$  are non-contractible and non-transferable. Each party tries to maximize its own utility. Effort is costly reflecting administrative costs of the government work, and generates disutility. Thus, tax share and governments' efforts are the variables to solve in the model, which should be in function of the exogenous variables: tax rate, potential product, and marginal productivity of public effort.

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<sup>10</sup> No intrinsic productivity of collecting revenue is modeled as the study cases collected most of their revenues in customs offices (imports and export taxes) where tax collection is easier to perform and contraband is harder.

<sup>11</sup> As the federal government has a strategic advantage over local governments by historical and military reasons, the negotiation can be taken only over yL. Thus, the federal government does not negotiate over their tax base and all negotiation may be focused on local government tax base. This assumption, however, does not change the main messages of the analytical framework.

The timing of the game consists of three stages: 1) FG offers a tax share contract  $\alpha$  to LG<sup>12</sup>. 2) LG decides whether to accept or reject the offer. If LG accepts  $\alpha$ , it will be defined in the Constitution. If LG rejects the offer, each party collects separately in their own territory. 3) After LG takes a decision, FG and LG exert effort, outputs are realized and payoffs are received. So, the profile strategies for the FG is  $\langle \alpha' \rangle$  and for the LG the strategy set is to accept if  $U_L(\alpha') > U_L^i$  and to reject if  $U_L(\alpha') < U_L^i$ . Then, we have two potential outcomes: a single country where the tax division is given by the FG offer; or two separate countries in which each government collects their own revenue.  $U_L^i$  refers to the utility obtained by the LG if it becomes independent from the FG. So we require, in order to LG to accept the FG offer, that LG had at least the same welfare as it would be independent. If this does not happen it is optimal for LG to separate. Implicitly, the FG also decides whether to work in conjunction with LG or not. If there is no tax share that makes him better than being independent, FG would offer a tax share that it knows will be rejected. The utility equations for independent LG and FG are respectively:

$$(4) U_L^i = tk_L(1 - \theta)(e_L) - \frac{e_L^2}{2}$$

$$(5) U_F^i = tk_F(\theta)(e_F) - \frac{e_F^2}{2}$$

The payoffs of the players are defined according to the outcome and are defined by equations (2) to (5).

### *Solving the game*

The equilibrium concept for this game is a Sub-game Perfect Nash Equilibrium. Therefore, I solve through backward induction. The first step is to maximize the governments' utilities (Equations 2 and 3), given the terms of the contract, to find the optimal effort levels:

$$(6) e_L = \text{Min}[\alpha t K(1 - \theta), 1]$$

$$(7) e_F = \text{Min}[(1 - \alpha)t K \theta, 1]$$

Effort is positively correlated to tax revenue share. The interior solution is guaranteed when  $ty \leq \text{Min}[2/(1 - \theta), 2/\theta]$ . With K too big, the marginal profit of more effort is very high and it is optimal to exert the maximum effort. The proof involves finding under which conditions the players will not exert effort equal to one, under maximum incentives (tax share equal to one) on the other

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<sup>12</sup> The fact that FG moves first is crucial for the dynamics of the game because it is also a source of bargaining power between players. This fact is based on that federalist rules are usually agreed at Federal Congress. Moreover, the tax contributions from the regions are usually not voluntary. FG has control over the army (see Treisman, 2000).

party, given that the other party also exerts effort equal to one. With the knowledge of the optimal effort, FG maximizes its utility respect to the bargained variable (replacing the optimal values of efforts in equations (6) and (7) into the FG utility function stated in equation (2)):

$$(8) \text{ FG Max } \alpha \frac{(1-\alpha)(tk)^2\theta^2}{2} + (1-\alpha)\alpha(tk)^2(1-\theta)^2$$

Optimizing the above expression (the unrestricted utility of the FG) with respect to  $\alpha$ , we know that FG offers LG:

$$(9) \alpha^* = \frac{\theta^2 - (1-\theta)^2}{\theta^2 - 2(1-\theta)^2}$$

Replacing (9) in (6) and (7), we obtain the optimal efforts:

$$(10) e_L^* = \frac{tK(1-\theta)(2\theta-1)}{\theta^2 - 2(1-\theta)^2}$$

$$(11) e_F^* = \frac{(1-\theta)^2(\theta)tK}{2(1-\theta)^2 - \theta^2}$$

With (10) and (11) we get the total tax revenue of the government replacing these terms into equation (1):

$$(12) ty = (tK)^2 \left[ \frac{\theta^2(1-\theta)^2 + (1-\theta)^2(1-2\theta)}{2(1-\theta)^2 - \theta^2} \right] = (tK)^2 \left[ \frac{(1-\theta)^4}{2(1-\theta)^2 - \theta^2} \right]$$

Using (9) and (12), we know the share of tax revenue retained by the LG:

$$(13) \alpha^* ty = (tK)^2 \left[ \frac{(1-\theta)^4(1-2\theta)}{(2(1-\theta)^2 - \theta^2)^2} \right]$$

Then we can calculate the utility obtained by the LG if accepts the FG offer:

$$(14) U_L = \left[ \frac{(tK)^2(1-\theta)^2(1-2\theta)\theta^2}{(2(1-\theta)^2 - \theta^2)^2} \right]$$

The agreement requires that both parties get a higher payoff than the one obtained if they had decided to keep separated and collect the taxes only on its own territory. LG payoff ( $U_L^i$ ) is equation (4). The optimal effort in this case is  $e_L^i = t(1-\theta)k_L$  with an indirect utility function equal to

$$(15) U_L^i = \frac{(t(1-\theta)k_L)^2}{2}.$$

In this case, tax share is suppressed since the state rules itself and no negotiation takes place.

Analogously,  $e_F^i = t(\theta)k_F$  and  $U_F^i = \frac{(t(\theta)k_F)^2}{2}$ .

Finally, LG will accept FG offer when expression (14) is greater than (15) and this will happen when:

$$(16) \frac{2(1-2\theta)\theta^2}{(2(1-\theta)^2 - \theta^2)^2} \geq \frac{k_L}{K}$$

The most important implication of the model is that a high FG's efficiency (high  $\theta$ ) implies a lower bargaining power of LG to opt out as its production depends much on FG. In other words, if LG would decide to become an independent country would be unable to produce as much as it would produce with FG help. So, in cases where the province is potentially rich and autonomous, FG would have to offer better terms to LG in order to keep the country united.<sup>13</sup> Moreover, the richer the province is (high  $k_L$ ), the higher its outside option and its bargaining power will be to get a better deal from the Center.

In summary, we have two equilibriums: when condition (16) is met, LG accepts FG offer ( $\alpha^*$ ), both regions conform a single country, exert optimal efforts (10) and (11), and LG gets (14) as its payoff. If the proportion of local potential production is high enough to avoid an agreement between LG and FG, in equilibrium LG rejects  $\alpha^*$  and 2 countries are formed with  $e_F^i$  and  $e_L^i$  as optimal efforts and  $U_L^i$  and  $U_F^i$  as payoffs.

Applying the results for Brazil and Mexico, we can say that both countries had provinces that were very rich (high  $k_L$ ) in proportion of the national country production but not as high to prevent the center and the periphery from making an agreement on staying united. However, the tax share was higher in Brazil than in Mexico. The difference was due to the value of  $\theta$ , as in Mexico was very high because local elites and government had no autonomy to exploit the endowments. Rich mining endowments required capital that was very scarce locally. Even in the case that local elites were autonomous to exploit mining sources, they have not easy access to markets or exports points (ports or border). So, they depended heavily on FG provision of capital and infrastructure, decreasing its bargaining power. On the other hand agricultural activities in Brazil were performed independently by local landlords and, moreover, most of the states had access to sea, which allow them to trade without central authorization. So, in Brazil  $\theta$  was low, which allows LG to get a high share of tax revenue.

#### **IV. Understanding Fiscal Federalism in Brazil in the Nineteenth Century**

How does the analytical framework fit with historical events in Brazil? After independence (in 1824) Brazil had a constitutional monarchy, in which the federal government collected and kept most of the tax revenue. In 1889, a relatively peaceful republican revolution overthrew the monarch and called a constitutional assembly. The 1891 Constitution altered the federalist pact in a

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<sup>13</sup> In the current setting, I assume that the separation process is peaceful but we can consider costs incurred in a conflict, which might hinder the payoffs of secession, or the state could even been surrendered by the FG army and lose any capacity of negotiation within the Federation.

significant way and gave states ample powers to collect taxes. As I will explain below, the model in the previous section explains the fiscal contract both, before and after 1891.

First, let me explain why there was a change in regime in 1889. After the relatively peaceful reigns of emperors Pedro I and Pedro II, in November of 1889 a republican movement deposed the monarchy. The proximate determinants of this shift in regime type are not difficult to identify (Viotti da Costa, 1989; Fausto, 1999). In 1887, Pedro II became extremely ill (evidently, diabetes and neurological complications) which obligated him to severely diminish his governing. Before traveling to Europe for medical treatment, he left the country in charge of his daughter, Princess Isabel. Isabel was married to Count d'Eu, a Frenchman who generated animosity among the Brazilian elite, thereby diminishing the prospect of a "Third Reign" after the inevitable death of the Emperor. The second reason was the abolition of slavery in 1888, over the objections of slave owners who had been among the monarchy's most ardent supporters. Next, the army had become dissatisfied with its political status under the monarchy and its share of the public budget, and its loyalties were up for grabs. Last, and most important for this paper, there was the emergence of a powerful "republican-federalist" movement among the owners of coffee plantations in São Paulo, an elite that furnished "a stable social footing for the republic that neither the army nor inhabitants of the city of Rio could provide on their own" (Fausto, 1999 p. 141).

The nineteenth Century Brazilian economy was agriculture-based and export-oriented. The ratio of exports to GDP fluctuated between 20 and 33 percent between 1861 and 1913, and the annual growth rate of exports averaged 3.7 percent (Bulmer-Thomas, 1994; Summerhill, 2001). Brazil's exports were concentrated in a small number of commodities, the most important of which by far were coffee and natural rubber. Of the two, coffee was quantitatively more important, its export share ranging from 40 to as much as 70 percent of total exports over the period 1831 to 1940. Rubber's share of exports peaked at about 30 percent around the turn of the Century but eventually declined as a result of intense competition from Asian sources after 1910. During the colonial era, sugar had also been an important export but its share declined substantially over the course of the nineteenth Century.

Brazil's coffee plantations were so productive that by the middle of nineteenth Century the country accounted for more than half of the international coffee market. Brazil capitalized on its inherent comparative advantage in coffee production as demand for the beverage grew rapidly in the United States and Western Europe in the nineteenth Century (Martins and Johnston, 1992).



The push for a new bargaining equilibrium among states and the federal government was the consequence of the growing power of the São Paulo coffee elites. During most of the nineteenth Century coffee production was concentrated in the Paraíba Valley (an area between the states of Rio de Janeiro, Minas Gerais, and São Paulo). Almost all exports were shipped from the port of Rio de Janeiro. The centrality of Rio in the nation's burgeoning coffee economy provided stability to the regime of Pedro II (Murilo, 1993; Love, 1993). However, the privileged position of the capital province did not last for long; by the 1870's and 1880's coffee production was moving away from Rio and strongly toward its neighbor state, São Paulo (see Table 3 and Figure 3 in Appendix B).

The expansion of production in São Paulo was in response to persistent growth in world demand, as reflected in relatively high prices (Clarence Smith and Topik, 2003). São Paulo's comparative advantage in coffee production was manifold – virgin land, better soil, topography, and weather (Cano, 1977; Schulz, 1996).<sup>14</sup> The demise of slavery hastened Rio's relative decline as a coffee producer, as slavery was concentrated in the capital region.<sup>15</sup> By contrast, planters in the new region relied heavily on European immigrants. São Paulo went so far as to petition Princess Isabel to admit foreigners from non-Catholic countries, a petition that she denied, furthering the conflict between the Crown and São Paulo's coffee elites. Coffee's profitability in São Paulo was also boosted by the region's extensive rail network and the rapid adoption of new growing techniques and associated capital (Cano, 1977).

#### *The Equilibrium before 1889: The Federal Government Takes All*

In the equilibrium before 1889, the Imperial (federal) government collected somewhat more than eighty percent of the national public revenue because local governments (and local elites) had low bargaining power (low  $k_L$ ).

Over two-thirds of public revenue during the Empire derived from import tariffs and export taxes. The conventional wisdom is that trade taxes were used because of lower collection costs and because landlords were opposed to property taxes. The Constitution of 1824, established that the central government was responsible for collecting trade taxes, while provinces were explicitly forbidden from collecting import duties or from levying taxes on inter-provincial trade. Although

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<sup>14</sup> There is a 40 year cycle to coffee production, at which point the tress and soil become unproductive. In 1882, more than 60 percent of the coffee trees in Paraíba Valley region were older than 40 years of age. See Cano (1977).

<sup>15</sup> The abolition was a smooth process which started at 1851, when the importation of slaves was forbidden by the British; and continued in 1872, with the "Law of the Free Womb;" and in 1885 with the liberation of slaves of more than 65 years. In 1885, banks stopped using slaves as guarantees for loans.

provinces were constitutionally forbidden to collect import taxes and inter-provincial taxes there were no explicit rules against levying export taxes, and some apparently did.<sup>16</sup>

Regionally, around half of the federal public revenue was collected in the capital, which was responsible for more than two thirds of the expenditure (see Table 3 in Appendix B). This figure may be biased because some of the public expenditure in “national” public goods should be attributed to Rio de Janeiro. However, if we consider just the expenditure of the Ministry of Agriculture and Public Works (responsible for internal improvements such as railroads, ports, and so forth; see Villela, 2007) about 66 percent of its budget was spent in the capital area in 1888, and only 3 percent in São Paulo.<sup>17</sup> Even allowing for Rio’s share of exports or population, the fiscal system appears to have been very “centralized”.<sup>18</sup>

### *The New Equilibrium: Fiscal Federalism after 1891*

As the model would predict, elites in states that were becoming export powerhouses by the end of the nineteenth Century bargained to keep more tax revenues and used the threat of secession to push for a new federalist arrangement. In fact, the limited legal capacity that provincial governments had to collect public revenue and the Imperial government’s apparent unwillingness to redistribute fiscal resources were the causes of permanent conflicts. For instance, according to Love (1980 pp.103-104) São Paulo’s elite complained that “revenues in 1870’s were totally inadequate to meet the provincial government’s responsibilities for road construction and maintenance, public health and education.” Moreover, “[t]he Republicans of São Paulo called for a distribution of revenues that would allow the province to meet the requirements of the expanding export economy, and for political autonomy to maximize São Paulo’s economic potential”. Furthermore, their discontent is reflected by the fact that “[s]ome Paulista Republicans *even threatened* to set a separatist course for the province if a Federation was not achieved” (emphasis added), They also felt underrepresented in the Congress, as only seven percent of the deputies and

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<sup>16</sup> Even the explicit constitutional provisions were sometimes violated; for example, in northeast provinces the import taxes represented between 20 percent and 33 percent of the provincial revenue, with tax rates of 30 percent in Pernambuco for inter-provincial imports. See Mello (1984).

<sup>17</sup> This is consistent with the work of Villela (2007), who shows that the Imperial government had a deficit with the North and a surplus with the South.

<sup>18</sup> Exports for Rio de Janeiro are overestimated as this does not include goods from Minas Gerais that were shipped from the capital. Adjusting for this makes the centralization of fiscal expenditure even more pronounced.

3 out of 69 senators were from São Paulo.<sup>19</sup> Fiscal discontent was not confined to São Paulo; similar complaints were voiced in Para, Rio Grando do Sul, and Pernambuco (Mello, 1984; Viotti da Costa, 1989).

After the revolution of 1889, the Republican government called a constitutional assembly and wrote the first draft of the new constitution. This draft was sent to the Assembly where it faced two critical votes. First, it was voted on by the “Commission of the 21,” where each state had one representative; and second, the initiative was presented for discussions and vote by the plenary (Costa, 1998).

One of the most important issues debated was the division of fiscal control between the central government and states. The Federal Government initially proposed that export taxes would be collected by the states but that the taxes would be abolished in 1898. This proposal was rejected as a non-starter by the Commission of the 21. Other proposals that were rejected included special import taxes on foreign goods consumed within states, and a clause that reserved for the states all powers not explicitly attributed to the federal government.<sup>20</sup> Both proposals were rejected by narrow margins in the assembly (123 to 98 and 123 to 103 respectively). Finally, the Constitution was voted in on February 24, 1891. The winning coalition consisted of the export states (São Paulo, Minas Gerais, Rio de Janeiro, Bahia, Para, Amazonas) against the less cohesive opposition of the northeastern sugar states and Rio Grande do Sul (Costa, 1998). The new constitution left exports taxes under the control of state governments.

Following the framework of my model, it is clear that the federal government knew that conditions had changed as the economic power shifted from the center towards the periphery ( $k_F$  was lowered and  $k_L$  increased), empowering local elites and making the secession threat credible. The federal government knew that the only way to create a unified Republic was to give up certain fiscal sources to the states. However, rather than seceding, the rich, exporting provinces voted in favor of a central government with some taxation powers (e.g., on imports) and capacity to represent a united front when negotiating with other countries. In terms of the model, this means that  $\theta$  (the marginal productivity of the federal government) was still relevant for the production of the states. The Federation’s proposal in the negotiations of the 1891 Constitution was the most centralist of all, and it was the position that ended up being adopted, thanks to the support of the

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<sup>19</sup> Each São Paulo deputy represented 145,141 inhabitants; the Pernambuco deputies represented 85,488 inhabitants and the deputies from Amazonas represented 40,327 inhabitants. The representation in the Senate was similar. See Murilo (1980) and Viotti da Costa (1989)

<sup>20</sup> These included such powers as the levying of import taxes, taxes of entry and exit of ships, stamp, creation and maintenance of custom offices, and various banking regulations, among others.

richest provinces. One of the arguments of the Ministry of Finance, Rui Barbosa (a former federalist republican during the Empire), was that the financial viability of the country was in risk if the Federation was not able to count on fiscal resources, even more so considering the high level of indebtedness inherited from the Monarchy. Furthermore, the landowner class was also aware that it needed the effective action of the Federal Government in order to satisfy the needs of the export sector. Love (1993) points out that those issues such as exchange and monetary policy and diplomatic representation were the responsibility of the central government, and were needed for the economic success of the coffee plantations. Only a united front could coordinate negotiations abroad, could facilitate loans, and could, eventually, coordinate coffee producers to control the price of their exports in international markets. On the other hand, the most radical states were the poor states of the Northeast or those states producing for the internal market (e.g., Rio Grande do Sul). For them, the export taxes did not represent a considerable flow of public revenue and they demanded other sources of revenue. As they felt the federal government distant from their needs, they were not concerned about Federation's financial weakness.

Under the new equilibrium, the Constitution allowed states to increase their share of public revenues to about one third (see Figure 4 in Appendix B). In the short run, export tax rates do not appear to have been modified, implying that, with the new constitutional provisions, revenues essentially shifted from the center to the periphery.<sup>21</sup> In Table 3 (see Appendix B), I show that richer state governments increased their fiscal shares after 1891. For instance, São Paulo collected almost 40 percent of the total state public revenue in the country (three times as much as it collected before the Constitution in per capita terms) with almost half of the total exports and less than one fifth of the population. Export taxes represented, on average, around 60 percent of the state government revenues between 1914 and 1919.<sup>22</sup> On the other hand, the northeast region exported less than 15 percent of Brazil's exports, having the same proportion of state public revenue but with more than two thirds of the population. The relationship between the states and the Federation regarding the federal receipts and expenditures did not change, as states kept

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<sup>21</sup> For instance, the São Paulo and Minas Gerais tax rate was of 11 percent (in the Empire coffee tax was 7 percent for Federal Government and 4 percent for states) on coffee. By the beginning of the Century both states lower the tax burden as São Paulo fixed it at 9 percent and Minas Gerais at 8 percent (Love, 1980; Topik, 1987). Moreover, those similar tax rates show that states relying in the production of the same commodity did not compete among themselves. Another example of this is Amazonas and Pará, which taxed rubber exports with a rate of 20 percent and 22 percent of the market price, respectively (Lyra, 1914)

<sup>22</sup> Dependence on export taxes varied across states: while Goiás and Rio Grande do Sul revenue's share was 24 and 29 percent respectively, states like Espírito Santo and Rio Grande do Norte depended on more than 85 percent from export taxes. São Paulo's share was 56 percent.

contributing in a greater proportion to the Federal Treasury than was federally spent in the states. By 1914, the Federal Government still concentrated most of its expenditure (61 percent) in the capital area, a higher proportion than its contribution to the Brazil's Treasury (46 percent). In terms of the expenditure of the Ministry of Transport and Public Works, the capital obviously benefitted enormously, as 81 percent of its budget was spent in Rio.

In sum, states with good endowments and geographic conditions could have not only generated exports but they could also build rich state treasuries. The value of the endowments was determined by the integration of international markets. The monopoly position of the coffee in international markets allowed governments (first the Imperial, later the states) to impose export taxes. The 1891 Constitution gave fiscal tools to the richest states to exploit their international monopoly position. Moreover, poor states were even more adversely affected because the central government did not implement a redistribution mechanism as I explore in Section IV.

#### *State Public Revenue before and after 1891*

The objective of this section is to perform empirical estimations to analyze whether the relation between exports and public revenues of state and federal governments at state level changed after the 1891 Constitution was written. Ideally, we would like to observe the direct effect of tax export revenue on total revenue. However, there is no availability for a long series of data for this variable. The approach followed here is an indirect one using exports as a proxy of export tax revenues. The underlying assumption is that states with higher capacity to export will be able to collect more export taxes and, furthermore, public revenue. Moreover, I also analyze if the relation between exports and federal revenue and expenditure at state level was affected after the 1891 Constitution.

#### *Data*

Compiling fiscal and population data for the different provinces and states of Brazil required collecting them from a variety of official archival sources and published materials. Appendix A describes in detail the sources and methodology of data collection of the variables used in the empirical estimations. The period covered is from 1870 to 1939. Below is a discussion and description of the variables.

*International trade data* includes exports and imports from the ports where the products were shipped from or arrived to. Although the data does not necessarily represent the origin or

final destination of the merchandise,<sup>23</sup> I consider that international trade in ports represents a good proxy for economic activity during this period. First, Brazil's economy relied heavily on exports as explained in Section III. Second, production centers and/or final markets were close to the ports due to the expensiveness of ground transport across states. Third, the 1824 and 1891 Constitutions did not modify the boundaries of the states in such way that most of Brazil's states were located on the seacoast or riverbanks. Therefore, states had relative autonomy to export through their ports. Fourth, even in the cases where the exports of a port were not produced in that state, the fact that they were being shipped from the port of other state shows that states with ports had an advantage in their geographic positions. In these cases, port's states had the possibility to impose taxes, meaning loss of competitiveness in international markets and/or loss of state fiscal revenue for the producer state. Furthermore, the differential in tax rates for the same products across states might have determined the location of export's shipments for some states. However, we do not observe high variation in tax rates across states.

International trade data are available for the eighteen states with ports (out of a total of twenty, plus the Federal District). Minas Gerais and Goiás do not have reported data as they are landlocked states and did not have international customs offices. Their exports were usually shipped from the closest states with ports like Rio de Janeiro and São Paulo. While Minas Gerais was traditionally an important pole of development in Brazil, Goiás' production was poorer. During the colonial era and the gold boom, important economic settlements were located in Minas Gerais. In the nineteenth Century this state also took advantage of the coffee's international market conditions to trigger its economic activity. Although the national reports did not consider the international trade activity of the state, a Minas Gerais government data compilation shows a long series of exports. Unfortunately, there is no detailed information regarding from which ports its exports were shipped, but it is well known that most were traded from Santos in São Paulo and Rio de Janeiro city (see Wirth 1982). In order to include this important state in the sample and deal with the overestimated data for Rio de Janeiro and São Paulo, I adjust the export for the three states (see methodological Appendix).<sup>24</sup>

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<sup>23</sup> For instance, while imports of Rio de Janeiro were also for the consumption of Minas Gerais and Goiás, Minas Gerais and Goiás also produced items to be exported through the port of Rio de Janeiro. Imports arriving in Recife went to the consumption of Alagoas, Sergipe and Pernambuco. Exports shipped from Amazonas and Pará also included Mato Grosso's products; from Maranhão, Pernambuco and Bahia's port were shipped products of neighboring states. See Brazil, *Commercio Exterior* (1914).

<sup>24</sup> Regressions were also run excluding Minas Gerais' exports and the results did not change.

*State Public Finance Data* were processed from the Agriculture Ministry for the nineteenth Century, National Statistics Yearbooks, and Expenditure of the Empire and Republic (several years); Estatísticas do Século XX (IBGE), and State Government Reports (several years). I also use data on population (censuses and estimations from National Statistics Yearbooks) and prices (Contador and Haddad, 1975 and Catão, 1992) to deflate the variables at per capita terms. Federal Public Finance data was collected directly from the Imperial and Republican governments' yearly fiscal balances.

#### *Empirical Strategy and Findings*

Table 4 (in Appendix B) shows the descriptive statistics. The last column shows the ratio between the average values of the variables after 1891, to its pre-1891 averages. The ratio indicates that state public revenue, and state public revenue per capita, grew faster than exports and exports per capita. The ratios suggest that the growth in state public finances after 1891 is not only driven by a growth in exports but by something else, that I presume is the state authority to collect export taxes established in the Republican Constitution.

The general specification is:

$$Y_{jt} = \alpha_j + \delta_t + \beta EXP_{jt} + \varphi EXP_{jt} * REP_t + \gamma X_{jt} + \varepsilon_{jt}$$

Y is the dependent variable (state public revenue, federal public revenue and expenditure) in per capita terms in period t for state j. All the variables are in 1913 prices. EXP represents exports per capita; and REP is an indicator variable for the Republic and it is 1, if the year is after 1891. I added it as an interaction term with exports in the equation, in order to measure how the exports determined the collection capacity of the states after the new Constitution was enabled. To control for time shocks common to all states (in some specifications we drop year dummies and include a post reform dummy) and unobservable characteristics of the states, I include time ( $\delta_t$ ) and state dummies ( $\alpha_j$ ), respectively. I use population and imports (vector X) to control for the demand of more public revenue, and their sign is expected to be positive. Standard errors are clustered by state. The regressions include 19 states and the Federal District (Goias is excluded)<sup>25</sup>. The period covered is between 1872 and 1939.

The results (see table 5 in Appendix B) show that the relation between exports and state public revenue was significant and positive once the Republican era began. The results are consistent for the different specifications. The results demonstrate that before 1891, exports and state public revenue per capita were not related, but after the Constitution, for every additional *rei*

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<sup>25</sup> For federal public revenue and expenditure, the Federal District is excluded given that most of the “national” public goods are accounted for, for the Federal District and it generates important distortions.

per capita exported, the states collected around 15 cents more in public revenue at per capita terms.

Table 6 (see Appendix B) shows some placebo estimations. In regressions 1 to 4, the last year of the sample is moved from 1939 to 1930, 1920, 1910 and 1900. The objective of this exercise is to check the sensibility of the results, changing the covered period as the weight for the sample after 1891 is larger than before 1891 (almost 50 years versus 19 years). Specification 5 shortened the period considerably as it includes only the period between 1887 and 1893 in order to avoid that other variables affecting state public revenue (including omitted variables) remain relatively constant in a short span of time. Although the coefficients are lower than the basic specification, it remains highly significant. More important, the conclusion is the same: the 1891 Constitution enabled richer states to collect more state public revenue. The second group of estimations (regressions 6 to 8) moves the break point from 1891 to 1900, 1910 and 1920 in order to confirm that 1891 is the year that matters in determining the threshold for the tax collection capacity of the states. The results show that the coefficient of the interaction term becomes insignificant, reinforcing the idea that the provisions of the 1891 Constitution is the event that marked the increasing of the financial capacity of the states, and not any other provisions that might have happened in the following years. Regressions 9 and 10 combined the two previous approaches, changing the breaking year and the period. The insignificant coefficient of the interaction term in the specifications confirms the previous findings.

In order to check if the change in the Constitution or in the general conditions of the public finances was for all tiers of governments or it was specific to state governments, I re do the regressions for the federal government. Table 7 (in Appendix B) shows that the relation between exports and federal revenue (specifications 2 to 4) and expenditure (regressions 6 to 8) did not have changes after the implementation of the 1891 Constitution as the interaction term is negative, though not significant. Regressions 1 and 5, which do not include the interaction term, interestingly show a high correlation between the level of exports and the contributions and spending of the federal government at the state level. The overall results indicate that during all the analyzed period, exporting states pay more federal taxes and that the federal government spends more in rich states. We do not detect a structural break in 1891 in this relationship, as we did with state public finances. So, the Constitution only affected positively the state public finances but not the federal ones. The results also suggest that federal expenditure did follow a compensatory criterion



for rich states, and not a redistributive in favor of poor states between 1872 and 1939, as the exports coefficient in specification is positive in specifications 1 and 5.

In summary, export states had more available resources after the Republican Constitution (the sign is larger and the Brazilian export sector kept growing consistently) and, consequently, had more autonomy to collect it and spend it. Rich states also contributed more to the finances of the Federation but they did not receive back those resources, through federal expenditure. Although the relation in terms of federal revenue and expenditure did not suffer modifications, the richer states were compensated with the attribution of collecting export taxes, thereby deriving in more resources and also higher control over the revenue and expenditure realized in their territory.

## **V. From Fragmentation to Centralization: the Case of Mexico**

Mexico's case shows an opposite trend than the one experienced in Brazil. During the first decades of independence, Mexico's local governments were relatively more powerful and they have control over a fair portion of the public revenue. However, a slow but continuous process of fiscal centralization took place by the end of the nineteenth Century. In this section I will use the analytical framework to understand the change of decentralization in Mexico.

Mexico became independent in 1821 after a decade of violent conflict. The first Constitution was written in 1824 with generous fiscal provisions to state governments.<sup>26</sup> According to Tenenbaum (1986, p.23), the country "had broken free from Mexico City during the insurgency and had not as yet been put under Mexico's control. Regional leaders were reluctant to pledge allegiance and revenue to an empire headquartered in the capital and ruled by a former Spanish army officer. They preferred to remit some revenue in exchange for as much autonomy as distance, inefficiency, and geography would allow". High fiscal autonomy for the regional elites was the cost that the federal government had to pay to keep the country united. To compensate such a loss, the Congress established the *contingente*, which it was a fixed payment that each state should pay in function of its population every year.

The incapacity of the federal government to generate enough revenues by its own, as well as the lack of control over the territory led the political elite to instrument a centralist reform in the mid 1830's, where the states would become provinces (governors were appointed from the

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<sup>26</sup> Sale taxes (*alcabalas*), duties on gold and silver, direct contributions, church contributions, income taxes on civil and ecclesiastical officials and taxes on *pulque*. On the other hand, Federal Government had the right to collect all port taxes and on national property; revenues from the monopolies of salt, tobacco, gunpowder, mints, post office and lottery

Center). However, this reform failed as separatist regional revolts upraised (Texas, Sonora, Yucatan, Queretaro and Guanajuato). The price of the centralist experiment was the loss of Texas that declared its independence and Mexico failed to surrender the rebellion. The failure of the centralism is attributed to three reasons (Tenenbaum, 1986): First, regionalism, which was a movement against the central control during and after the independence. Second, the extension of Mexican territory, as well as the distance between the capital and the ports made centralization hard to implement and; finally the republic was unable to get legitimacy “to create new taxes, administer them efficiently, and stimulate investment”(p.55) and keep the Nation in order. The weakness of Federal Government is evidenced by the loss of more than half of its territory to United States. Even after the American invasion (1846-1848), many states upraised in sake of independence (Sonora, Yucatan, Chiapas, Guerrero, Puebla, Guanajuato, San Luis Potosi).

A new attempt to bring order to Mexico came in 1857, when a new Constitution was written and it tried to empower the Federal Government to prevent new dismemberments of the territory. The arrangements defined explicitly the taxes that Federal Government could collect. States were allowed to collect residually those taxes not defined as exclusive responsibility of the Federation. In practice, the central power levied indirect taxes and states were in charge of the direct taxes. The Constitution also established anticlerical clauses that generated a polarization between conservatives and liberals, triggering a civil war. Its critical point was the rule of the Emperor, Maximiliano of Habsburg, with the backing of Mexican conservatives and Napoleon III (Bazant, 1991). Maximiliano lasted only 3 years in power. After that, a series of liberal presidents ruled Mexico, but stability kept absent.

In sum, the new country was unable to construct national political institutions during the first 55 years of independence. The country had 75 presidents, lost about half of its territory, was unable to control army and local bosses, and was invaded by foreign forces. The political instability and social unrest impacted severely the economy<sup>27</sup>: Coatsworth (1978) has estimated that the GDP per capita in 1860 represented only 66 percent of the GDP per capita of 1800.

In the context of the model, the fiscal equilibrium observed in Mexico reflects a very weak federal government (low marginal federal government productivity  $\theta$ ) unable to provide safety, protection against external threat, negotiation for better access to other markets due to the

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<sup>27</sup> Coatsworth (1978) argue that the economic difficulties of Mexico in the nineteenth century are due to two constraints in the Colony: 1) Geography: the country has no navigable rivers, making transport costs too expensive and; 2) Colonial institutional legacy: Judicial, political and economic institutions little propitious to free enterprise (p.94) as they were very extractive, discretionary and greatly centralized.

country's continuous conflicts and incapacity to attract investments to the different regions. In sum, the marginal productivity of the federal government was very low, and thus, its bargaining power. Local elites did not perceive a benefit from giving up fiscal resources to the Federation as the latter did not have so much to offer back to the regions. The federal government's vulnerability due to its incapacity to control the territory and keep it unified reflects the credibility of the secession threat of the states if they didn't get more fiscal autonomy. The result was a high level of decentralization *de facto*.

The political and economic situation turned into a new direction in the Porfirio Díaz dictatorship (1876-1880 and 1884-1910). During Díaz' tenure, Mexico reached peace and stability, promoting economic development and broaden national markets. The pursuit of those objectives could have interfered with the interests of regional elites, who had been responsible for many coups against the presidents and had enjoyed great autonomy in the past. Díaz instrumented a complex political strategy combining cooptation and repression against local bosses. His first actions were to remove local *caciques* (governors) and put in place someone loyal to his cause. This strategy was also followed by its predecessors but soon the new *caciques* demanded autonomy. However, Díaz counted with several advantages that allowed them to control efficiently the regional leaders. The first one was the expansion of the railroad network in the country, which allowed the federal forces get to the provinces as soon as a governor rebelled. The location (financed by foreign investment and granted for the central government) of the railroad lines was also used in favor of the central interests because of the positive economic effects that a cheaper and faster mean to transport merchandise could represent to the regions. Díaz also allowed the deposed governors and the new one received economic rents from the activities performed in their states as they act as intermediaries with foreign investors. This mechanism prevents rebellions from the local oligarchy since local instability meant dissuasion of foreign investment and consequently the closing of an important revenue source for the *caciques*. Finally, Díaz appointed military commanders with no local links where they were assigned to oversee the local officials and promoted the *jefes políticos* (district administrators) to control the police and armed forces. Now, they were loyal not to the governors but to the central government (see Katz, 1991 for this process).

The key of the success of this political operation was the impressive economic growth experienced in Mexico during the *Porfiriato* (as the Porfirio Díaz tenure is known), driven mainly by the exports boom. Between 1877 and 1910 GDP per capita doubled, see Coatsworth (1978)) as this

enable him to distribute (and co-opt) economic rents among the local bosses, who were a constant source of political instability. Beyond the economic capacity to align the interests of the federal government and local elites, the economic bonanza gave financial autonomy to the Federal Government. To obtain more revenues, Díaz avoided keeping high taxes or executing forced loans, because those measures would drive away foreign investors (Katz, 1991). Thus, the composition of the federal revenue was based on precious metals, imports and timber taxes (consumption taxes). The federal public revenue increased consistently during his term.

The engine of the economic growth during the *Porfiriato* was, as in Brazil, the export sector. Bulmer Thomas (1994) estimates that the exports per head in Mexico grew almost 500 between 1870 and 1910.<sup>28</sup> The Mexican export sector was also concentrated in a few commodities, mining products. Mining had always represented an important share of the economic output since colonial times but it had a severe depression in the post- independence era. During the *Porfiriato*, minerals and metals' share in the Mexican exports ranged between 60 and 80 percent, where the most important mineral was silver. Mexican silver provided around one third of the international demand of this metal. The mining boom in this period was possible because of the surge in the international demand for minerals. Particularly, the industrial boom in United States increased the demand for Mexican metal mineral inputs. Around 75 percent of Mexican exports were delivered to its northern neighbor.

Mexico could diversify, beyond the traditional silver and gold, their mining production too because the new worldwide industries demanded new minerals to their productive processes (e.g. zinc, lead and copper). Technological changes also increased the productivity in the sector (e.g. introduction of electricity to mining and cyanide process, see Sariego et al., 1988).

The mining production growth was mainly due to the role of foreign investment. The precarious internal capital markets, along with the fact that mining was technically more complicated and expensive to exploit (at least relative to crops like coffee), explain why the mining expansion could not be financed with national investments.<sup>29</sup> However, these conditions would have not been sufficient to bring international capitals. Long roots of political instability did not guarantee the property right enforcement and it could have kept foreign capital away from Mexico.

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<sup>28</sup> Mexico's exports per capita went from 2.3 dollars in 1870 to 10.7 in 1910. The exports/GDP ratio was around 14 percent in 1913. Brazil's exports per head passed from 8.6 dollars to 14.2 in the same period. See Bulmer Thomas, 1994.

<sup>29</sup> Only 5 percent of the investments made in mining were domestic (see Haber, et al., 2003).

In addition, foreign investment had faced other obstacles such as high taxation and underdevelopment of the national transport system.

To overcome the potential risks for foreign investments, Porfirio Díaz allowed the economic elite to design the rules of their own economic activities. Haber, Maurer and Razo (2003) argue that in order to make credible the respect of those rules, the President encouraged state elites and politicians to participate in the economic activities and be members of the board of directors of many firms. Any attack of the President against the property rights of foreigners will be also an attack against the quasi-rents received by the local politicians. If Díaz was willing to violate the property rights of the firms, he would be breaking the implicit agreement with regional leaders and his presidency could have been in danger. Moreover, the tax system was modified to lower the burden in mining and a massive construction of railroads was implemented.

However, a natural question rises in this discussion: Why didn't the local elites try to appropriate the whole economic rents and threaten to become independent in order to negotiate directly with foreign investors or why didn't they attract the investment by themselves if the mining wealth was in its soil? Haber et al. (2003) provide a feasible answer. They argue that local elites decided not to fight against the centralization to preserve their autonomy as they were also benefited from the mechanism designed by the Center. In the same line of argument, Carmagnani (1993, pp. 163-164) says that "the beginning of the American investment in the productive sector and railroads, led to states to diminish the intensity of their [fiscal] demands of sovereignty and, instead, they work collaboratively with the federation with the aim of being benefited from the economic reactivation". The regional elites' calculus should have considered the costs of a conflict, the probability of winning, the international perception which would make more difficult generate the needed foreign investment trust in a new, perhaps unstable country and the costs associated with stop being part of a greater country (greater internal market, common army, exclusion from a national railroad network). Moreover, the option of staying in a country with economic growth and political stability were high, increasing the bargaining power of the central government. In addition, the change of relative power allowed the federal government to be the entity in charge of conciliating the diverse interests of the regions and to head the political economy.

The consequence of the change of the bargaining power was the centralization of many laws (Medina 1997). Particularly two law changes had implications in the economic and fiscal relation between states and Federation: the elimination of the *alcabalas* (interstate taxes) and the mining

code. Along with *contribuciones*,<sup>30</sup> the interstate taxes were a permanent source of conflict between the two tiers of governments. Since 1848, the *alcabalas* were legally forbidden but they were commonplace in the interstate transactions. It was until 1896 that the parties achieved a formal agreement where the states compromised stop collecting these taxes. This was a triumph of the Center because it unified the domestic market (and furthermore increase the federal government revenues); and signified a great loss for the revenue of the state government as *alcabalas* represented up to more than 40 percent of their revenue for some states.<sup>31</sup> The negotiation too implied the elimination of the federal manufacture tax, which had been created in 1880 and the states considered that invaded its autonomy (Carmagnani, 1993). Figure 5 (see Appendix B) shows the path of fiscal resources of states and Federation, where the latter consistently grew, while state governments could not expand its collection capacity.<sup>32</sup>

On the other hand, the mining reforms intended to promote foreign investments, federalizing the legal framework and limiting state taxation on mining production. Since 1857 the states had the autonomy to legislate on mining and, after a failed attempt in 1867; the mining legislation was finally federalized in 1883 (Sariego 1988). The main objective of this reform was to bring certainty to the investors. Now, instead of dealing with 32 different governments and legislation, and different risks of violation of the property rights, the foreign investors were under a single, federal law. The mechanism described above prevented federal government of expropriation and, furthermore, the federalization improved the trust of investors (Haber et.al. 2003). This change also resulted in the weakening of the states' position. The states' loss of the capacity to legislate and deal directly with the capital owners meant that the federal government controlled the economic strategy of development. Further reforms limited the capacity of states to tax mining production.<sup>33</sup>

The north and center regions, along with Yucatán were the most prosperous of the *Porfiriato*. Southeastern states based its economy on the cultivation of a couple of export corps. The most emblematic case is Yucatán,<sup>34</sup> which main crop cultivated was sisal (*henequen*, used for

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<sup>30</sup> The *contribuciones* were transfers made from state governments to the federal one during the first decades of Mexico as an independent nation. See Villa Patiño (1945)

<sup>31</sup> However, the elimination of *alcabalas* was not complete and survived until the second half of the twentieth century as Aboites (2001) points out.

<sup>32</sup> A very interesting contrast to the Brazilian case, it is that in 1898 the states were forbidden to borrow overseas, preventing them to have alternative sources of resources.

<sup>33</sup> The 1892 reform established that states could only set a maximum tax rate of 2 percent on the gross value production of the mining production.

<sup>34</sup> On the other hand, Chiapas and Tabasco foreign landowners cultivated mainly rubber and coffee.

making rope and cordage). The demand for sisal increased considerably since the 1880's when McCormick reaper started using it, representing around 15 percent of the exports in some years.

Yucatán represents a good counterfactual for the model. This state is peculiar because unlike other export activities, the henequen haciendas and the local railway system were owned by Mexicans (Katz, 1991). Historically, Yucatan was seduced by the idea of becoming an independent nation. Once Mexico became independent, local creoles landlords cultivated henequen independently and they developed little links with the capital and they saw naturally the idea of forming a new country. This was concretized in 1839, when the *henequeros* armed Mayan peasants to fight against the central army with the aim of declaring Yucatan an independent country, as it happens temporarily. However, the Mayans were recruited under the promise of privileges like abolition of taxes and the use of communal lands. The promise was not honored by the local elite, triggering a racial conflict, called War of the Castes, where the whites were targeted to be exterminated. After some years of cruel conflict (half of the population disappeared), the rebellion was pacified but with help of the national army, eliminating the secession dream (Bazant, 1991). However, small elite controlled the production of the henequen in a relative autonomous way. The equilibrium of Yucatan is similar to the one we observe in Brazil in the late 20<sup>th</sup> Century, as it could produce and trade independently from the federal government (low federal government productivity).

In contrast, the north had a more diversified economy (they exported minerals, chick peas, cattle and lumber) and part of their production was directed to the internal market (e.g. cotton in La Laguna). Some industries were raised in the north like steel, smelters of minerals and food processing. Although the Mexican capital was located in crops and some industries, the penetration of foreign capital was high, mainly in mining. Finally, in the central Mexico the traditional crops like corn and wheat did develop slowly, but there was an important industrial development in Veracruz, Puebla and Mexico City. In sum, the development strategy was based on foreign capital which penetrated in central activities like mining, banking, industry and transportation (See Katz, 1991).

Thus Mexico, like Brazil, had regional redistribution of economic activities. The Center-North of the country was favored by important mining sources in their soil and the international demand conditions to trigger production. However, unlike Brazil, the exploitation of the Mexican endowments required specialized knowledge, technology and machinery, as well as high investments to start up mining projects. Both were very scarce in Mexico. So, the economic initiative of developing the well endowed regions was instrumented in the center and not by the

local elites. This necessarily altered the balance of power because the Federal Government decided who, how and where to invest in states were attentive to be granted with investments in their own territory, where the local economy and personal finances will be benefited. The increasing in bargaining power by the federal government was used to strengthen its economic and fiscal attributions of the Federation. Although, the economic activities were away from the Center of the country, the capital was the most beneficiary of the new order of things. Table 8 and Figure 6 (in Appendix B) show the regional reallocation of the mining and export activity in the ports of the country. The mining production is reallocated to the North, which passed from one fifth of the total mining production to more than half of the production between the beginning and the end of Díaz tenure in expense of the center states. The same trend is observed in the ports where the exports were shipped from. Tamaulipas, a US Border state with ports, increased its custom activities. In 1877-78 less than 10 percent of the Mexican exports got out from there but by the end of the *Porfiriato* the share surpassed 40 percent. Veracruz, the traditional port linked to the economic activities of the Center, loss its relative export importance during the *Porfiriato*, going down from 60 to 20 percent. Progreso's port, located in Yucatan, reflects the cycle of henequen demand.

However, we do not observe a similar trend in the regional property value according to the reallocation of economic production (see table 9 in Appendix B). Although the north was the leading region in mining production, it loses participation in the value of properties. Meanwhile the empowered Federal District jumped from 15 percent to more than a quarter of the national property values. This was mainly due to investments in urban properties promoted by the Federal Government. The last column of Table 9 (see Appendix B) shows that the regional share of the sales years before the end of the *Porfiriato* was also very concentrated in the Center. These trends suggest that the northern reactivation enrich the center of the country and my argument is that it happens because the federal government's role in economic promotion improved its bargaining power and most of the benefits of the economic growth were enjoyed in the capital.

In spite of the decentralization of economic activity, fiscal centralization can be explained with the analytical framework. Mexico also participated in the process of worldwide trade globalization experienced in the second half of the nineteenth Century. The country's exports, mainly mining, were produced in regions away from the traditional economic states (in the North, what in the context of the model is high  $k_L$ ) located in the Center of the country. However, the local elites were not independents in the production. The lack of financial capacity and technological knowledge prevented the local elite of developing the mining sector by their own. An additional



factor that played a role in favor of the bargaining power was that many mining states were land or US border locked, in such way that they needed transportation and tax exemptions for interstate trade in order to reach the export shipping places. All these circumstances increased the productivity of the Federal Government (high  $\theta$ ), as it was the only entity capable to bring foreign investment needed to mining and railroads. Moreover, its increased bargaining power allowed him to eliminate the interstate taxes which could hinder the formation of national markets. These factors made the Federation more powerful and able to centralize fiscal resources without a credible threat of state secession opposed as to the previous attempts of centralization, when there were not economic rents to co-opt the local elites. In conclusion, the period covering the *Porfiriato*, represented two changes in the variables of the model that changed the relative power of the Center and Periphery. From 1821 to 1876, Mexico had a very slow growth in economic activity, in part due to the incapacity of the Center to stabilize the country and for the low international demand for commodities produced in Mexico. This implied that Mexico had low  $K$  and low  $\theta$ , in such way that, even the provinces had a low outside option/autonomous production, they did not require help from Federation to produce and the Center was so weak in order to rule in the territory, leading to an equilibrium with a high tax share. Trade globalization changes the incentives of the players as the fundamentals of the model change. International demand made the value of the endowments to change increasing the value of the potential production. Moreover, the marginal productivity of the federal government increases given the characteristics of the production function of mining as local elites were unable to exploit their resources by their own. So, the new equilibrium move to a one in which Federation share less tax revenue with states.

After the Revolution that overthrew Díaz, a new Constitution was written in 1917. Here it was established that all the subsoil (including mining and petroleum) resources belonged to the Nation and administered by the federal government. Two elements should be highlighted along with this regulation. The first one is that although the power in the country was divided among some regional revolutionary leaders, it was agreed that the main source of the national wealth was attribution of the Federation. The second one is that, in practice, the federal government did not produce minerals and petroleum as foreign firms were allowed to exploit those resources. The technical and financial incapacity of the government and domestic capital to run such businesses can explain both facts. Anyway in terms of federalism, the result of the new institutional changes benefited the tax position of the Federation due to the low economic bargaining power of the regional leaders. Years later, in 1937, the government confiscated the foreign firms their petroleum

infrastructure and it created PEMEX, an oil public monopoly company. After this, the petroleum has represented an important share of the GDP and it has financed the public expenditure (around 40 percent of the total). Although the oil has been exploited in the states and not in the political Center of Mexico, this product is property of the Federation.

## **VI. Conclusion**

This paper provides a new explanation for differences in tax decentralization. I use a model to compare the fiscal decentralization trends in two Latin American countries with very similar characteristics. My model shows that, independently of the level of development, what it really matters when distributing fiscal resources is the regional distribution of the economic wealth and the relative capacity to exploit the endowments from local elites. Countries with richer provinces that are capable to exploit its endowments have bargaining power to negotiate tax attributions because its secession threat is credible. We illustrate these dynamics in Brazil where the economic empowerment of some of the Provinces due to a sudden positive valuation of its endowments led to higher autonomy. Mexico's regions could not do it because of the financial and technical limitations to exploit mining products. Some evidence of the model and the study cases showed that the incentives posed in a more decentralized country could lead to boost the overall public revenue as it was in Brazil.

Further work should expand the utilization of this model to explain the evolution of tax decentralization institutions in other Latin America countries or other regions. Another direction of further work is to explore the effects of these institutional arrangements in the regional development of both countries. Although it is well known the relation between provision of public goods and development, it is intriguing why Mexico and Brazil has had a similar GDP per capita gap at least since the beginning of the twentieth Century given that the later has consistently collected more public revenue than the later. A hypothesis to be explored is that Brazil's decentralization favored the provision of public goods in the richer states and the poor ones were left behind. On the other hand, even with a more centralist division of fiscal responsibilities, Mexico also suffers from important levels of regional inequality. This may indicate that the Federation has not been able to redistribute regionally the public resources. Finally, future work should emphasize the mechanisms of institutional persistence of federalism, its effects on economic development and size of government.

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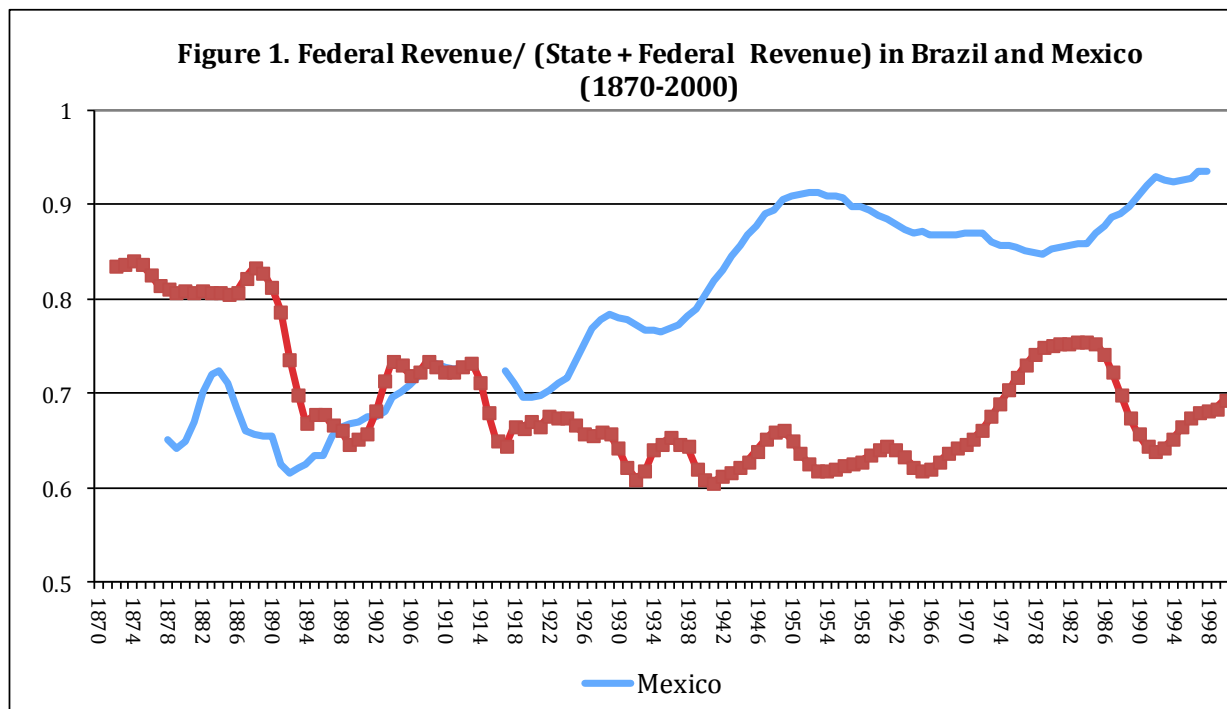
## Appendix A. Sources and Methodology to Construction of the Dataset

Variable	Source	Comments
Federal Public Finance	Balancos da Receita e Despesa do Imperio e da Republica (1869-70 to 1914), Some datar for the eighties were taken from Cavalcanti, Amaro, Resenha Finaceira do Ex-Imperio do Brasil em 1889, Rio de Janeiro, Imprensa Nacional, 1890. (from 1878-79 1886-1887) when the balances are not available. The balances were downloaded from <a href="http://www.nemesis.org.br">www.nemesis.org.br</a> . Ministerio da Fazenda, Contas do Exercicio Financeiro de 1926. RJ Imprensa Nacional 1927 for data from 1915 to 1927. From 1928 to 1938 see Quadros Estatisticos 1,2 and 3.	The fiscal year until 1886-7 was from summer to summer, and from 1888 on the fiscal year changed from January to December. The figure for 1886-87 reported 3 semesters. It was adjusted, multiplying it by 2/3. Similarly, figure for 1933 includes 15 meses (12 from 1933 and 3 from 1934) and 1934 is reported only for 9 months. It was adjusted in order to leave both figures at yearly base.. Between 1900 and 1927 part of the imports tax receipts was collected in gold. So, it was necessary to convert the amount of gold into paper <i>reis</i> . The exchange rate between gold and <i>reis</i> was taken from between 1900 and 1924: Directoria Feral de Estatistica (Ministerio da Agricultura, Industria e Commercio), Estatistica das Financas do Brazil, Rio de Janeiro, 1926. For the 1924-1927 period, the rate was calculated as we know the total collected in paper and gold, as well as the total converted to paper from the <i>Estatisticas historicas</i> . From the total we subtract the amount denominate in paper and this result we divided by the amount in gold to get the exchange rate. Part of the federal revenue and expenditure was collected and spent in London (where the Ministry of Finance had an office and it was in charge of paying the external debt). It was not included.
State Public Finances	For data before 1897, we use Brazil (1914). For data from 1897 to 1939, see AEB V (1939/40).	Few data for some years and some states, the data is the budgeted and not the "actual". Some data reported was not for 1 year (either 6 or 18 months) and it was adjusted to be of 12 months (multiplying by 2 or 2/3 respectively). Finally, missing data for some years was filled out with linear interpolation between the closest data points available.
International Trade Data	Data from 1888, Ministerio da Fazenda (1888) Data from 1887, 1892 to 1897 and 1903-1907 is from Directoria Geral de Estatistica (1908). Data from 1902 (imports) and 1901 and 1902 (exports) from Servico de Estatistica Commercial ,(1904) 1908-1912 comes from AEB I Data from 1913-1927 and 1935-40 comes from Commercio Exterior do Brasil, several years. Information from 1928-1934 is from Serviço de Estatística Econômica e Financeira (1938). Overall data of exports and imports for the whole country from 1889-92 and 1898-1901 was taken from	1.. To fill out data gaps from 1889 to 1892 and 1898 to 1900 for exports and 1898 to 1901 for imports we followed the following strategy: We have data for total exports and imports of Brazil for these years, so we calculated the values for each state making a linear interpolation of the shares between the two known points of time and multiplying this share by the total imports and exports respectively. 3. Information includes only 18 states, the ones which have customs offices (usually the states with river or sea ports). For this reason, no data available data for Goias and Minas Gerais (MG). The later one, however, has reported exports but not from which ports they were shipped from. However, we know that most of the exports were shipped from Santos (in São Paulo, SP) and Rio de Janeiro (RJ). So, in order to include this important state in the sample, we assume that the same share in the total exports for RJ and SP corresponds to the exports from MG in each port. So in this case, we subtract from the SP and RJ exports, the MG's share and recalculate the export values for these 3 states. For the MG export data for 1927-1931, we assume that the MG average export share between 1923 and 1927 will prevail for the rest of the studied period and we proceed with the same methodology as explained above. In order to show that results of the estimations do not change, we also use the exports as reported by the federal publications (excluding MG).

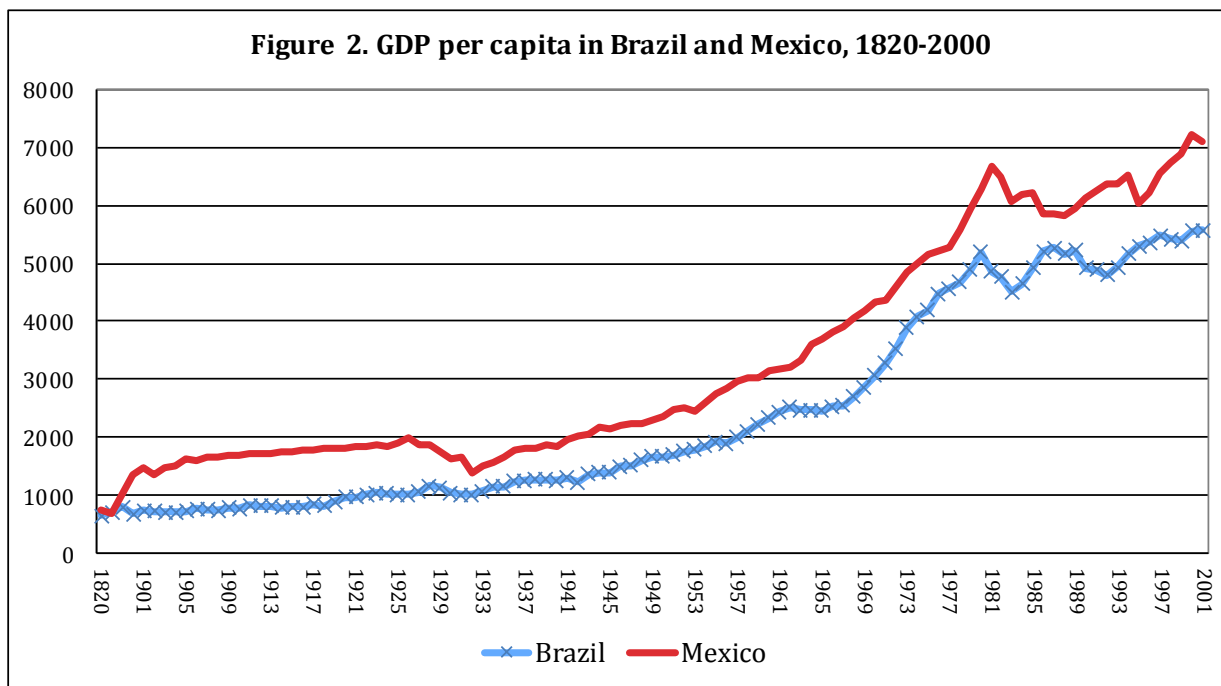


	<p>AEB V. Data from Minas Gerais is Servico de Estatistica Geral (1929). Yearly information since 1839-1840 until 1927.</p>	<p>Unfortunately, data for imports for MG is not available. So, all the estimations including imports exclude MG.</p> <p>4. Rio de Janeiro/DF. Federal District is located in Rio de Janeiro city, which is in Rio de Janeiro state. Both the city and the states collected their own public revenue, but the federal revenue public revenue is consolidated. Moreover, the port of the state is in Federal District and it is not until the twenties when other ports were open in the state (eg. Angra dos Reis). So we can not distinguish the exports made by the city in itself or the state. However, we are confident that most of the state exports were shipped from the RJ port and most of the RJ port's exports come from the commodities produced in the state. Furthermore, we consider that the state was benefited from the exports and economic activity made in the port of Rio de Janeiro and vice versa and for this reason we use the same level of international trade activity for both state and city.</p>
<i>Population</i>	<p>The sources for the population are from the Population Census 1890 and 1900; and AEB V which contains data from 1900 to 1939.</p>	<p>Data from 1873 to 1899 was estimated through interpolation: We assumed a linear trend between censuses points for each state.</p> <p>Used to calculate the variables at per capita terms.</p>
<i>Prices</i>	<p>Index prices before 1913 were taken from Catao (1992) and from then on, see Contador and Haddad (1975).</p>	<p>Used to deflate the variables at 1913 prices.</p>

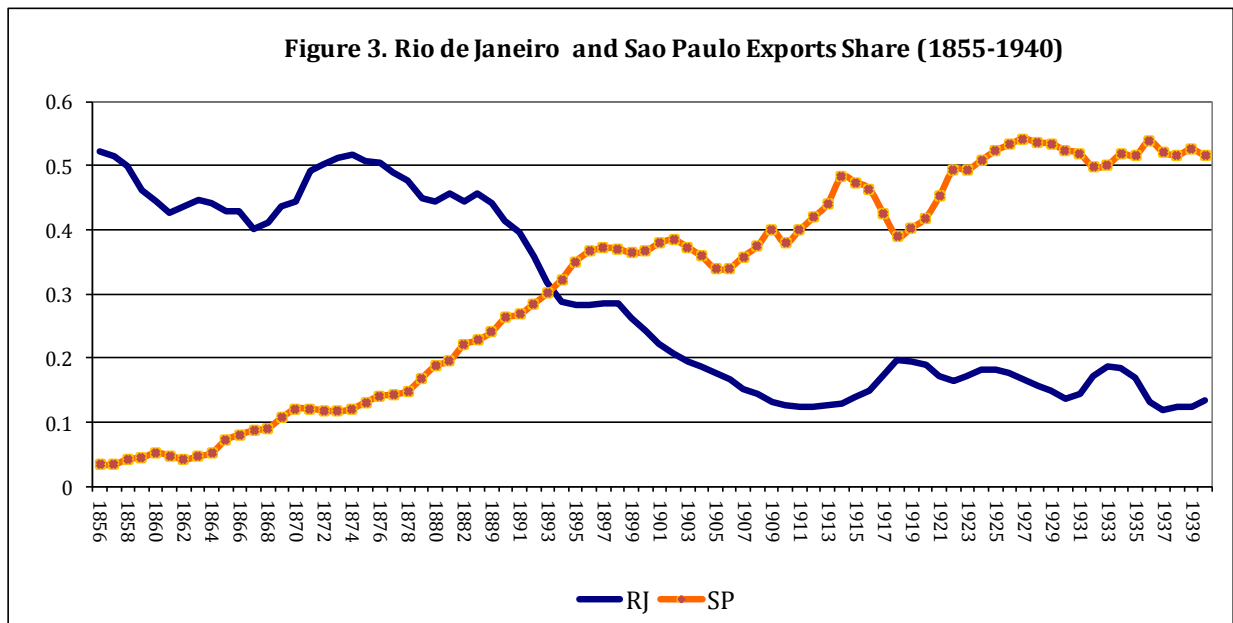
## Appendix B. Tables and Figures



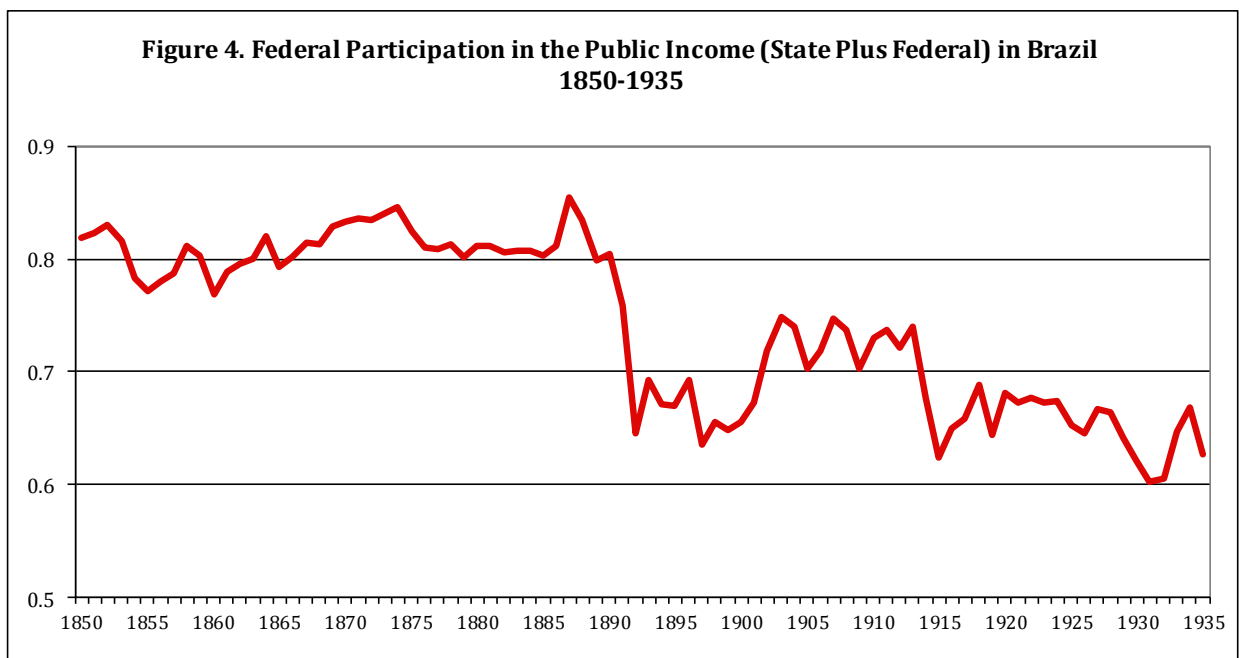
Sources: Mexico: AEEUM (several years), Peñafiel (several years) and EHM;  
Brazil: Secretaria de Agricultura (1914), Estatísticas do Seculo XX and AEB (1939)



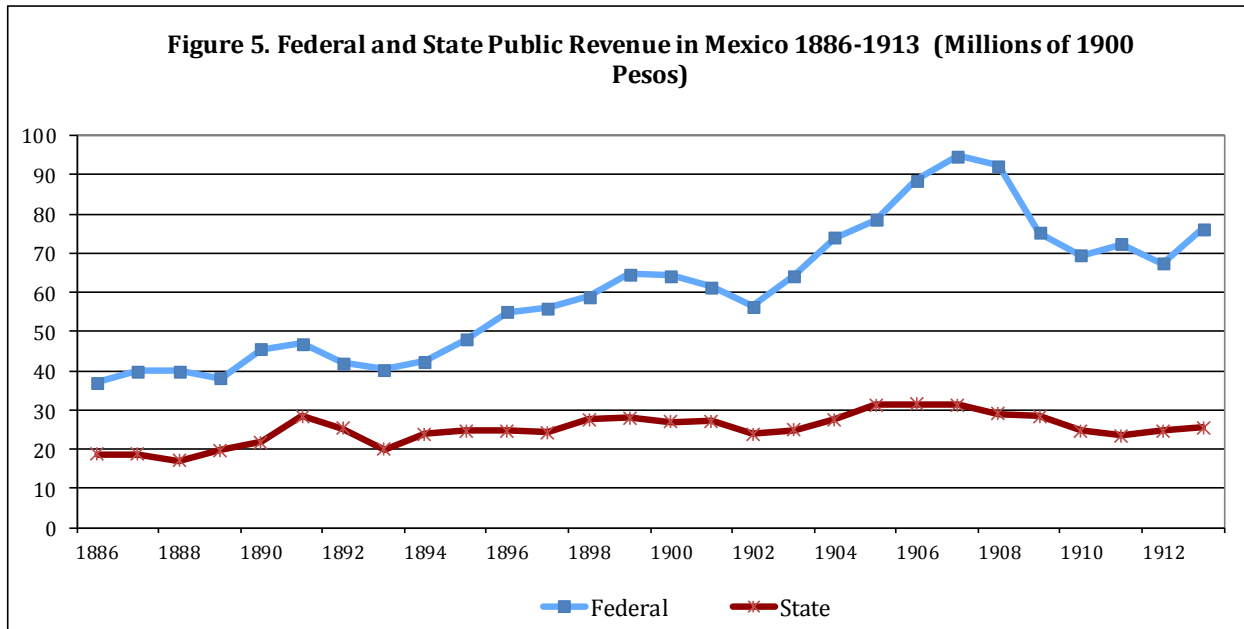
Source: Madison and OECD (2003)



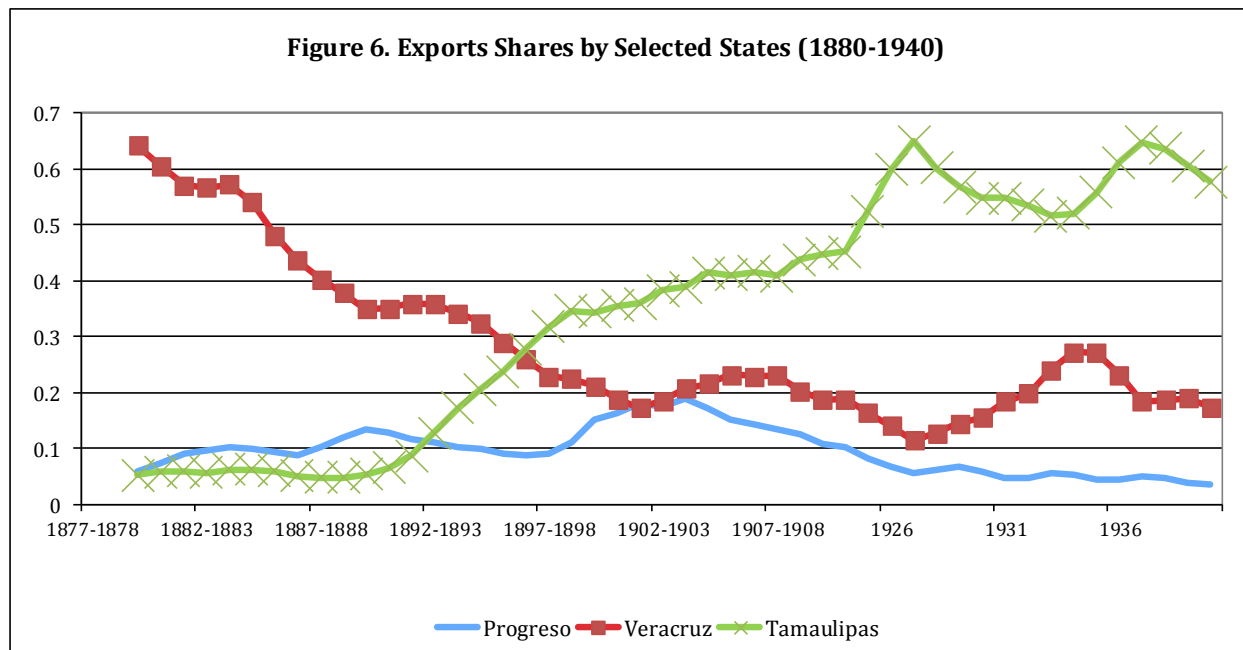
Source: See Methodological Annex (International Trade Data)



Source: See Methodological Annex (Public Finance Data)



Source: EHM (1987), Penafiel (several years), Perez Siller (2004), Servin (1957) and Gomez and Mussachio (2000)



Source: EHM (1987)

<b>Table 1. Comparative Statistics for Mexico and Brazil*(2000's)</b>		
	<b>Brazil</b>	<b>Mexico</b>
PPP GNI per capita (world rank) (2003)	<b>7510 (86)</b>	<b>8980 (80)</b>
Agricultural share in GDP (2003)	6	4
Exports and Imports of Goods as %of GDP (2003)	<b>30</b>	<b>58 (38)**</b>
Urban population (% of total, World bank) (2003)	83	75
Population density (people per square kilometer) (2003)	21 (49)***	54
Size of informal population as % of GDP <sup>1</sup> (early 1990's)	37.8-29.0	35.1-49.0
Gini Index	59.3 <sup>2</sup>	54.6 <sup>3</sup>
Population below \$2 a day %	22.4 <sup>2</sup>	26.33
Institutional factors (2004) <sup>4</sup>	0.01(0.05)	0.08(.11)
Legal origin <sup>5</sup>	French	French
Catholic Population (%) <sup>5</sup>	87.8	94.7
Territory Area (1000's of square kms) <sup>6</sup>	<b>8514</b>	<b>1972</b>
Democracy Index (2007) <sup>7</sup>	2	2.5
Ethnic fractionalization Index <sup>8</sup>	0.54	0.54
Language fractionalization Index (2001) <sup>8</sup>	0.04	0.15

<sup>1</sup>Schneider, et.al (2000), First figure is MIMIC approach average between 1990 and 1993 and the second one is the physical input method for 1989-1990.

<sup>2</sup> Figure for 2001. Data from poverty and inequality are from income surveys for Brazil.

<sup>3</sup> Figure for 2000. Data from poverty and inequality are from expenditure surveys for Mexico.

<sup>4</sup> Average of 6 institutional indexes (ranging from -2.5 and 2.5)Government Effectiveness, Regulatory Quality, Rule of Law and Control of Corruption. In parenthesis variance is shown. Data from Kaufman, et.al (2006).

<sup>5</sup> La Porta, et.al. (1999).

6. Wikipedia

7. Freedom House Democracy Index. The index can take values from 1 (completely free) to 7(no free).

8. Alesina, et.al (2003). Index is between 0 (lowest fractionalization) and 1. Broadly, fractionalization means there is more groups evenly distributed in the population. Mexico's figure is for 1990 and Brazil 1995.

\*Information mainly taken from World Development Report, 2005 at least otherwise indicated

\*\*\*In parentheses, the figure shows the population density of Brazil without taking into account the inhabited and vast territory of North and Center of Brazil.

\*\* Parentheses figure show the openness considering only non-maquila foreign trade.

<b>Table 2. Tax indicators for Brazil and Mexico (2004)</b>		
	<b>Brazil</b>	<b>Mexico</b>
Total Revenue (% of GDP) (1)	40.50%	24.40%
Tax Revenue (% of GDP) (2)	26.66% <sup>1</sup>	10.60%
Share of Local Governments in (1)	31.50%	5.80%
Share of Local Governments in (2)	37.70%	5.60%
Post transfers participation of Local Governments in Total Revenue	40.30%	22.3% <sup>2</sup>
% of FG collection transferred to LG	12.90%	21.4% <sup>3</sup>
% of LG own income of in their total available income	78.10%	28.8% <sup>4</sup>

Own elaboration with data from:

Brazil: Data includes tax revenue, contributions and other receipts (Patrimonial, Services, Industrial and Other). The two former were taken from Receita Federal (2005) and the latest from Tesouro Nacional (2004), Contas Nacionais. Financial sources are excluded.

Publicas Estatales y Municipales de Mexico 2001-2004 INEGI (2006). Includes Income from Public Enterprises and excludes financial sources.

1. For Federal Government, I only consider Social Security contributions, PIS, PASEP and FGTS as contributions. The taxes according to the classification of the IMF.

2. The considered transfers are only Participaciones which can be used by the local governments freely. decides in which aspects will be spent and local governments only are executors. They are not in this percentage.

3. See note 2.

4. See note 2.

<b>Table 3. Regional Distribution of Public Finance, Population and International Trade (1850-1930)</b>						
	<b>Federal Expenditures</b>					
	Southeast	Northeast	North	South	RJ and Federal District	São Paulo
Average 1870-1889	72.8%	16.6%	2.4%	8.1%	67.0%	1.8%
Average 1890-1909	81.5%	8.6%	2.2%	7.7%	76.9%	1.8%
Average 1910-1929	84.2%	7.3%	2.1%	6.4%	76.5%	4.3%
	<b>Federal Receipts</b>					
	Southeast	Northeast	North	South	RJ and Federal District	São Paulo
Average 1870-1889	63.0%	24.7%	6.1%	6.1%	54.6%	6.8%
Average 1890-1909	66.0%	16.5%	9.6%	7.8%	50.6%	14.0%
Average 1910-1929	77.8%	10.8%	3.3%	8.1%	47.8%	26.8%
	<b>State Public Revenue</b>					
	Southeast	Northeast	North	South	RJ and Federal District	São Paulo
Average 1855-1870	44.3%	38.4%	7.0%	10.3%	22.0%	8.3%
Average 1870-1889	46.8%	31.5%	11.5%	10.1%	19.3%	13.9%
Average 1890-1909	59.5%	16.3%	16.2%	8.1%	20.8%	26.1%
Average 1910-1929	64.4%	17.3%	3.6%	14.7%	17.1%	30.2%
	<b>State Public Revenue / (State Public Revenue + Federal Public Revenue)</b>					
	Southeast	Northeast	North	South	RJ and Federal District	São Paulo
Average 1870-1889	15.3%	23.7%	31.6%	28.7%	7.9%	33.4%
Average 1890-1909	31.5%	33.5%	46.1%	34.4%	17.3%	48.9%
Average 1910-1929	32.8%	48.6%	38.9%	51.6%	17.4%	39.9%
	<b>Imports</b>					
	Southeast	Northeast	North	South	RJ and Federal District	São Paulo
Average 1852-1869	55.4%	34.9%	4.1%	5.6%	54.3%	1.1%
Average 1870-1889	59.8%	29.0%	5.1%	6.1%	52.7%	6.8%
Average 1890-1909	62.8%	18.1%	10.9%	8.2%	43.3%	18.5%
Average 1910-1929	77.6%	12.1%	2.2%	8.1%	42.0%	35.2%
	<b>Exports</b>					
	Southeast	Northeast	North	South	RJ and Federal District	São Paulo
Average 1852-1869	50.3%	37.7%	5.0%	7.0%	44.9%	5.4%
Average 1870-1889	65.5%	22.9%	8.0%	3.6%	46.5%	18.5%
Average 1890-1909	58.5%	13.5%	23.8%	4.3%	18.4%	37.3%
Average 1910-1929	71.9%	14.3%	4.9%	8.9%	16.6%	51.3%
	<b>Population</b>					
	Southeast	Northeast	North	South	RJ and Federal District	São Paulo
Average 1872-1889	44.0%	43.9%	3.3%	8.8%	10.2%	9.1%
Average 1890-1909	46.4%	39.3%	3.9%	10.4%	9.5%	12.6%
Average 1910-1929	47.2%	36.8%	4.4%	11.6%	9.0%	15.0%

Data on public finance do not include Acrea and London.

Southeast include Rio de Janeiro, Federal District, São Paulo, Minas Gerais, Espiritu Santo, Goias and Mato Grosso;

Northeast Alagoas, Bahia, Piaui, Ceara, Rio Grande Do Norte, Sergipe, Paraíba, Maranhão and Pernambuco; North, Amazonas and Para and; South Parana, Santa Catarina and Rio Grande do Sul.

Table 4. Descriptive Statistics						
Variable	Obs	Mean	Std. Dev.	Min	Max	Average Post1891/Pre 1891
State Public Revenue (1000's of reis)	1400	11,385	26,570	103	281,209	6.67
State Public Revenue per capita (1000's of reis)	1360	8.7	9.5	0.5	76.7	2.03
Exports (1000's of reis)	1252	50,151	93,244	2.08	671,074	3.43
Exports per capita (1000's of reis)	1220	39.4	58.8	0.004	711.0	1.68
Imports (1000's of reis)	1244	40,482	104,609	1	761,768	2.97
Imports per capita (1000's of reis)	1212	28.9	56.5	0.01	418.2	1.36
Population (thousands)	1360	1,119.7	1,331.0	57.6	8,086.0	2.24

1 conto is equivalent to one million of reis.

Table 5. State Public Revenue per capita (Brazil states 1872-1939).									
Dependent variable is the state public revenue per capita at 1913 reis. All the specifications are OLS panel data. The hypothesis tested is that the 1891 Constitution brought a change in the relation between the public revenue collected by states and exports per capita. Exports are incorporated in two ways: 1) the exports for the whole period; and 2) an interaction term that multiplies exports by a post 1891 dummy. A positive and significant sign in the second coefficient confirms our hypothesis. Robust standard errors clustered at state level in parentheses. Coefficients marked with: *** indicates significant at 1%, ** at 5% and * at 10%									
	State Public Revenue per capita								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Exports per capita	0.11*** (0.004)	0.055*** (0.005)	0.053 (0.05)	0.014*** (0.01)	-0.049 (0.03)	-0.046 (0.03)	-0.045 (0.03)	-0.043 (0.03)	-0.042 (0.03)
Exports pc*Post 1891				0.132*** (0.01)	0.148*** (0.03)	0.147*** (0.03)	0.148*** (0.03)	0.144*** (0.03)	0.144*** (0.03)
Post 1891									-0.00190* (0.00)
Imports per capita							-0.008 (0.03)	-0.018 (0.02)	-0.017 (0.02)
Population								0.003*** (0.001)	0.004*** (0.00096)
Constant	0.005*** (0.0003)	0.007*** (0.0003)	0.011*** (0.0021)	0.007*** (0.0008)	0.007*** (0.0007)	0.009*** (0.0022)	0.009*** (0.0025)	0.004 (0.0032)	0.0062*** (0.00118)
Observations	1288	1288	1288	1288	1288	1288	1220	1220	1220
States	20	20	20	20	20	19	19	19	19
R-squared	0.375	0.096	0.267	0.547	0.465	0.515	0.512	0.542	0.517
Time Dummies	No	No	Yes	No	No	Yes	Yes	Yes	No
State Dummies	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Clustered Errors by State	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes



<b>Table 6. State Public Revenue per capita (Brazil states 1872-1939). Placebo estimations</b>										
Dependent variable is the state public revenue per capita at 1913 reis. All the specifications are OLS panel data. The hypothesis tested is that the 1891 Constitution brought a change in the relation between the public revenue collected by states and exports per capita. Exports are incorporated in two ways: 1) the exports for the whole period; and 2) an interaction term that multiplies exports by a post-1891 dummy. Specifications from 1 to 4 run the estimations in different periods to check the sensibility of the results. In specifications 5 to 10 the interaction term is multiplied by a different time-threshold dummy (1900, 1910 and 1920). Robust standard errors clustered at state level in parentheses. All estimations include state and time dummies. Coefficients marked with: *** indicates significant at 1%, ** at 5% and * at 10%.										
	<b>State Public Revenue per capita</b>					<b>State Public Revenue per capita</b>				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	1872-1930	1872-1920	1872-1910	1872-1900	1887-1893	1872-1939	1872-1939	1872-1939	1890-1910	1890-1930
Exports per capita	-0.037 (0.03)	-0.033 (0.03)	-0.011 (0.02)	0.023 (0.02)	0.004 (0.02)	0.001 (0.06)	0.051 (0.05)	0.053 (0.05)	0.041 (0.05)	0.099*** (0.01)
Exports pc*Post 1891	0.13*** (0.02)	0.12*** (0.02)	0.12*** (0.02)	0.12*** (0.02)	0.07*** (0.02)					
Exports pc*Post 1900						0.089 -0.061			0.000 -0.029	
Exports pc*Post 1910							0.021 -0.065			-0.052 -0.022
Exports pc*Post 1920								0.055 (0.07)		
Imports per capita	-0.015 (0.02)	-0.037 (0.02)	-0.061 (0.02)	-0.027 (0.02)	-0.012 (0.01)	-0.020 (0.03)	-0.011 (0.03)	-0.016 (0.03)	-0.05 (0.03)	0.022 (0.02)
Population	0.0029* (0.00)	0.001 (0.00)	0.003* (0.00)	0.006* (0.00)	0.029*** (0.01)	0.004** (0.00)	0.004** (0.00)	0.004** (0.00)	-0.006 (0.00)	0.003 (0.00)
Constant	0.004 (0.00)	0.008* (0.00)	0.007** (0.00)	0.003 (0.00)	-0.001 (0.01)	0.003 (0.00)	0.003 (0.00)	0.003 (0.00)	0.018*** (0.01)	0.005** (0.00)
Observations	1034	860	683	507	131	1220	1220	1220	344	695
Number of stcode	19	19	19	19	19	19	19	19	19	19
R-squared	0.544	0.549	0.609	0.554	0.478	0.410	0.311	0.318	0.193	0.449

<b>Table 7. Federal Public Revenue and Expenditure per capita (Brazil states 1872-1939)</b>								
Dependent variable is the federal public revenue and expenditure per capita at 1913 reis. All the specifications are OLS panel data. The hypothesis tested is that the 1891 Constitution brought a change in the relation between the federal public finance and exports per capita. Exports are incorporated in two ways: 1) the exports for the whole period; and 2) and as an interaction term multiplied by a dummy which takes 1 if the year is after 1891. A positive and significant sign in the second measure confirms our hypothesis. Clustered Robust standard errors in parentheses. State and year dummies included in all the specifications. Coefficients marked with: *** indicates significant at 1%, ** at 5% and * at 10%.								
COEFFICIENT	(1) Federal Revenue per capita	(2) Federal Revenue per capita	(3) Federal Revenue per capita	(4) Federal Revenue per capita	(5) Federal Expenditure per capita	(6) Federal Expenditure per capita	(7) Federal Expenditure per capita	(8) Federal Expenditure per capita
Exports per capita	0.15302* (0.019)	0.13321 (0.079)	0.18861** (0.042)	0.18921* (0.045)	0.02209*** (0.003)	-0.00823 (0.025)	0.00911 (0.015)	0.00911 (0.015)
Exports pc*Post 1891		0.02028 (0.068)	-0.08224* (0.045)	-0.0812 (0.048)		0.03115 (0.026)	-0.00135 (0.020)	-0.0013 (0.020)
Imports per capita			0.24914** (0.088)	0.2277** (0.080)			0.07843* (0.038)	0.07784** (0.036)
Population				0.00223 (0.001)				0.00006 (0.001)
Constant	0.00329* (0.002)	0.00331* (0.002)	0 (0.002)	-0.00309 (0.002)	0.00370*** (0.001)	0.00370*** (0.001)	0.00300*** (0.001)	0.00325 (0.002)
Observations	1143	1143	1077	1077	1013	1013	955	955
Number of stcode	19	19	18	18	19	19	18	18
R-squared	0.628	0.629	0.751	0.761	0.23	0.239	0.299	0.299

<b>Table 8 .Regional Distribution of Mining Production in Mexico 1878-1907</b>			
	1877-78	1899	1907
North	20.4%	56.4%	54.6%
Center	78.9%	43.5%	45.2%
South	0.6%	0.0%	0.3%

Source: Penafiel (1899, 1907) and Busto (1880).

Norte: Chihuahua, Coahuila, Durango, Nuevo León, Sinaloa, Sonora, Baja California, Tamaulipas.

Central: Aguascalientes, Colima, Distrito Federal, Guanajuato, Guerrero, Hidalgo, Jalisco, Mexico, Michoacan, Morelos, Puebla, Queretaro, San Luis Potosi, Tlaxcala, Veracruz, Zacatecas, Tepic.

South: Campeche, Chiapas, Oaxaca, Tabasco, Yucatan.

<b>Table 9. Regional Share of Property Value in Mexico</b>					
	<b>Regional Share of Property Value</b>				<b>Total Sales</b>
	1877-78	1891	1891	1907	Average 1905-1909
North	15.6%	11.3%	13.1%	11.3%	20.1%
Center	63.9%	60.7%	54.1%	51.6%	44.5%
South	6.4%	5.9%	10.7%	9.9%	10.4%
Federal District	14.1%	22.1%	22.1%	27.2%	25.0%

Source: Penafiel (1893, 1899, 1907) and Busto(1880); The Mexican Yearbook.

Norte: Chihuahua, Coahuila, Durango, Nuevo León, Sinaloa, Sonora, Baja California, Tamaulipas.

Central: Aguascalientes, Colima, Distrito Federal, Guanajuato, Guerrero, Hidalgo, Jalisco, Mexico, Michoacan, Morelos, Puebla, Queretaro, San Luis Potosi, Tlaxcala, Veracruz, Zacatecas, Tepic.

South: Campeche, Chiapas, Oaxaca, Tabasco, Yucatan.