Looking at the Dark Side of Things:
Political Instability and Economic Growth in Post-Independence Mexico

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Abstract

I study the connection between economic growth and political instability during the most turbulent period in Mexican history, the post-independence period in the nineteenth century. Political instability implied policy uncertainty, no public programs for development, but most important, violence, lack of property rights, and other forms of disorder that led to risk of loss for economic actors. Political differences were based on ideological disagreement among political agents. I measure political instability by a combination of four variables: changes in the executive post; internal wars; number of parallel governments; and most importantly, foreign wars. The evidence is very strong. There is a negative link between political instability and growth. The result is robust to different control variables, equation dynamics, estimation methods, and growth measurements. I show that between 50 and 100 per cent of the decline in the growth rate during the four or five "lost decades" after independence can be attributed to political instability. And furthermore, political stability is responsible for about 50 to 88 per cent of the increase in the growth rate during the Belle Époque. And most important, there is no systematic difference in the growth rate after 1867 when I control for political stability. Political instability is the single most important factor in explaining why Mexico lagged behind during the nineteenth century.

1. Introduction

With independence, Mexico turned from a wealthy, flourishing colony, into a nation disturbed by political strife and economic decline. Modern estimates suggest Mexican GDP per capita to be at least as high as in the United States in the eighteenth century.[1] While the Atlantic economy started industrialization during the nineteenth century, Mexico collapsed into its own internal struggles, foreign invasions, and penurious times. Coatsworth (1998) estimates that the difference in GDP per capita between Mexico and the United States has not changed since the start of the twentieth century. Thus, all of the gap between Mexico and the economies of the North Atlantic can be explained by Mexican economic failure in the nineteenth century and the 50 years between 1820 and 1870 in particular. The purpose of this paper is to explore the connection between economic and political instability during those "lost decades".

Increasingly, economists are focusing their attention on the historical experience of the past two centuries in the underdeveloped world to gain some insight into the process of growth. A central question in this recent literature is how is it that the underdeveloped world actually became, and then remained, poor relative to currently rich countries?[2] Past institutions, past inequality, and past international trade, all seem to have played an important role (Acemoglu, Johnson, and Robinson 2001; Engerman and Sokoloff 2002; Sokoloff and Engerman 2000; Williamson 2002).

This paper will concentrate on political instability, something that political economists have explored with modern evidence (Alesina et al. 1996). I will study the most politically turbulent era in Mexican history, its post-independence period (1821-1867). I will argue that economic conditions stagnated due to political causes. We also know that by world standards, tariffs in Latin America were very high during the second half of the nineteenth century. And more, the roots of this protectionism were the financial

[1] See Maddison (2001) and Coatsworth (1998).
[2] On the timing of divergence among regions, see Pritchet (1997, 2000), O'Rourke and Williamson (1999), Allen (2001), and Bourguignon and Morrisson (2002).

problems created by the military requirements associated with conflict and instability (Coatsworth and Williamson 2002).

From independence, Mexico acquired a legacy of political violence that accompanied the economic devastation. The army did not step aside to allow civilians to control the nation, but for a long time, it would be involved in the political process to increase its share of government, ready to be an instrument of corrupt politicians. The country was not united, but divided between liberals and conservatives, federalists and centralists, republicans and monarchists, and between anticlerical and proponents of clerical privilege.[3] These divisions transformed the 50 years between 1820 and 1870 into an epoch of violence, lack of property rights, and other forms of disorder. For many writers, the political groups in the new nation proved without the ability to govern the country.

Table 1 presents the governments in independent Mexico from 1821 to 1911. The first column provides the period of each government, while the second column presents the corresponding administration. Some of them governed during different periods, and a number in parenthesis indicates this. The governments displayed in Table 1 include emperors, dictators, and presidents. First, I must point out that in the 46 years that go from 1821 to 1867, Mexico had 56 administrations. This includes the first presidency of Manuel Gómez Pedraza nullified by congress, and the two days government of José Ignacio Pavón. Seven more governments lasted less than a month, those of José María Bocanegra, Francisco Javier Echeverría, José Joaquín Herrera (1st), Valentín Canalizo (2nd), Nicolás Bravo (3rd), Rómulo Díaz de la Vega, and Manuel Robles Pazuela. In contrast, the United States had 13 administrations in the 52 years between 1817 and 1869.

The economic literature has shown that political instability has an economic impact on growth first because it increases policy uncertainty, discouraging investment and savings of risk-averse economic agents (Alesina et al. (1996). Foreign investors also prefer a stable economic environment. And more, government changes can have large effects when there are stark differences between the new and the old group in power. Second, when political change is associated with violence, individuals engage in revolutionary

instead of productive activities. This diverts resources from market activities, and, most important, it discourages investment because violence leads to risks of expropriation and other violent forms of economic loss for citizens. And third, political instability makes continuity of public programs for development an impossible task. Public investment in roads, education, law enforcement, etc., becomes unattainable.[4]

Political instability in Mexico lasted for the entire 1821-1867 period. The number of administrations reached a peak in the 1840s, when the nation had 21 different governments. Most of the changes in administration were associated with armed movements ousting a particular government. This was a common practice in early independent Mexico. The major civil conflict, known as the War of the Reform (1858-1861), was the culmination of prior political disputes and other minor civil wars settled since independence in 1821. In 1862, the French started a war of occupation in Mexico that culminated with the arrival of new monarchs, the Austrian archduke Maximilian of Hapsburg and his wife Charlotte, sent by the French emperor. From the start of the War of the Reform in 1858 to the execution of Maximilian in 1867, two parallel governments ruled in Mexico. One of them was liberal, led by Benito Juarez; the other was conservative, and its last representative was Maximilian.[5]

Coatsworth (1978) and Stevens (1991) have already pointed out the plausible relationship between political instability and lack of growth in post-independence Mexico. According to Coatsworth (1978), the political turmoil deprived the economy of the resources necessary to invest in transportation. According to him, geography was not favorable to Mexican economic development. On the other hand, Stevens (1991) has presented another non-competing view. He related the lack of strong governments in

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[3] See Meyer and Sherman (1995).

[4] Section 3 offers several examples from post-independence Mexico showing these effects of political instability.

[5] With the start of the war, conservative general Zuloaga dissolved the liberal government, led by President Comonfort. According to the constitution, the new president was the Chief Justice of the Supreme Court, Benito Juarez. He managed to escape to the north, where his liberal cohorts proclaimed him President. In the capital, the army declared Zuloaga as president. During this period of war between liberals and conservatives, the liberals were able to establish their capital in Veracruz, the most important port of the country, where they controlled custom receipts.

independent Mexico to the financial difficulties confronted by the Federal administration, which might be related to the economic stagnation of the country.[6]

In the economic historiography, the period after the Independence War (1810-1821) has been portrayed as one of economic decline. In the traditional story, the deterioration of the mining industry during the decade of war led to the economic crisis. And since recovery of mining took several decades, per capita output declined for half a century. In one interpretation, mining and its silver was a growth-leading sector, so its stagnation hindered economic growth. In another interpretation, shortages of money (silver) spread the depression. And at first sight, either of these two versions seems consistent with the observed behavior of coinage in Mexico.[7]

This essay explores the hypothesis that economic stagnation in nineteenth century Mexico was caused by political instability. Section 2 presents the theory. It also reviews the empirical results in the economic literature connecting political instability and economic performance. Section 3 describes political instability in Mexico, from 1821 to 1867. Its purpose is to establish the following: Political instability might have transformed itself into lack of property rights, constant risks of economic loss, and forms of disorder that disincentive investment and economic growth. It also shows that the political conflicts of early independent Mexico were exogenous from an economic point of view. They were based on ideological differences among opposing parties.

Section 4 presents the data, where economic growth is proxied by the growth of government revenue. Five different series of government income are presented, each for different periods of nineteenth century Mexico. A simple summary of government income shows support for the idea that Mexico stagnated after independence, from 1821 to 1867, and then shows unambiguous evidence of growth in the epoch of political stability known as the Restored Republic and the Porfiriato, starting around 1867. As population grew during the century, per capita GDP may have declined from 1821 to 1867, though not from 1867 on. Section 5 presents the main empirical results. It reports estimates of the

[6] See Coatsworth (1978, 1989), Salvucci and Salvucci (1993), and Salvucci (1997).
[7] Recent applications of these ideas can be found in Dobado and Marrero (2001), Cárdenas (1997), and Salvucci (1997). Irigoin (2003) studies the role of fiscal and monetary fragmentation after independence in explaining Latin American backwardness.

connection between the rate of economic growth, proxied by the growth of government income, and an index of political instability, using different data sets between 1821 and 1910. The results show that political instability reduced economic growth in Mexico. The estimates are robust to different control variables, to different combinations of the dependent variable, and to different estimation methods.

Section 6 shows that political instability severely harmed Mexican economic growth, and is the most important factor in explaining why Mexico lagged behind. Between 50 and 88 per cent of the increase in the growth rate after 1867, during the Belle Époque, can be attributed to the political stability of the period. And most important, when I control for political instability, there is no systematic difference in the rate of growth after 1867. Furthermore, political instability is responsible for about 50 to 100 per cent of the reduction in the rate of growth during the four or five "lost decades" after independence. Section 7 concludes.

The results of this paper differ from those of Haber et al. (2003), who studied the period from 1876 to 1929, and found no evidence of economic stagnation during the Mexican Revolution and its aftermath. This may be due to several factors. First, the period under study of this and their work is different. The political instability during the Revolution could be distinct to the political instability of the post-independence period, where it was dominated by foreign invasions. Second, they do not compare their period of instability, 1910-1929, to the period of stability after 1940. And third, the nature of the statistical analysis in this essay is very different than in their work.

2. Political Instability and Economic Growth: Theory and Empirical Literature

Theoretical models describing the effects of political instability could be just around the corner. This is because the economic effects of taxation may be suggestive of the impact of lack of protection of property rights, and policy instability can be equivalent to rapid changes and uncertainty in taxes. To illustrate this point I will rely on the work by Mendoza (1997), adapting his analysis of terms of trade volatility to study uncertainty in

taxes. The model builds on previous developments by Phelps (1962) and Levhari and Srinivasan (1969).

The point of departure is the basic neoclassical model of savings and consumption, that forms part of the economic growth literature. Households inhabit the economy forming consumption plans to maximize expected lifetime utility:

$$U(C) = E\left[\sum_{t=0}^{\infty} \beta^t \frac{C_t^{1-\gamma}}{1-\gamma}\right] \tag{1}$$

with $\gamma > 0$ and $0 < \beta < 1$. C_t is consumption and β is the subjective discount factor. With this utility function, γ is the coefficient of relative risk aversion and the intertemporal elasticity of substitution is equal to $1/\gamma$

On the production side, I follow Mendoza (1997) in assuming a linear technology that, put simply, consists of a perfectly durable asset, A_t, that yields an exogenous stochastic gross return $\overline{R}_t$. As it will be shown in the next section, this assumption helps to capture the risks associated to investment in nineteenth-century Mexico. Furthermore, I also assume that consumption is taxed at the random rate τ_t. However, in this study political instability will be only partially captured through instability in consumption taxes and the return of savings. Political instability in post-independence Mexico also meant expropriation of assets, and therefore, it will be natural to consider the case in which wealth is randomly taxed, say at the rate θ_t. This captures the more general situation in which property rights are not well protected, and there is the risk of expropriation of wealth as well as other forms of property loss like violent seizures of property by armed groups.[8] The period by period resource constraint is:

$$A_{t+1}(1+\theta_{t+1}) \leq \overline{R}_t \cdot \left(A_t - (1+\tau_t) \cdot C_t\right) \tag{2}$$

[8] Examples of violent seizures of property and other forms of disorder are presented in section 3.

Households maximize utility (1) subject to the resource constraint (2). In what follows, I will assume that the random variable $(1+\theta_{t+1})$, which involves the tax on wealth, distributes independently of $C_{t+1}^{-\gamma}/(1+\tau_{t+1})$, which involves the marginal utility of consumption in period t+1. Furthermore, θ_t, τ_t, and $\overline{R}_t$ are such that the effective rate of return of savings defined by:

$$r_t = \frac{(1+\tau_t)\cdot\overline{R}_t}{(1+\tau_{t+1})\cdot(1+\theta_{t+1})}$$

follows an i.i.d. log-normal distribution. These assumptions help to simplify the analysis.

The optimal intertemporal decision involves two sets of equations. These are the budget constraint (2), and Euler's equation (3):

$$C_t^{-\gamma} = \beta\cdot E\left[C_{t+1}^{-\gamma}\frac{(1+\tau_t)\cdot\overline{R}_t}{(1+\tau_{t+1})\cdot(1+\theta_{t+1})}\right] \tag{3}$$

The solutions in this model have the same structure than those in Mendoza (1997):

$$C_t^* = \lambda\cdot\left(\frac{A_t}{1+\tau_t}\right) \tag{4}$$

$$A_{t+1}^* = \left(\frac{(1-\lambda)\overline{R}_t}{1+\theta_{t+1}}\right)\cdot A_t^* \tag{5}$$

In these equations, λ represents the marginal propensity to consume with respect to wealth, and is given by:

$$\lambda = \left[1 - \beta^{1/\gamma} \left[E(r_t^{1-\gamma}) \right]^{1/\gamma} \right]$$

I assume that the effective rate of return is such that $\beta \cdot E(r_t^{1-\gamma}) < 1$. Furthermore, λ can be expressed as a function of the mean and the mean-preserving variance of r_t, according to the following equation:

$$\lambda = 1 - \left(\beta \cdot E(r_t)^{1-\gamma} \cdot e^{-(1-\gamma)\frac{Var(r_t)}{2}} \right) \tag{6}$$

Finally, I must note that equations (4) and (5) imply that:

$$\frac{C_{t+1}}{C_t} = (1 - \lambda) \cdot r_t \tag{7}$$

Equation (7) shows that the rate of growth of consumption (and thus of the economy) are affected by the actual realization of r_t, and by its statistical properties: its mean and variance. In particular, when the coefficient of relative risk aversion is lower than one, increased political instability will reduce the rate of economic growth. That is, when $\gamma < 1$, a higher variance of the effective rate of return, say stimulated by increased volatility in the expropriation rates of consumption and wealth, will decrease the growth rate in this economy.[9]

The last decade has seen an increase in the empirical literature that explores the effects of political instability on economic growth. The empirical literature can be divided

[9] Evidence from twentieth century data poses an anomaly for the consistency of equation (7) and the empirical results of this paper that show a negative relationship between growth and instability. This is

in two groups: Those that exploit country cross sections, (Campos and Nugent 2002; Ali 2001; Fosu 2001; and Alesina et al 1996), and those that study country time series experience (Asteriou and Price 2001; Asteriou and Siriopoulos 2000; and Gounder 1999).[10] The seminal paper is Alesina et al (1996) who investigate the relationship between political instability and per capita GDP growth, using a sample of 113 countries for the period 1950 through 1982. They define political instability as the propensity of a change in the executive power, either by constitutional or unconstitutional means, and construct three measures of government change.

They find that political instability is harmful to economic growth, but that growth does not affect the propensity of a change in government. The results also apply to major government changes: Those that involve regular or irregular but significant turnovers of leadership. For the case of coups, political instability reduces growth again, but now low growth increases the propensity of a government change, especially among Latin American countries. Fosu (2001) studies the relationship between political instability and economic growth using data on different events of coups d'etat in 31 post-independent sub-Saharan African countries during the 1960-1986 period. Ali (2001) investigates the effect of political stability and the stability of economic policies on economic growth, using a panel of developing countries between 1970 and 1995. And these studies also find evidence of political instability affecting economic growth. Though different results are obtained by Campos and Nugent (2002), who empirically test for a causal and negative relationship between political instability and economic growth using a panel of 98 developing countries during the 1960-1995 period.

Uisng time series experience, Gounder (1999) examines the impact of military coups on Fiji's recent economic growth. He uses time series data for the period 1968 to 1996, and applies a neoclassical production function to estimate the effect of political instability on growth. Asteriou and Siriopoulos (2000) examined the relationship between

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because consumption studies by Mankiw (1981), Hansen and Singleton (1983), Hall (1988), and Campbell and Mankiw (1989,1991) estimate γ to be larger than one.

[10] There is a related field of literature that explores the effects of terms of trade instability on economic growth (Mendoza, 1997), the role of adverse trade shocks in prolonged recessions (Kose and Riezman, 2001), and the negative effects of volatility on economic performance (Ramey and Ramey, 1995).

stock market development, economic growth, and political instability in Greece between 1960 and 1995. Asteriou and Price (2001) have tested for the influence of political instability on UK economic growth between 1961 and 1997. They estimate GARCH and GARCH-M models that reveal negative effects of instability on growth. These authors find that political instability mainly affects economic growth, and not vice versa. In summary, the economic literature has found strong evidence of a negative relationship between political instability and economic growth. And the causation tends to be from instability to growth.

3. Political Instability in Nineteenth-Century Mexico[11]

Political instability in early independent Mexico implied economic policy uncertainty, no public programs for development, and most important, violence, lack of property rights, and other forms of disorder that led to risk of loss for economic actors in Mexico, and that might have discouraged investment. I also argue that the origin of these disputes was exogenous from an economic standpoint. Political differences were based on ideological disagreement among political and economic agents.

Politicians gained and lost power with perplexing dispatch. Administrations were brief and many economic policies involving taxes changed drastically from one year to another, or were quickly reversed.[12] Many economic policies involving public programs were not enforced. The significant decisions were to replace cabinet ministers or overthrow a government. But most important, urban riots, demonstrations, assaults, and rural rebellions usually accompanied cabinet resignations and changes of presidents. According to Stevens (1991), historians are still reluctant to characterize post-independence Mexico as a period of revolution, but they consider it as one of rapid violent political rotations.

After independence, violent struggles to control the government lasted for half a century. Political instability coincided with financial difficulties for the Treasury, and with

[11] My discussion of political instability in Mexico draws heavily from Stevens (1991), and that of rural rebellions from Coatsworth (1988).
[12] This evidence is difficult to survey in a Table, but it is evident through the several thousands of pages of laws and decrees compiled by Dublan and Lozano (1876-1912).

masses armed by radical leaders to attack armories and government offices. Weakened by the internal political turmoil, Mexico saw the loss of Texas in 1836, the Pastry War with France in 1838, and very dramatically, the loss of half its territory to the United States in the War of 1846-1848. In the end, political instability transformed into civil war by end of the 1850s. By that time, two clearly defined armies opposed each other. The middle stratum of the population supported the liberals, living in the periphery of Mexico. The conservatives were supported by privileged classes living in the capital. And it was until the triumph of the liberal army over conservatives and the French occupation (1862-1867) that Mexico saw the start of political stability.

Between 1824 and 1867, the average period of presidents was 15 months, 7 months for both ministers of war and justice, and less than 5 months for ministers of finance and of foreign relations. Continuity of economic policy for development was impossible. Public investment in roads, education, and social order, was missing.[13] The direct economic impact of political instability in independent Mexico through lack of long-term projects for development is evident in the case of the Bank of Provision,[14] a public firm created to finance private entrepreneurial projects. It lasted just a few years in the late 1820s and early 1830s; and furthermore, most of its resources were spent as government consumption.

The period of political instability coincided with strong financial difficulties for the Mexican government. The collection of laws and decrees gathered by Dublan and Lozano (1876-1912) shows that this problem in public finances was reflected in the constant change of taxes on international trade, taxes on domestic commerce, and very importantly, unexpected taxes on property.[15] Sometimes this involved expropriation and sale of private property that might have constituted a violation of property rights.[16] Some economic policies, however, were never enforced, or were reversed, after coups and revolts that

[13] See Dublan and Lozano (1876-1912).
[14] "Banco de Avío".
[15] Many of these measure also coincided with coups d'etat and rebellions.
[16] Examples are the continuous expropriation of Church wealth through out the century, unexpected reductions of salaries to government officials, unexpected taxes on buildings including residential houses, etc.

ousted that particular government.[17] In addition to difficulties for the Treasury, political instability also saw masses armed by radical leaders to attack armories and government offices.

Rural revolts accompanied political instability. According to Coatsworth (1988), rural revolts like land invasions involved the burning of estate buildings, theft of livestock and other property, and sometimes the assassination of estate employees, foreman, and owners. Invasions of hacienda lands were associated with village rebellions, especially after independence. Village riots, on the other hand, were often provoked by arbitrary acts of public officials. Sometimes, these were economic provocations like new taxes, monopolies and forced sales, though more documented acts are imposition of new village officials, quarantines, boundary changes, etc. Caste wars predominated in the northern and southern peripheries of Mexico, where indigenous uprisings were directed at the expulsion of non-indigenous authority. Political authority in the post-independence period was closely associated with the regional elite of hacendados.

From the 1840s to the 1870s, Mexico experienced resurgence not only in small village revolts, but also in large-scale caste wars and regional rebellions. In the 1820-1900 period, Mexico had 18 large-scale wars. In contrast, Peru had 4 and Bolivia 3.[18] And when compared to the previous colonial period, from 1700 to 1820, Mexico had only 5 large-scale revolts. The contrast between Mexico and Latin America and between Colonial and Independent Mexico stands out clearly. Mexico saw a lot of violence between 1820 and 1870.[19]

Ten of the eighteen wars occurred in the decades of the 1840s and 1850s. In contrast, the last two decades of the nineteenth century were relatively peaceful. No new large-scale rebellions occurred after 1883. This is consistent with the accepted view that the regime of Porfirio Díaz (1876-1880 and 1884-1911) was successful in maintaining

[17] For instance, on May 22, 1829, Finance Minister Lorenzo Zavala levied new taxes of 5% on yearly incomes exceeding 1,000 pesos and 10% on incomes exceeding 10,000 pesos. The wealthy took action supporting a successful coup on December 4, led by General Anastasio Bustamante (Tenenbaum, 1986, pp. 34-35).
[18] Brazil stands with 8 wars in that period.
[19] This data comes from Coatsworth (1988).

rural peace until the turn of the century.[20] No evidence of plantation uprisings is recorded for nineteenth century Mexico, though four of these conflicts are known for the eighteenth century. Of the 102 small-scale village uprisings, there is information on the precipitating causes of 54. In 8 of them, there were complaints about taxes. But in 40 out of 52 cases, private property rights violations were involved. There were protests against usurpation, violent land seizures, etc.

The history of modern Mexico starts with the Restored Republic (1867-76) and the triumph of the liberal army over the French occupation and its conservative support, in 1867. Democracy and modernization were two milestones in the victorious President Juarez administration. According to Meyer and Sherman (1995), the Restored Republic shows signs of an era of political stability and economic progress. Though differences existed among political actors, war became less the means to solve disputes. This is the transition to a period of complete political calm: the Porfiriato in the last quarter of the nineteenth century.

Juarez's administration plan included improvement of transportation facilities, exploitation of natural resources through foreign investment, and tax and tariff incentives to increase mineral production. Minor rebellions and private armies were reduced in this period, and completely disappeared with the arrival of the Porfiriato. The Restored Republic also brought some peace to the countryside through an increased rural police force of "rurales". They patrolled roads, assisted the army, and guarded special shipments. The Mexico City-Veracruz railroad was completed in 1872, modernly linking the Mexican capital to its most important port.

The death of Juarez in 1872 led to new elections won by Sebastian Lerdo. He let railroad contracts for the construction of a new line from Mexico City to the United States. And there were also contracts for the construction of telegraph lines. He added more than 1,600 miles of telegraph. School construction sharply increased. In 1870 there were less than 5 thousand schools in Mexico, but by 1874, there were almost 9 thousand.[21] In 1876,

[20] There was an increase in small-scale rebellions during the 1890s, but they did not reach the magnitude of the 1850s.

[21] See Cosío (1957).

Lerdo sought reelection, but General Porfirio Diaz, who had already opposed Juarez's reelection in 1871, also did in 1876, but this time he was successful in overthrowing the government. Porfirio Diaz would control the government from 1876 to the Mexican Revolution, in 1910.

According to Meyer and Sherman (1995, p. 414), it was in the Restored Republic (1867-76) that "for the first time in Mexican history the administrations in power seemed more to pull the country together than to drive it apart". The governments of Juarez and Lerdo laid the foundations for modernization in Mexico, and "Porfirio Diaz would construct the edifice". In the 46 years from 1821 to 1867, Mexico had 56 administrations, making continuity of policy very difficult. During the 9 years of Restored Republic (1867-1876), Mexico had 3 presidents; and during the 35 years of Porfiriato, the presidency changed hands only 4 times.

During his first term of presidency (1876-1880), Porfirio Díaz faced some agrarian rebellions and other types of insurrections. However, violence would promptly decline during the Porfiriato, and order became the landmark of this period. In his first term, Porfirio Diaz cut public spending by reducing salaries, increased revenues by strengthening punishment of smuggling in Mexican ports, and opened ports of commerce with the United States. During the presidency of Manuel Gonzalez (1880-1884), railroad construction continued and steamship lines were fostered. Rumors started that Porfirio Díaz would run for the presidency again in 1884. And both liberals and conservatives gathered together around him. He would not step out of the presidential office again until 1911.

During the Porfiriato, steam and electric power replaced human and animal force. Hydraulic and hydroelectric stations were built, along with the telephone, wireless telegraph and submarine cables. Flooding problems in the capital that used to damage property were solved. Several public renovations were carried on. And most importantly, the Porfiriato was able to attract foreign investment and technology into the transportation sector. A boom in railroads occurred during this period. In 1876 there were 400 miles of track, but in 1911 there were 15,000. Most of the state capitals were connected to the

trunks running from Mexico City to the United States. A boom that might have sparked commerce in Mexico.

Foreign investment also promoted silver mining, oil, steel, drink, cement, textile, cigarette, brick, and many other industries and factories. Facilities in Mexican ports were improved. Mexico's foreign trade went from 50 million pesos in 1876 to 488 million pesos in 1910. Economic progress occurred without civil wars, and without liberal-conservative disputes. Order and progress were the synonymous of the Porfiriato.

4. The Data

This section describes the main data used in this study. I will start with a description of the several measures of Fiscal Revenues that I will use to proxy GDP growth. Then I will turn to the construction of an index of political instability that may reflect threats to the security of property rights and high risks of loss for economic actors. These measures tend to reduce the incentives of investment in the economy. To track the performance of the Mexican economy, I use several measures of government revenue summarized in Table 5, that I will now describe.

Figure 3 presents Tax Collections of the Federal Government from 1825 to 1856. These data were constructed from Tenenbaum (1986), and are missing for some years in the late 1840s and the early 1850s. Two big declines are evident in Figure 3, and both occurred immediately after foreign invasions. The first one coincides with the Pastry War with France in 1838. The second decline comes after the war with the United States in 1846-1848 and the return of federalism in 1846. The difference between centralism and federalism is important because centralism involved a higher appropriation of state income by the Federal Government, while under federalism the states retained higher shares of their revenues. Federalism lasted from 1824 to 1834, when it was replaced by centralism from 1834 to 1846, and it finally returned from 1846 to 1855.

If we abstract from the effects of wars, Figure 3 shows two big changes in the level of tax collections. They occurred as the government went to centralism in 1834 and then to federalism after 1846. Centralism increased tax collections. Then the arrival of the second

federalism reduced tax revenues so much that they were lower than during the first federalism. However, this is expected since some taxes of the first federalism were abolished during the second. If we were to ignore these two shifts in tax collections, from visual inspection of Figure 3 it seems probable that a slight upward trend in tax revenues appeared after the arrival of centralism in 1834, and maybe during the second federalism. However, the unambiguous overall picture depicted in Figure 3 is one of a lack of growth during the entire 1825-1856 period.

The picture of the economy suggested by total income of the federal government is a little bit different. Figure 4 displays Total Income of the Federal Government, according to Tenenbaum (1986), from 1825 to 1856. There are two lines in that figure. The highest curve is total income including loans, and it is less reliable for tracking the behavior of the economy. The lower curve excludes both domestic and foreign loans, and is more credible for my purpose of establishing economic trends in nineteenth century Mexico.

Figure 4 shows an upward trend in total revenues, including loans, since the first federalism (1824-1834) and it continues during most of the centralist period (1834-1846). However, the reader will notice that the one-time increase in tax collections seen in the 1830s in our previous Figure 3, occurring with the change from federalism to centralism, is less evident from pure visual inspection in Figure 4. Though it is manifest in Total Income excluding loans. In fact, this income is consistent with the idea of a stagnant economy during both the federalist and centralist periods (1824-1846).

It is important to note that the upward trend in total revenues including loans, in Figure 4, comes to an end after the war with the United States (1846-48) and the arrival of the second federalism (1846-1853). And more, during this period there is a dramatic downward trend in total government income. By the end of the term, in the early 1850s, total revenues reach lower levels than those of the first federalism. A one-time decline and the appearance of a downward trend in the level of total income could have taken place during the second federalism. For Total Income excluding loans, the decline is also evident, though less pronounced.

In terms of general trends, Tax Revenues in Figure 3 and Total Income excluding Loans in Figure 4 are not contradictory from the first to the end of the second federalism

(1824-1856). Both figures present increases with the arrival of centralism, and decreases in the aftermath of the war with the United States and with the arrival of the second federalism. The "Pastry War with France had only temporary effects on these measures of government revenue. I must conclude that the data on Government Income –Tax Collections and Total Income excluding Loans- presented by Tenenbaum (1986) clearly suggest economic stagnation from 1825 to 1856

Figure 5 presents another measure, Ordinary Income of the Federal Government according to Carmagnani (1982). This series covers a longer period than that of Tenenbaum, going from 1824 to 1879. Like total revenue of Tenenbaum, ordinary income shows an upward trend during the first federalism (1824-1834) and during the centralist period (1834-1846). Again, there is a temporary decline with the Pastry War of 1838, tough the sharpest decline in government income occurred only after the war with the United States (1846-1848). Government revenue stagnated from here, in the late 1840s, to the end of the War of the Reform (1857-1861).[22]

After this War, at the start of the 1860s, ordinary income of the Federal Government showed some signs of recovery, but this was soon interrupted with the French occupation of the country in 1863 (1863-1867). It was until the execution of Emperor Maximilian of Hapsburg during the Restored Republic (1867-1876) when government revenues resumed growth. And it was only at the end of the period of the Restored Republic in the late 1870s, with the start of the Porfiriato, that ordinary income neared levels observed before the war with the United States.

In summary, the picture offered by Carmagnani's (1982) figures is somewhat different from what those of Tenenbaum (1986) reveal. It shows some growth from 1824 on, only interrupted by the War with the U.S. in the late 1840s and its aftermath, and by the French occupation in the 1860s. However, the evidence is conclusive in one respect. Taking the post-independence period as a whole, say from 1824 to the late 1860s, it is very evident that Mexico missed sustained economic growth.

We now turn to the data for the last quarter of the century, during the Porfiriato, which is more abundant. We have a series that complements the previous one on Tax

Income by Barbara Tenenbaum, and another one on Ordinary Income that complements the data of Carmagnani. Both series come from Rosenzweig et al. (n.d.) and cover the period from 1876 to 1910. And both of them show signs of plausible economic progress.

Figure 6 presents the 1876-1910 series on Tax Income of the Federal Government, which corresponds to direct and indirect taxes, including taxes on international trade. The upward trend is very evident. The annual average rate of growth of this revenue is 5.6 per cent. See Table 5. This is in contrast with the zero average growth rate estimated from the mid 1820s to the mid 1850s using the Tax Collection series by Tenenbaum (1986). A difference in means test for the rate of growth, allowing for different variances in each period, gives a one sided p-value of .04. Therefore, at the 5% significance level, we reject the hypothesis that the rate of growth was equal in both periods, and we accept the alternative hypothesis that it was higher during the Porfiriato.[23] Summary statistics of the variables are presented in Table 5.

Figure 7 presents the 1876-1910 series on Ordinary Income of the Federal Government. This is Tax Income plus revenue from public firms, government services, etc. The upward trend is also evident for this income. The average rate of growth from 1876 to 1910, according to this revenue, was 5.4 per cent. This is higher than the 0.6 and 4.0 per cent rates estimated with the series of Total Income excluding loans from Tenenbaum (1986) and Ordinary Income from Carmagnani (1983) in the period from the 1820s to the 1850s and 1870s, respectively (Table 5). A mean test for the difference in average growth rates in both periods, using Tenenbaum (1986) and Rozensweig (n.d) data, rejects the null hypothesis that the growth rates are the same in both periods, in favor of the alternative that the growth rate was higher during the Porfiriato. [24] The one sided p-value is .01

Political instability poses a threat to the security of private rights, whenever driven by violence and revolutions. Greater instability reduces the incentive to invest in various economic activities, and, therefore, it lowers the growth rate of the economy. I have several

[22] This was the major civil conflict of nineteenth century Mexico.
[23] This results comes from using the Satterhwaite approximation formula of degrees of freedom, and from eliminating two plausible outliers from the sample: the maximum and minimum growth rates.

measurements of political instability that are related and will be used to create a new aggregate variable. This will simplify the analysis and interpretation, and it will help to increase the degrees of freedom in the regression analysis.

The measures of political instability are the following: annual number of changes of executive (z_1); number of regional, peasant, and caste wars[25] (z_2); number of parallel governments (z_3); and a dummy variable indicating a foreign war (z_4). Forming a linear combination of these variables will produce a single index containing information from all variables. To choose the weights, principal component analysis is used, since this produces a valuable summary of the measurements.

Details of the principal component analysis applied in this paper are presented in the Appendix. I use the first component as the index of political instability in nineteenth century Mexico, and Figure 8 displays it. The mean of this index is 0.000, with standard deviation of 1.25. The peaks in Figure 8 coincide with international wars. First, the Pastry War with France in the late 1830s, then the War with the United States in the late 1840s, and finally the French Intervention in the 1860s. The index is mainly a constant with zero variance during most of the Porfiriato, reflecting the low political turbulence of that period. Was political instability negatively related to economic growth in nineteenth century Mexico? I now turn to that question.

5. Empirical Model and Estimation Results

This section presents estimates of the effect of political instability on economic growth. Its primary purpose is to test the hypothesis that economic growth declined in nineteenth century Mexico when political instability increased. Economic growth is proxied by the growth of the different measures of government revenue presented in the last section. The rationale for this approximation is that economic growth must have been

[24] This is invariant to whether we use the Welch or Satterthwaite approximation formula of degrees of freedom. The two maximum and the two minimum growth rates of the combined sample were treated as outliers.
[25] Data from Coatsworth (1988).

reflected in the growth of government income, or that at least there was a positive relationship between the growth of the economy and the growth of government revenues.

The models estimated in this paper have the general form:

$$g_t = c_0 + \alpha_0 I_t + \alpha_1 I_{t-1} + \gamma g_{t-1} + \beta' x + u_t$$

where g_t is a proxy of economic growth as described in section 4. It represents the growth rate of one of the government revenue measures.

I_t is the index of political instability constructed through principal components using four measurements of instability: the number of changes in the executive post, the number of regional, peasant, or caste wars, a dummy variable indicating a foreign war, and number of parallel governments. Since the number of regional wars is measured up to 1899, I also constructed the index I_t^p as a linear combination of all three variables except regional wars, using the principal component method. This new index increases the sample size up to 1910, and its summary statistics are depicted in Table 5. Sometimes I use I_t^p as explanatory variable instead of I_t. This increases the sample size, and it will be indicated each time that I use it. The graph of I_t^p looks very similar to that of I_t, but less smooth.

Some forms of regression equation (8) correspond to Finite Distributed Lag (FDL) models because I include one lag of political instability as an explanatory variable. In this case, the lag of the dependant variable is excluded from the equation. This is because most of the time the lag of the dependent variable must be instrumented, and for that I use the lag of the political instability variable. The FDL model allows political instability to affect economic growth with a lag of one year. Other forms of regression equation (8) correspond to Infinite Distributed Lag (IDL) models because I include one lag of the dependent variable as regressor. Most of the time, in these cases the lag of economic growth must be instrumented, and I use one lag of political instability as the instrument, so that the lag of political instability is excluded from the regression equation as explanatory variable.

Under the FDL and IDL models, a temporary, one-year increase in political instability affects current economic growth as α_0 times the change in political instability, and next year it affects economic growth by α_1 and $\alpha_0\gamma$ times the change in instability, respectively. After $t>1$ years, there is no additional effect in the FDL model, but it is $\alpha_0\gamma^t$ and $(\alpha_0+\alpha_1)\gamma^t$ times the change in political instability under the IDL model with and without lag of political instability, respectively. The long run multiplier (LRP) is the long run effect of a permanent change in political instability, and this is given by $\alpha_0+\alpha_1$ in the FDL model, and by $\alpha_0/(1-\gamma)$ and $(\alpha_0+\alpha_1)/(1-\gamma)$ in the IDL models. Studies on the empirics of economic growth such as Alesina et al. (1996), Barrro (1991), Barro and Lee (1994), Caselli, Esquivel, and Lefort (1996), Levine and Renelt (1992), and Sala-i-Martin (1997) have found a negative relationship between political instability and economic growth.[26]

In equation (8), β represents a vector of parameters and x is a vector of control variables. They include the growth in the price of Mexican bonds in the London market, the growth in the quantity of coined silver, the growth in the relative price of silver in terms of gold, and the rate of depreciation of the Mexican peso with respect to the U.S. dollar. Summary statistics of these variables are displayed in Table 5.

The change in the price of the Mexican bonds[27] is included in the regression because it can potentially measure the expectations of foreign investors on the stability and growth of the Mexican economy. It reflects expectations on future growth in the Mexican economy, which can be related to current economic growth as in recent New Keynesian macroeconomic models (See Clarida, Gali, and Gertler, 1999). Furthermore, it may also reflect the expectations of future political instability. Its coefficient in equation (8) should be positive. Finally, this variable may also measure the profitability of investment in the Mexican economy. Studies on growth empirics such as Barro (1991, 1996, 1997), Barro and Lee (1994), Caselli et al. (1996), DeLong and Summers (1993), Levine and Renelt,

[26] Levine and Renelt (1992), however, dispute the robustness of the result.
[27] The source of this variable is Costeloe (2003).

and Mankiw, Romer and Weil (1992) have found a positive relationship between the investment ratio and economic growth.

The rate of growth of the coined silver may be related to two other variables. First, a high rate of growth is associated with higher employment, and therefore, with higher growth during the year. Second, the growth of coined silver may reflect the growth in silver production, which was the most important export product of the epoch. Many economic historians believe that exports were an important sector that pushed growth in the rest of the economy. And therefore, I expect the coefficient of this variable to be positive. Sala-i-Martin (1997) finds a positive relationship between mining as a share of GDP and growth, while Kormendi and Meguire (1985) find a positive link between money and economic growth. On the relationship between trade and growth, Frankel and Romer (1996), Frankel, Romer and Cyrus (1996), and Kormendi and Meguire (1985) found a positive association.

The growth in the relative price of silver in terms of gold[28] is included for reasons similar to those outlined for coined silver. This was the relative price of the principal export product of Mexico, and it is determined in world markets. An improvement in this price raises Mexico's real income, and this may generate more output and growth, so that its coefficient in the regression equation should be positive. Barro(1996, 1997), Barro and Lee (1994), Caselli, Esquivel and Lefort (1996), and Easterly, Kremer, Pritchet and Summers (1993) found that an improvement in the terms of trade betters economic growth. However, Hadass and Williamson (1993) found something different. They conclude that before World War I, improvements in the terms of trade damaged economic growth in the periphery.[29]

Since colonial times, Mexico was an importer of machinery and other important intermediate goods. The most important supplier of these goods during the nineteenth century was the U.S. Therefore, a depreciation of the Mexican peso with respect to the U.S. dollar would increase the price of important capital goods and reduce investment.

[28] The source of this variable is Jastram (1981).
[29] However, Blattmen, Hwang, and Williamson (2003) show that in the Third World, volatility in the terms of trade has been more important than their secular change.

This is the reason for which I include the change in the price in Mexican pesos of the U.S. dollar. The depreciation of this exchange rate is expected to reduce the rate of economic growth.[30]

Tables 6-10 present the estimation results for equation (8). Table 6 excludes the control variables *x* from the regression, so that it incorporates the restriction $\beta = 0$. It estimates three different models. First, a static model in which only the current level of political instability affects growth ($\alpha_1 = \gamma = 0$). Second, a Finite Distributed Lag model (FDL) where current and one lag of political instability affects growth ($\gamma = 0$). And third, an Infinite Distributed Lag (IDL) model where the current level of political instability and one lag of the rate of growth affect the current growth rate. In two out of three cases, the lag of political instability was excluded ($\alpha_1 = 0$). These models are applied to three data sets: Tax collections of the Federal Government from Tenenbaum (1986), T_1; Total Income of the Federal Government, excluding loans, again from Tenenbaum (1986), T_2; and Ordinary Income of the Federal Government from Carmagnani (1982), T_3. At this moment, the remaining two series from the Porfiriato, T_4 and T_5, were not considered since there is almost no variation in political instability in that period. They will be taken into consideration when combined with T_1 to T_3 in Tables 7 to10.

Regression equations in Table 6 were first estimated using OLS, and then testing for serial correlation of order one with the Breusch and Godfrey LM statistic. Under the null hypothesis of no autocorrelation, this statistic follows a χ^2 distribution with one degree of freedom. This is reported as BP(1) in Table 6. If the test rejected the null hypothesis, then Newey-West robust standard errors were reported (OLSN) in the static and FDL models, while IV estimation was carried on for the IDL model. A lag of political instability instrumented the lag of growth. When BP(1) did not reject the hypothesis of zero autocorrelation, the Breusch-Pagan test of homoskedasticity was carried on. The LM

[30] Most studies on growth empirics have found a negative relationship between the real exchange rate and economic growth.

statistic follows a χ^2 distribution with *k-1* degrees of freedom,[31] and it is reported as BP(k-1) in table 6. When homoskedasticty was rejected, White robust standard errors were reported (OLSR). Otherwise, OLS estimates were used.

All equations in Table 6 resulted in an estimated negative effect of political instability on economic growth. The first 6 equations, which correspond to T_1 and T_2, gave estimates of the current effect of instability which are statistically different than zero at the 10% significance level, and half of them are significant at the 5 % level.[32] The highest p-value among them is .072, so that marginally, all 6 regressions gave a significant negative relationship between political instability and the growth of government revenue. The range of the Long Run Multiplier (LRP) goes from -.096 to -.185 in the 6 equations, and from -.013 to -.185 including all 9 regressions. This measures the long run effect of a permanent increase in political instability on the growth of government income.

Tables 7 and 8 report estimates of the static model using control variables *x*, and combining the series for post-independent Mexico (1820-1870) with the series for the Porfiriato (1870-1910). The static models exclude the lag of political instability and the lag of growth in the regression equation (8). That is, $\alpha_1 = \gamma = 0$. The model is estimated using three combined data sets. G_1 joins together the growth rate of Tax Collections from Tenenbaum (1986) with the growth rate of Rosenzweig's Tax Income in the Porfiriato. G_2 unites Total Income excluding loans from Tenenbaum with Rosenzweig's Ordinary Income of the Porfiriato. And finally, G_3 combines the growth of Ordinary Income from Carmagnani with the growth of Rosenzweig's Ordinary Income. These are three series that go from the 1820s to the 1910s, though two of them with missing values in the middle of the them.

Table 7 presents robust (Newey-West) estimates including control variables as explanatory variables for each of the *G* series, and using in the regression equation either the index of political instability from 4 variables, *I*, or the modified index constructed from

[31] *K* represents the number of regressors, including the constant.
[32] Columns (1), (5) and (6).

three variables, I^p. The reason is that even though *I* summarizes more information than than I^p, it is truncated at 1899. On the other hand, I^p reaches the year of 1910. Each series of growth in government income is regressed against the index of political instability and the control variables. The results excluding control variables are also reported in Table 7.

The 12 equations estimated in Table 7 give negative relationships between political instability and growth. The first 8 regressions resulted in significant coefficients at the 10 % significance level, and half of them at the 5 % level. Their highest p-value is 0.088, and therefore, they are marginally significant. The range of the coefficient on political instability goes from -.111 to -.168 in the first 8 equations, and from -.038 to –168 including all 12. The change in the price of Mexican bonds is included as explanatory variable in columns (2), (6) and (10). Its sign is positive as expected, and significant at the 5 % significance level. This variable is truncated at the year of 1899, and so columns (4), (8) and (12) exclude this price from the equation, because they use the modified index of political instability to expand the size of the series. In these equations, the change in the relative price of silver has the expected positive sign, and is significant at the 5 % level. The growth in silver production has most of the time the desired sign, but it is usually not significant. The rate of depreciation sometimes has the wrong sign, but it is never significant.

Section 2 argued that political instability was exogenous from an economic standpoint. I argued that it was generated by ideological differences between political actors. Now I relax that hypothesis, and I assume political instability may be endogenous. I instrument it with one lag. Table 8 presents the results. It shows 3 panels, each for each *G* variable. And each panel presents the IV estimation for all different subsets of control variables. To have reasonable standard errors, the sample size becomes critical, and most

of the time the index of political instability used is I^p, while the growth in the price of Mexican bonds is excluded from the equation.[33]

All 27 regressions showed a negative relationship between political instability and growth. And 24 of them gave significant results at the 5 % significance level. For G_1, the range of values goes from -.316 to -.350; for G_2, the estimated coefficient is between -.200 to -.206; and for G_3, the results are between -.046 and -.048. The growth of silver production and the growth in its relative price always have the desired sign: they are positively related with the growth rate, but their coefficients are never significative. The depreciation of the exchange rate sometimes has the wrong sign, but it is never significant.

Table 9 extends the static model to include lags of the dependent and independent variables. It estimates an FDL model with one lag of instability, and an IDL model with one lag of the dependent variable. For comparison purposes, it also displays the static model with no lags. The estimation methodology was similar to that used to generate Table 6. I relayed on the Breuch-Godfrey and Breusch-Pagan tests to select an estimation method. The results show again a negative relationship between political instability and growth.

The first 6 regressions in Table 9 gave negative and significant relationships between instability and growth at the 10 % significance level, and half of them at the 5 % level. The long run multiplier in Table 9 is between -.020 and -.280. The growth rates of silver production and its relative price have always the desired sign, and the later is significative several times. The rate of depreciation of the Mexican peso with respect to the dollar is never significative.

Finally, I combined all 5 original measures of economic growth, the growth rates of T_1 to T_5, into one single series that I call *G*. This series may contain more than one estimate of economic growth for a single year, since the original measurements overlap in certain periods. To estimate the relevant parameters of regression equation (8), I included a

[33] The sample size becomes so critical that correcting for autocorrelation in the IV estimation leaves very similar point estimates with very high standard errors. The number of significant estimates reduces in each case.

set of 5 dummy variables indicating the original data set to which each observation belongs. Furthermore, the error series of the pooled data will be correlated at least by groups of years. That is, the measurements of economic growth in a single year will be correlated. To estimate equation (8), then, I used clustered regression to estimate the standard errors.

The estimation results for the pooled data are displayed in Table 10.[34] The first 6 regressions used *I* as the index of political instability, while the last 6 equations used I^p. The effect of political instability is always negative, and it is significative at the 10 % level in 8 out of the 12 regressions,[35] and in half of them at the 5 % level.[36] The estimates significative in the 5% one tailed tests range between -.051 and -.053. Among them, the change in the price of Mexican bonds has the expected positive sign and is significative. The growths in silver production and its relative price have the expected positive and significative sign in some equations. The rate of depreciation of the Mexican peso, on the other hand, is never significative.

The results in this section show very strong evidence of a negative effect of political instability on economic growth when this growth is measured by the growth of fiscal variables. The results are robust to different control variables, estimation methods, and growth measurements.

6. Political Instability: Accounting for the Lost Decades and the Porfiriato

Table 6 suggests that in the best scenario, political instability accounts for almost 60 per cent of the variance in the growth rate during the lost decades of nineteenth-century Mexico. This section now asks two more questions. First, how much of rise in growth from c1820-c1860 to c1860-c1910 is due to decline in political instability? And second, How much of the drop in growth after independence was due to political instability? I will use the estimates presented in the last section to offer an answer to these questions.

[34] The estimates for the dummy variables are not displayed.
[35] These are the static models, columns (1)-(4) and (7)-(10).
[36] Columns (7)-(10).

The first row in Table 11 displays the change in the average growth rate after 1867 in each measure of growth, G_1 to G_3 and G. This varies from .036 to .106. The second row presents the change in the index of political instability. The difference is a decline of 0.58 points. And the third row shows the estimated effect of a one-unit increase in political instability on the growth rate. This parameter varies from -.038 to -.161, and its source are the preferred (by precise) estimates in Table 7. The fourth row presents the estimated effect of the decline in political instability after 1867. It is given by the multiplication of the second and third rows.

The fifth and last row in Table 11 presents the estimated effect of political instability, as a proportion of the actual change in growth. The results show that between 50 and 88 per cent of the increase in the growth rate was due to reduced political instability. Two columns attribute more than 80 per cent of the growth change to political instability and one more attributes it 60 per cent.

Table 12 presents regression estimates of the static model, including and excluding control variables, and for each of the two indexes of political instability, when I include a dummy variable to account for a possible difference in the growth rate after 1867 that has nothing to do with political instability. This allows me to establish if there is still any difference in the growth rate after 1867 that is not accounted by political instability or the control variables.

I first notice that political instability has always the expected sign, and is significant at the 5 per cent level in more occasions than before: in 7 out of 16 cases. It is significant in one-tailed tests, or at the 10 per cent level, in 12 cases. In the 4 cases in which political instability is not significant, the dummy variable is also insignificant. And only 3 cases resulted with a significant dummy variable (at the 10 per cent level), but it never transformed political instability into a non-significant variable. These results suggest that once we control for political instability, there is no systematic difference in the growth rate after 1867.

I now turn to the following question: how much of the drop in the growth rate after independence was due to political instability? Table 13 uses the same estimates for the effect of political instability on the growth rate. To calculate the average growth rate before

1810, I used data on government income in Mexico City from TePaske (1985). The first row shows the decline in growth after independence, while the second row displays the increase in political instability. To construct the values of the index of political instability before independence, I constructed a linear combination of the relevant variables using the same weights that I employed for the post-independence period. The estimated effects on growth appear in the fourth row.

The fifth and last row of Table 13 displays the estimated decline in the growth rate that is due to political instability, as a proportion of the actual decline. The results show that between 50 and 100 per cent of the decline was due to increased political instability. The first and second column attribute 72 and 51 per cent of the decrease to instability. The third column overestimates the effect of political instability, and the fourth column attributes to political instability the totality of the drop in the growth rate.

In summary, this section has shown two important results. First, an important cause of the increase in the growth rate after 1867, during the Restored Republic and the Porfiriato, was political stability. Between 50 and 88 per cent of the increase can be attributed to the stability of the period. Second, a large fraction of the decline in the growth rate during the "lost decades" after independence was related to the increase in political instability. It is responsible for about 50 to 100 per cent of the reduction.

7. Conclusions

This essay studied the connection between economic growth and instability during the most politically turbulent period in Mexican history, the post-independence period in the nineteenth century. Political instability implied economic policy uncertainty, no public programs for development, but most important, violence, lack of property rights, and other forms of disorder that led to risk of loss for economic actors and that might have discouraged investment. I also argued that the origin of these disputes was exogenous from an economic standpoint. Political differences were based on ideological disagreement among political and economic agents.

Political instability was measured by a combination of four variables: Annual changes in the executive post; regional, caste and peasant wars; number of parallel governments; and foreign wars. To increase the sample size, an additional measurement excluded regional wars. But the general results applied to either of these indexes. There is strong evidence of a negative link between instability and growth.

Economic growth was proxied by the growth of Tax and/or Ordinary Income of the Federal Government. The results are robust to different measures. Also, Static, Finite Distributed Lag, and Infinite Distributed Lag models were estimated, including and excluding a number of control variables. These variables were the change in the price of Mexican bonds in the London market, the growth in silver production and its relative price in terms of gold in international markets, and the depreciation of the Mexican peso with respect to the U.S. dollar.

The growth in the price of Mexican government bonds was related positively to economic growth, as expected. This variable may be measuring the expectation of the international public on the future stability of the Mexican economy, and therefore a positive link was likely. The growth in silver production also resulted positively related to growth. The rational for this result is that the growth in silver production may be related to the rate of employment. Finally, I did not find any evidence of a significant relationship between growth and the depreciation of the Mexican peso with respect to the dollar. Most of these results did hold when I instrumented political instability and when the different measurements of growth were combined.

This paper showed that political instability harmed Mexican growth during the 40 or 50 years of the post-independence period. And foreign wars contributed a lot to it. Between 50 and 88 per cent of the increase in the growth rate after 1867 can be attributed to the stability of the period. And most important, political instability is responsible for about 50 to 100 per cent of the reduction in the growth rate during the four or five “lost decades” after independence. It was an important factor that made Mexico fall behind.

Appendix

Fiscal variables are originally expressed in fiscal years. In this essay, they were transformed to calendar year by the following formula:

$$y_t^c = \frac{a}{A} y_{t-1,t}^f + \frac{b}{B} y_{t,t+1}^f$$

where $y_{t,t+1}^f$ is the value of the variable in fiscal year *t* to *t+1*. The numbers a and b are the number of months of year *t* in fiscal years *t-1* and *t*, and *t* and *t+1*, respectively. A and B are the total number of months on those fiscal years.

The index of political instability *I* was constructed as a linear combination of the following variables: number of changes of executive (z_1), number of regional, peasant, and caste wars (z_2), number of parallel governments (z_3), and a dummy variable indicating a foreign war (z_4). The weights in the expression $I = \sum \delta_i \cdot z_i$ were chosen using the first component in the principal component method. The results were $\delta = (.22, .29, .65, .67)$. The first component explains 40 % of the total variance. I^p excluded z_2, and the weights were $\delta^p = (.37, .63, .68)$. The first component explained 90 % of the total variance.

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Table 1.
Governments in Mexico, 1821 - 1911

Period	Administration
1821 – 1823	Agustín de Iturbide
03/30/1823 – 10/10/1824	Supremo Poder Ejecutivo
10/10/1824 – 04/01/1829	Guadalupe Victoria
Congress nullified election	Manuel Gómez Pedraza (1st)
04/01/1829 – 12/19/1829	Vicente Guerrero
12/18/1829 – 12/23/1829	José María Bocanegra
12/23/1829 – 12/31/1829	Gobierno Provisional
01/01/1830 – 08/14/1832	Anastasio Bustamante (1st)
08/14/1832 – 12/24/1832	Melchor Múzquiz
12/24/1832 – 04/01/1833	Manuel Gómez Pedraza (2nd)
04/01/1833 – 05/16/1833	Antonio López de Santa Anna (1st)
04/02/1833 – 04/24/1834	Valentín Gómez Farías (1st)
04/24/1834 – 01/28/1835	Antonio López de Santa Anna (2nd)
01/28/1835 – 02/27/1836	Miguel Barragán
02/27/1836 – 04/19/1837	José Justo Corro
04/19/1837 – 03/20/1839	Anastasio Bustamante (2nd)
03/20/1839 – 08/10/1839	Antonio López de Santa Anna (3rd)
07/10/1839 – 07/19/1839	Nicolás Bravo (1st)
07/19/1839 – 10/22/1841	Anastasio Bustamante (3rd)
09/22/1841 – 10/10/1841	Francisco Javier Echeverría
10/10/1841 – 10/26/1842	Antonio López de Santa Anna (4th)
10/26/1842 – 03/05/1843	Nicolás Bravo (2nd)
03/04/1843 – 10/04/1843	Antonio López de Santa Anna (5th)
10/04/1843 – 04/04/1844	Valentín Canalizo (1st)
04/04/1844 – 12/12/1844	Antonio López de Santa Anna (6th)
12/12/1844 – 12/24/1844	José Joaquín Herrera (1st)
12/24/1844 – 12/06/1844	Valentín Canalizo (2nd)
12/06/1844 – 12/30/1845	José Joaquín Herrera (2nd)
01/04/1846 – 07/27/1846	Mariano Paredes y Arrillaga
07/28/1846 – 08/04/1846	Nicolás Bravo (3rd)
08/06/1846 – 12/24/1846	José Mariano Salas (1st)
12/24/1846 – 03/21/1847	Valentín Gómez Farías (2nd)
03/21/1847 – 04/02/1847	Antonio López de Santa Anna (7th)
04/02/1847 – 05/20/1847	Pedro María Anaya (1st)
05/20/1847 – 11/16/1847	Antonio López de Santa Anna (8th)

Table 1 (cont.)

11/26/1847 – 11/13/1847	Manuel de la Peña y Peña (1st)
11/13/1847 – 01/08/1848	Pedro María Anaya (2nd)
01/08/1848 – 05/30/1848	Manuel de la Peña y Peña (2nd)
06/03/1848 – 01/15/1851	José Joaquín Herrera (3rd)
01/15/1851 – 01/06/1853	Mariano Arista
01/06/1853 – 02/08/1853	Juan Bautista Ceballos
02/08/1853 – 03/20/1853	Manuel María Lombardini
04/20/1853 – 08/12/1855	Antonio López de Santa Anna (9th)
08/15/1855 – 09/12/1855	Martín Carrera
09/12/1855 – 10/04/1855	Rómulo Díaz de la Vega
10/04/1855 – 09/15/1856	Juan N. Alvarez
09/15/1856 – 01/21/1858	Ignacio Comonfort
01/23/1858 – 12/23/1858	Félix Zuloaga *
12/23/1858 – 01/21/1859	Manuel Robles Pezuela
02/02/1859 – 08/13/1860	Miguel Miramón (1st)
08/14/1860 – 08/15/1860	José Ignacio Pavón
08/15/1860 – 12/24/1861	Miguel Miramón (2nd)
1862 – 1864	French Occupation
06/1863 – 04/1864	Junta de Regencia
04/10/1864 – 05/15/1867	Ferdinand Maximilian of Hapsburg
01/19/1858 – 12/01/1867	Benito Juarez *
1867 – 1872	Benito Juarez
07/19/1872 – 11/20/1876	Sebastián Lerdo de Tejada
10/31/1876 – 10/23/1877	José María Iglesias
11/23/1877 – 12/11/1877	Porfirio Diaz (1st)
12/11/1877 – 02/17/1877	Juan N. Mendez
02/17/1877 – 11/30/1880	Porfirio Diaz (cont.)
12/01/1880 – 11/301884	Manuel González
12/01/1884 – 1911	Porfirio Díaz (2nd to 7th)

Source: Vázquez-Gómez (1998).

- From 1858 to 1867, after the presidency of Comonfort, Mexico had two parallel governments. During all this period, the president of the liberal government was Benito Juarez. The conservative government started with Felix Zuloaga and ended with Maximilian of Hapsburg.

Table 2
Chronology of Events in 19th century Mexico

Period	Event
1521-1810	Colonial Period
1810-1821	Independence War
1824-1834	First Federalism
1834-1846	Centralism
1836	Loss of Texas
1838	Pastry War with France
1846-1848	War with the United States
1846-1853	Second Federalism
1854-1855	Revolution of Ayutla
1858-1861	War of the Reform
1862-1867	French Occupation
1867-1876	Restored Republic
1876-1880	First Presidency of Porfirio Díaz
1884-1911	Porfiriato Dictatorship

Table 3
Political Factions by Independence Era Group, First Major Political Post, and Initial Military Experience (1821-1867)

	Radicals (%)	Moderates (%)	Conservatives (%)
Independence Era Factions:			
Insurgents	70	44	16
Royalists	30	56	84
First Mayor Political Post:			
State Governor / National Legislator	75	74	51
National Executive Office	25	26	49
Initial Military Experience			
State / Civic Militia	100	40	10
National Army	0	60	90

Source: Stevens (1991).

Table 4
International Trade in Nineteenth-Century Mexico
(1820s and 1870s)

Year	Imports	Exports
1820s:		
1825	19 093 716	5 082 240
1826	15 452 001	7 648 137
1827	14 889 016	12 171 780
1828	9 947 700	14 488 793
1870s:		
1871	24 775 933	13 602 867
1872	29 552 433	31 594 005
1873	34 005 299	27 688 703
1874	27 300 856	27 318 788
1877	28 778 000	28 777 508

Source: Herrera Canales (1980).

Table 5
Summary Statistics

Variable	Mean	Std. Dev.	Max	Min	N	Period
$\Delta \ln T_1$	-.007	.219	.406	-.678	24	1826-1856
$\Delta \ln T_2$	.006	.283	.685	-.671	26	1826-1856
$\Delta \ln T_3$	.040	.213	.629	-.673	47	1825-1879
$\Delta \ln T_4$	.056	.064	.159	-.083	34	1877-1910
$\Delta \ln T_5$	.054	.093	.213	-.220	34	1877-1910
G_1	.030	.151	.406	-.678	58	1826-1910
G_2	.028	.159	.406	-.678	58	1826-1910
G_3	.045	.175	.629	-.673	78	1825-1910
I	0.000	1.25	3.44	-1.24	79	1821-1899
I_p	0.000	1.25	3.34	-.764	91	1821-1910
Changes	.725	1.16	6	0	91	1821-1910
Regional	1.68	.941	4	0	79	1821-1899
Goverments	1.10	.314	2	1	91	1821-1910
War	.175	.382	1	0	91	1821-1910
$\Delta \ln P_b$	-.006	.226	.664	-.614	65	1825-1889
$\Delta \ln S$	-.014	.161	.340	-.792	90	1821-1910
$\Delta \ln P_S$	-.009	.047	.105	-.214	90	1821-1910
$\Delta \ln e$	.008	.043	.206	-.178	90	1822-1911

Note: T_1 and T_2 represent Tax Collections of the Federal Government and Total Income of the Federal Government (without Loans) by Tenenbaum (1986). T_3 represents Ordinary Income of the Federal Government by Carmagnani (1982). T_4 and T_5 represent Tax Income and Ordinary Income of the Federal Government, according to Rosenzweig et al. (n.d.). *I* is the index of political instability using all 4 measures of instability: Changes of executive (Changes), Regional, caste, and peasant wars (Regional), Number of parallel governments (Governments), and Foreign wars (War). I_p is the index that uses those measurements except Regional. G_1 is the combination of rates of growth in T_1 and T_4, G_2 is the combination in T_2 and T_5, and G_3 in T_3 and T_5. P_b refers to the price of Mexican bonds in the British market, *S* is the quantity of silver measured by coinage, P_S is the price of silver in terms of gold in the U.K, and *e* is the dollar exchange rate.

Table 6
Results for the Simple Static, FDL, and IDL models for each Data Set in Post-Independence Mexico

Independent Variable	Dependent Variable								
	$\Delta \ln T_1$			$\Delta \ln T_2$			$\Delta \ln T_3$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I_t	-.133 (.057)	-.116 (.056)	-.120 (.062)	-.119 (.059)	-.142 (.064)	-.235 (.046)	-.028 (.024)	-.033 (.035)	-.013 (.018)
I_{t-1}	-	-.068 (.042)	-.063 (.046)	-	.045 (.066)	-	-	.006 (.032)	-
$\Delta \ln T_{t-1}$	-	-	-.070 (.202)	-	-	-.273 (.152)	-	-	.289 (.323)
Constant	-.084 (.046)	-.110 (.047)	-.110 (.050)	-.076 (.048)	-.067 (.047)	-.148 (.035)	.036 (.021)	.036 (.021)	.009 (.031)
LRP	-.133	-.185	-.171	-.119	-.096	-.184	-.028	-.027	-.019
BG(1)	.200 [.654]	.583 [.445]	1.57 [.209]	4.99 [.025]	4.83 [.027]	.837 [.360]	1.02 [.311]	1.41 [.233]	6.54 [.010]
BP(k-1)	.572 [.449]	.392 [.821]	1.26 [.737]	-	-	.393 [.821]	13.1 [.000]	13.9 [.000]	-
$F_{k-1,n-k}$	5.44 [.030]	4.25 [.030]	2.39 [.106]	4.03 [.057]	2.57 [.101]	12.8 [.000]	1.30 [.260]	0.68 [.510]	1.67 [.201]
RSS	.365	.319	.312	-	-	.266	-	-	.705
R^2	.222	.320	.309	-	-	.588	.067	.068	.135
$\overline{R}^2$	.181	.245	.180	-	-	.542	-	-	.090
N	21	21	20	23	23	21	44	44	41
Period	1825-1856			1825-1856			1824-1879		
Estimation	OLS	OLS	OLS	OLSN	OLSN	OLS	OLSR	OLSR	IV

Note: Standard errors are in brackets, and p-Values in square brackets. *RSS*, $\overline{R}^2$, and $\overline{R}^2$ were not reported when robust standard errors were used. For variable definitions, see note to Table 5. *BG(1)* is the Breusch-Godfrey LM statistic for testing the null hypothesis of no serial autocorrelation of order one. *BP(k-1)* is the Breusch-Pagan LM statistic for testing the null hypothesis of homoskedasticity, and it was not reported when the *BG(1)* test rejected the hypothesis of zero autocorrelation. Newey-West robust standard errors were used when *BG(1)* rejected the assumption of spherical errors (Equations 4 and 5). White robust standard errors were used when *BG(1)* did not reject zero autocorrelation, but *BP(k-1)* rejected homoskedasticity (Equations 7 and 8). *RSS* is the Residual Sum of Squares. OLSN and OLSR refer to robust OLS using Newey-West and White standard errors, respectively. When IV was applied, the lag of the independent variable was excluded from the equation and used to instrument the lagged dependent variable. Under *IV*, *BG(1)* refers to the zero autocorrelation test using OLS.

Table 7
Robust OLS Estimates of Static Model

Independent Variable	**Dependent Variable**											
	G_1				G_2				G_3			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
I	-.161 (.082)	-.161 (.085)			-.111 (.063)	-.120 (.063)			-.038 (.028)	-.039 (.029)		
I_p			-.161 (.056)	-.168 (.059)			-.120 (.051)	-.122 (.054)			-.037 (.026)	-.039 (.027)
$\Delta \ln P_b$		.161 (.077)				.221 (.101)				.169 (.076)		
$\Delta \ln S$		.117 (.241)		.041 (.046)		-.033 (.315)		.011 (.061)		.043 (.242)		.031 (.059)
$\Delta \ln P_s$		-.070 (1.36)		.413 (.143)		.136 (1.37)		.607 (.250)		1.94 (2.17)		.632 (.234)
$\Delta \ln e$		-.065 (1.57)		.144 (.230)		-.365 (1.84)		.530 (.329)		1.27 (1.97)		.509 (.298)
Constant	-.073 (.058)	-.088 (.065)	-.066 (.041)	-.065 (.043)	-.037 (.044)	-.051 (.048)	-.036 (.036)	-.034 (.036)	.020 (.022)	.025 (.025)	.022 (.020)	.025 (.021)
$F_{k-1,n-k}$	3.80 [.057]	2.21 [.082]	8.10 [.006]	7.95 [.000]	3.04 [.088]	2.14 [.087]	5.41 [.023]	3.50 [.013]	1.77 [.188]	2.63 [.035]	1.94 [.167]	3.42 [.013]
N	44	34	55	55	46	36	57	57	64	54	75	75

Note: Standard errors are in brackets like ( ), and p-Values in square brackets like []. Robust standard errors were calculated using the Newey-West procedure. For variable definitions, see note to Table 5.

Table 8
IV Estimates of Static Models

Variable	Panel A: Dependent Variable is G_1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I	-.358 (.209)								
I_p		-.316 (.107)	-.334 (.116)	-.336 (.113)	-.324 (.111)	-.350 (.121)	-.347 (.123)	-.336 (.114)	-.350 (.123)
$\Delta \ln S$			.148 (.114)			.137 (.117)	.172 (.122)		.154 (.135)
$\Delta \ln P_s$				.494 (.346}		.441 (.351)		.567 (.518)	.264 (.581)
$\Delta \ln e$					-.363 (.381)		-.474 (.412)	.103 (.060)	-.244 (.686)
Constant	-.176 (.111)	-.146 (.058)	-.152 (.061)	-.149 (.060)	-.146 (.059)	-.154 (.063)	-.153 (.063)	-.150 (.060)	-.154 (.063)
$F_{k-1,n-k}$	2.93 [.094]	8.73 [.004]	4.17 [.021]	4.50 [.015]	4.25 [.019]	2.87 [.045]	2.67 [.057]	3.11 [.034]	2.26 [.075]
σ	.164	.139	.143	.143	.141	.147	.146	.145	.148
N	44	55	55	55	55	55	55	55	55
	Panel B: Dependent Variable is G_2								
I	-.160 (.095)								
I_p		-.200 (.078)	-.208 (.082)	-.211 (.081)	-.202 (.081)	-.216 (.084)	-.211 (.085)	-.212 (.081)	-.216 (.085)
$\Delta \ln S$			.100 (.109)			.090 (.110)	.106 (.113)		.067 (.123)
$\Delta \ln P_s$				.345 (.349)		.308 (.352)		.686 (.529)	.554 (.580)
$\Delta \ln e$					-.079 (.387)		-.142 (.402)	.490 (.587)	.341 (.662)
Constant	-.061 (.051)	-.075 (.042)	-.076 (.043)	-.075 (.043)	-.074 (.042)	-.076 (.044)	-.076 (.043)	-.076 (.043)	-.077 (.043)
$F_{k-1,n-k}$	2.83 [.099]	6.49 [.013]	3.21 [.048]	3.38 [.041]	3.22 [.047]	2.22 [.096]	2.11 [.109]	2.69 [.055]	2.00 [.107]
σ	.157	.146	.147	.147	.147	.149	.147	.148	.150
N	46	57	57	57	57	57	57	57	57

Table 8 (cont.)

	Panel C: Dependent Variable is G_3								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I	-.051 (.019)								
I_p		-.046 (.017)	-.047 (.018)	-.048 (.017)	-.046 (.018)	-.049 (.018)	-.048 (.018)	-.047 (.018)	-.048 (.018)
$\Delta \ln S$			.086 (.103)			.074 (.104)	.089 (.105)		.039 (.115)
$\Delta \ln P_s$				.307 (.339)		.271 (.344)		.717 (.542)	.631 (.598)
$\Delta \ln e$					-.038 (.373)		-.082 (.378)	.573 (.593)	.480 (.654)
Constant	.019 (.019)	.021 (.017)	.022 (.017)	.024 (.017)	.021 (.017)	.025 (.017)	.023 (.018)	.024 (.017)	.024 (.018)
$F_{k-1,n-k}$	6.69 [.012]	6.72 [.011]	3.64 [.031]	3.72 [.029]	3.31 [.042]	2.60 [.058]	2.40 [.075]	2.82 [.045]	2.10 [.089]
σ	.158	.148	.149	.148	.149	.149	.150	.148	.149
N	64	75	75	75	75	75	75	75	75

Note: Standard errors are in brackets like ( ), and p-Values in square brackets like []. For variable definitions, see note to Table 5. σ is the root mean square error.

Table 9
Estimation of Finite and Infinite Distributed Lag Models

Independent Variable	Dependent Variable								
	G_1			G_2			G_3		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I_t^p	-.168 (.058)	-.145 (.053)	-.271 (.089)	-.122 (.062)	-.098 (.057)	-.280 (.110)	-.039 (.027)	-.020 (.031)	-.032 (.022)
I_{t-1}^p		-.059 (.024)			-.044 (.030)			-.023 (.022)	
G_{t-1}			-1.08 (.863)			-1.46 (1.14)			.161 (.153)
$\Delta \ln S$	.041 (.046)	.043 (.047)	.066 (.138)	.011 (.062)	.009 (.062)	.049 (.173)	.031 (.059)	.034 (.060)	.046 (.062)
$\Delta \ln P_s$	.413 (.171)	.486 (.137)	.363 (.655)	.607 (.266)	.671 (.260)	.559 (.840)	.632 (.234)	.645 (.235)	.522 (.231)
$\Delta \ln e$	.144 (.251)	.186 (.222)	-.303 (.846)	.530 (.340)	.574 (.332)	-.090 (1.06)	.509 (.298)	.509 (.300)	.515 (.310)
Constant	-.065 (.040)	-.081 (.045)	-.073 (.034)	-.034 (.042)	-.042 (.037)	-.051 (.044)	.025 (.021)	.025 (.021)	.013 (.022)
LRP	-.168	-.205	-.130	-.122	-.143	-.113	-.039	-.043	-.038
BG(1)	1.98 [.159]	4.53 [.033]	3.07 [.079]	1.59 [.206]	2.58 [.108]	2.11 [.145]	2.58 [.108]	2.96 [.085]	1.82 [.177]
BP(k-1)	19.9 [.000]	-	-	26.5 [.000]	-	-	-	-	40.8 [.000]
$F_{k-1,n-k}$	6.01 [.000]	6.64 [.000]	3.23 [.013]	3.29 [.017]	3.25 [.012]	1.91 [.110]	3.42 [.013]	2.98 [.017]	2.76 [.025]
RSS	-	-	1.33	-	-	2.26	-	-	
R^2	.359	-	-	.202	-	-	-	-	.136
N	55	55	53	57	57	54	75	75	72
Method	OLSR	OLSN	IV	OLSR	OLSN	IV	OLSN	OLSN	OLSR

Note: Standard errors are in brackets like ( ), and p-Values in square brackets like [ ]. *RSS* were not reported when robust standard errors were used. For variable definitions, see note to Table 5. *LRP* is the Long Run Multiplier of Instability. *BG(1)* is the Breusch-Godfrey LM statistic for testing the null hypothesis of no serial correlation of order one. Critical values of *BG(1)* were selected at 15% significance levels. *BP(k-1)* is the Breusch-Pagan LM statistic for testing the null hypothesis of homoskedasticity, and it was not reported when the *BG(1)* test rejected the hypothesis of zero autocorrelation. Newey-West robust standard errors (OLSN) were used in the FDL models when *BG(1)* rejected the assumption of spherical errors. IV estimation was carried on in the IDL models when *BG(1)* rejected the assumption of no autocorrelation. White robust standard errors (OLSR) were used when *BG(1)* did not reject zero autocorrelation, but *BP(k-1)* rejected homoskedasticity. *RSS* is the Residual Sum of Squares. When IV was applied, the lag of political instability was excluded from the equation and used to instrument the lagged dependent variable. *BG(1)* and *BP(k-1)* refer to tests using OLS.

Table 10
Cluster Estimation with Pooled Data

Independent Variable	Dependent Variable is *G*											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
I or I_p	-.051 (.027)	-.051 (.027)	-.051 (.027)	-.055 (.027)	-.052 (.043)	-.055	-.052 (.025)	-.053 (.026)	-.053 (.026)	-.055 (.026)	-.047 (-.010)	-.061 (.034)
I_{t-1} or I_{t-1}^{p}	-	-	-	-	-.003 (.035)	-					-.010 (.027)	
G_{t-1}						.091 (.428)						-.089 (.326)
$\Delta \ln P_b$	-	-	-	.132 (.060)	.134 (.062)	.122 (.072)				.126 (.057)	.138 (.059)	.142 (.061)
$\Delta \ln S$	-	-.100 (.138)	-.098 (.136)	-.051 (.172)	-.054 (.173)	-.089 (.176)		.029 (.053)	.000 (.053)	-.060 (.173)	-.065 (.174)	-.075 (.179)
$\Delta \ln P_s$	-	.302 (.263)	.933 (.849)	.806 (1.01)	.821 (1.05)	.859 (1.07)		.340 (.185)	.649 (.195)	.633 (1.05)	.741 (1.06)	.447 (1.14)
$\Delta \ln e$	-	-	.677 (.871)	-.190 (1.35)	-.170 (1.43)	.536 (1.45)			.430 (.265)	-.434 (1.43)	-.302 (1.47)	-.121 (1.65)
Constant	-.049 (.046)	-.047 (.046)	-.047 (.046)	-.047 (.046)	-.048 (.046)	-.066 (.049)	-.032 (.041)	-.032 (.041)	-.032 (.041)	-.029 (.042)	-.028 (.042)	-.041 (.048)
LRP	-.051	-.051	-.051	-.055	-.056	-.061	-.052	-.053	-.053	-.055	-.058	-.056
$F_{k-1,n-k}$	1.30 [.276]	1.29 [.270]	1.43 [.200]	2.47 [.018]	2.53 [.013]	2.87 [.006]	1.33 [.259]	1.37 [.230]	2.90 [.006]	2.45 [.019]	2.32 [.022]	2.94 [.005]
R^2	.126	.135	.137	.171	.171	.205	.126	.140	.145	.168	.166	.155
N	135	135	135	115	115	106	157	157	157	115	115	106

Note: Standard errors are in brackets like ( ), and p-Values in square brackets like [ ]. Robust standard errors were calculated assuming data was clustered by year. For variable definitions, see note to Table 5. Equations (1)-(6) use *I* as independent variable, while equations (7)-12 use I_p.

Table 11
Effect of decline in Political Instability on Economic Growth after 1867

	Independent Variable			
	G_1	G_2	G_3	G
ΔG	.106	.079	.036	.063
ΔI	-.58	-.58	-.58	-.58
α	-.161	-.111	-.038	-.055
Est. Effect	.093	.064	.022	.032
Percentage	87.7	81.0	61.1	50.8

Note: ΔG is the observed increase in the rate of growth after 1867. It was calculated as the difference between mean growth after 1867 and mean growth before that year. ΔI is the observed change in political instability after 1867. It is the mean difference between periods. α is the estimate used for the effect of political instability on economic growth. *Est. Effect* is the effect estimated on economic growth due to the decline in political instability after 1867. *Percentage* is the proportion of the observed change in the rate of growth after 1867 that can be explained by the decline in political instability.

Table 12
Robust OLS Estimates accounting for different Periods

Variable	Panel A. Dependent Variable:							
	G_1				G_2			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
I	-.169 (.071)	-.195 (.078)			-.109 (.059)	-.128 (.060)		
I_p			-.148 (.063)	-.151 (.065)			-.113 (.061)	-.114 (.062)
D	.120 (.040)	.170 (.069)	.026 (.042)	.035 (.044)	.079 (.039)	.095 (.059)	.013 (.045)	.018 (.048)
$\Delta \ln P_b$		.081 (.082)				.185 (.102)		
$\Delta \ln S$		.220 (.181)		.051 (.048)		-.005 (.290)		.016 (.065)
$\Delta \ln P_s$		.228 (1.38)		.419 (.150)		.358 (1.33)		.612 (.254)
$\Delta \ln e$		-1.54 (1.80)		.109 (.234)		-1.14 (2.06)		.515 (.336)
Constant	-.141 (.061)	-.158 (.069)	-.076 (.045)	-.077 (.047)	-.077 (.052)	-.082 (.055)	-.040 (.040)	-.040 (.041)
$F_{k-1,n-k}$	5.41 [.008]	3.02 [.021]	4.39 [.017]	6.52 [.000]	2.93 [.064]	2.22 [.069]	2.96 [.060]	3.12 [.015]
N	44	34	55	55	46	36	57	57
	Panel B. Dependent variable:							
	G_3				G			
I	-.031 (.028)	-.033 (.029)			-.051 (.027)	-.054 (.027)		
I_p			-.034 (.029)	-.035 (.030)			-.055 (.027)	-.055 (.027)
D	.022 (.037)	.027 (.048)	.002 (.040)	.008 (.042)	.002 (.051)	.017 (.052)	-.027 (.054)	-.024 (.053)
$\Delta \ln P_b$		.146 (.086)				.132 (.061)		
$\Delta \ln S$		.080 (.238)		.047 (.065)		-.055 (.167)		.001 (.053)
$\Delta \ln P_s$		3.00 (2.40)		.649 (.219)		.806 (1.02)		.644 (.194)
$\Delta \ln e$		2.07 (2.22)		.504 (.304)		-.254 (1.35)		.433 (.266)
Constant	.016 (.034)	.023 (.037)	.026 (.032)	.027 (.033)	-.049 (.046)	-.047 (.046)	-.032 (.041)	-.032 (.041
$F_{k-1,n-k}$	0.83 [.439]	2.91 [.017]	0.89 [.415]	3.53 [.006]	1.07 [.387]	2.16 [.033]	1.12 [.361]	2.62 [.010]
N	64	54	75	75	135	115	157	157

Table 13
Effect of increase in Political Instability on Economic Growth after Independence

	Independent Variable			
	G_1	G_2	G_3	G
ΔG	-.053	-.053	-.007	-.013
ΔI	.24	.24	.24	.24
α	-.161	-.111	-.038	-.055
Est. Effect	-.038	-.027	-.009	-.013
Percentage	71.7	51.0	128.6	100.0

Note: ΔG is the observed decline in the rate of growth after independence. It was calculated as the difference between mean growth in the period from 1821 to 1857 and the period between 1750 and 1800. ΔI is the observed change in political instability after independence. It is the mean difference in political instability between the 1821-1857 and the 1750-1810 period. α is the estimate used for the effect of political instability on economic growth. *Est. Effect* is the effect estimated on economic growth due to the increase in political instability after independence. *Percentage* is the proportion of the observed change in the rate of growth that can be explained by the increase in political instability.

Figure 1. Coined silver in Mexico, 1700-1900.
Source: Orozco (1857) and Peñafiel (1900).

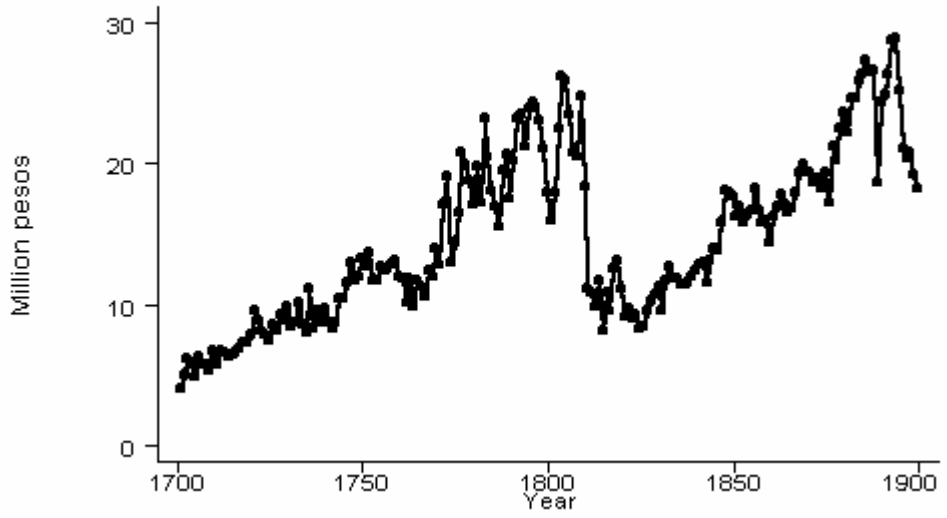

Figure 2. Index of Mexican per capita income, 1800-1877.
Source: Coatsworth (1989).

Figure 3. Tax Collections of the Federal Government, 1825-1856.

Figure 4. Total Income of the Federal Government, 1825-1856.
Source: Constructed from Tenenbaum (1986).

Figure 5. Ordinary Income of the Federal Government, 1824-1879.
Source: Carmagnani (1982).

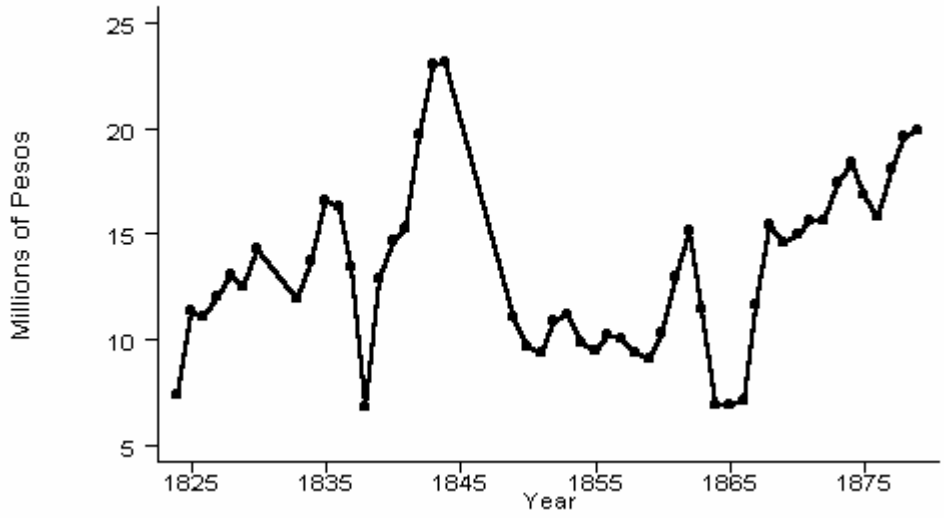

Figure 6. Tax Income of the Federal Government, 1876-1910.
Source: Rosenzweig et al. (s.f.)

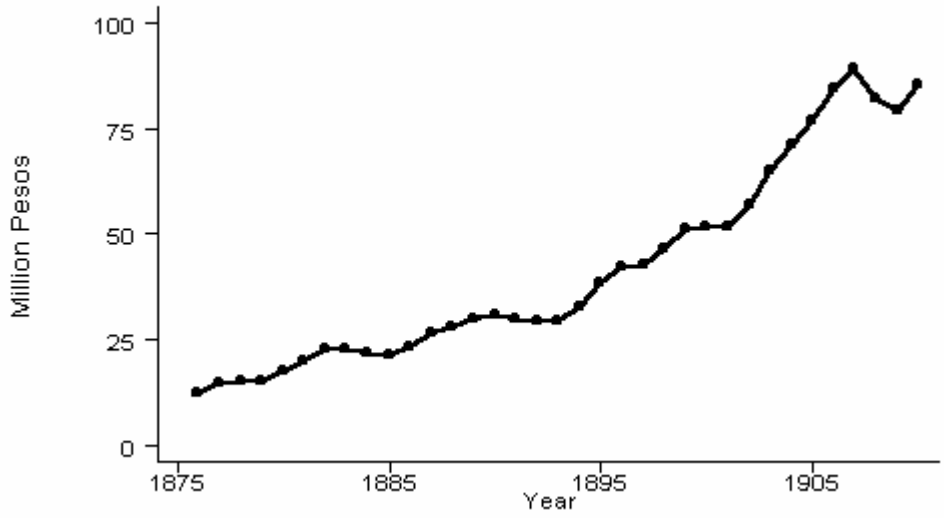

Figure 7. Ordinary Income of the Federal Government, 1876-1910.
Source: Rosenzweig et al. (s.f.)

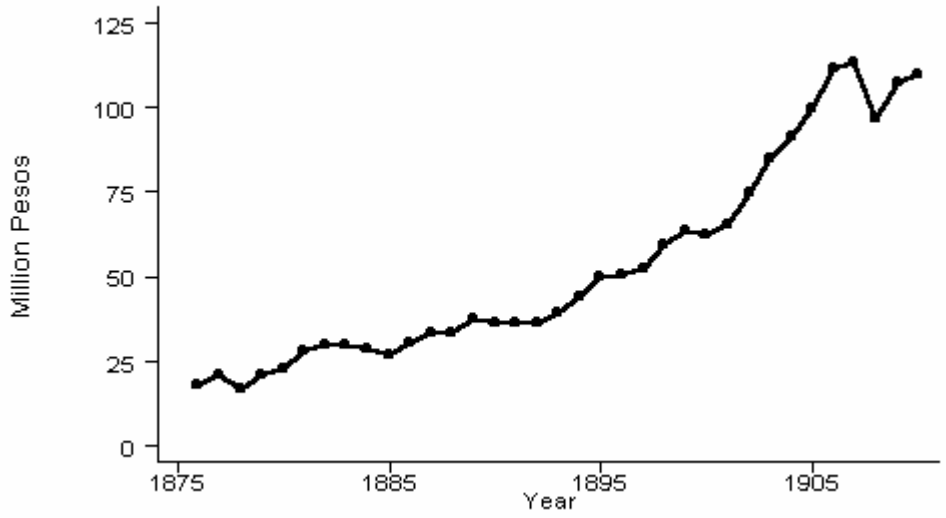

Figure 8. Index of Political Instability, 1821-1899.
Source: See text.

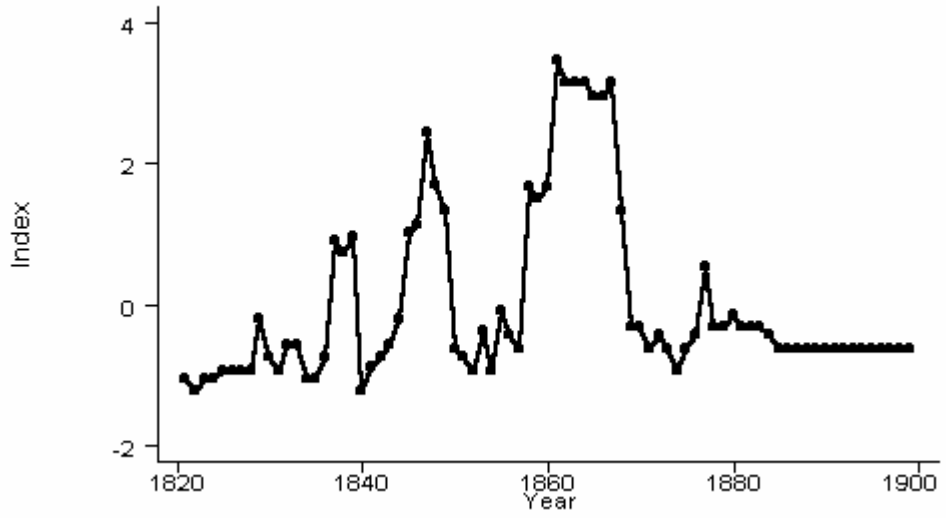

Figure 9. Hacienda Sale Prices in Michoacan, 1800-1856.
Source: Chowning (1997).