

**CHANNELS THROUGH WHICH INCOME INEQUALITY INFLUENCES
GROWTH: FISCAL AND POLITICAL INSTABILITY APPROACHES.**

(Analysis across the 32 Federal Entities of México 1989-2001.)

By

Araceli Ortega Díaz *

Tecnológico de Monterrey – CCM **

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Abstract

The present work encloses an analysis related to the channels through which income inequality affects economic growth and another related to the sources of economic growth. In the first, we use two-stage estimation with fixed effects finding that the fiscal effects of inequality on growth may depend on the government expenditure covariate. Secondly, we constructed a political instability index using principal components analysis, and look at its influence on income inequality and economic growth using dynamic panel data analysis for the 32 Federal Entities of Mexico. We find that political instability is bad for growth, and the fiscal effects of inequality on growth are not conclusive and need to be studied taking into account different fiscal variables.

Key Words: Panel data models, inequality, growth.

JEL classification: C23, O4, O54.

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** The Author is a part-time teacher at Tecnológico de Monterrey, Centro de Investigacion en Finanzas, Calle del Puente 222, Col. Ejidos de Huipulco 14380 Tlalpan, México D.F. Mexico City. Tel (++ 52-55) 54832254, Fax (52/55)56718121, araceli.ortega@itesm.mx. Currently working at Ministry of Development SEDESOL, aortega@sedesol.gob.mx

Section 1. Introduction

“As the good law is superior to all men, the laws that our congress rule should be such that that oblige constancy and patriotism: moderate opulence and indecency, increase the payoff of the poor, improve their customs; and keep ignorance, pillage and robbery away.”¹

José María Morelos y Pavón.

Mexican Hero of National Independence, 1810.

The last two decades, the Mexican economy has undergone several political, economical and social changes that have had an impact on the economy. Following the recent economic crisis, it is estimated that 51% of the population is living below the poverty line (see SEDESOL, 2002); in addition, the alternation² in political power has costly adjusting effects in government management and rule of law. These plus other factors lead to social and political unrest reflected in the increase in the number of strikes and demonstrations, increasing crime, and killings. Rodrik (1998) argues that domestic social conflicts are a key to understanding why so many countries have experienced growth collapse since the mid-1970s. Therefore, an analysis of growth the sources of economic growth should include variables that account for the socio-political instability. Barro & Lee's (1994) analyse the sources of economic growth across countries. They conclude that their model

¹ Translated from an original text, taken from one of Morelos essays permanently displayed at his house in Morelia, Michoacán.

² After 71 years of being ruled by the PRI party, from 2000 Mexico is now ruled by the PAN party, although this party does not hold the majority in the congress.

does not fully explain why the countries in Sub-Saharan Africa and Latin America experienced below-average growth rates.

One variable that is missing in Barro & Lee (1994) is income inequality, and the present analysis will make use of this variable. In addition to it, it is well known that the path that growth follows in a developing country is different from that of a developed country. Therefore, using data at Federal Entity Level, and including income inequality and socio-political instability in the model, while using panel data methods is expected to make a contribution in that sense for the Mexican case.

Recalling the results of Perotti (1996), it is important to consider the effects that any fiscal policy may have on the relationship of inequality and growth. In short, the current chapter considers two frameworks of analysis: 1) Fiscal Policy and 2) Political Instability.³

Our results suggest that inequality is positively related to growth. We also found that, among the sources of growth analysed, the one that seems to be the main source of economic growth is government expenditure (as in expenditure-led growth economies) rather than foreign direct investment. We also found that one of the main determinants of

³ These two frameworks can be mixed, but in the current study we analyse the Fiscal approach separately to look at its influence in economic growth. Afterwards, when we analyse the political instability approach, we use the fiscal variable as one more explanatory variable.

income inequality is political instability⁴ because this variable is always positive and significant.

This chapter is structured as follows. Next section presents an overview of the Mexican economy. Section 3 explains the data used in both, the fiscal and in the political framework. In section 4, we analyse the relationship of inequality and growth under a fiscal framework. Sections 5 and 6 use a political instability variable to explain the sources of economic growth and the determinants of income inequality respectively. Section 7 presents the conclusions.

Section 2. Mexico: an Overview.

We analyse the period 1989 to 2001 inclusive, because those are the available dates of comparable data for the variables used in this chapter at Federal Entity Level⁵. Nevertheless, this period captures some of the important socio-politic and economic events from the late 1980's in Mexico that have triggered important structural changes.

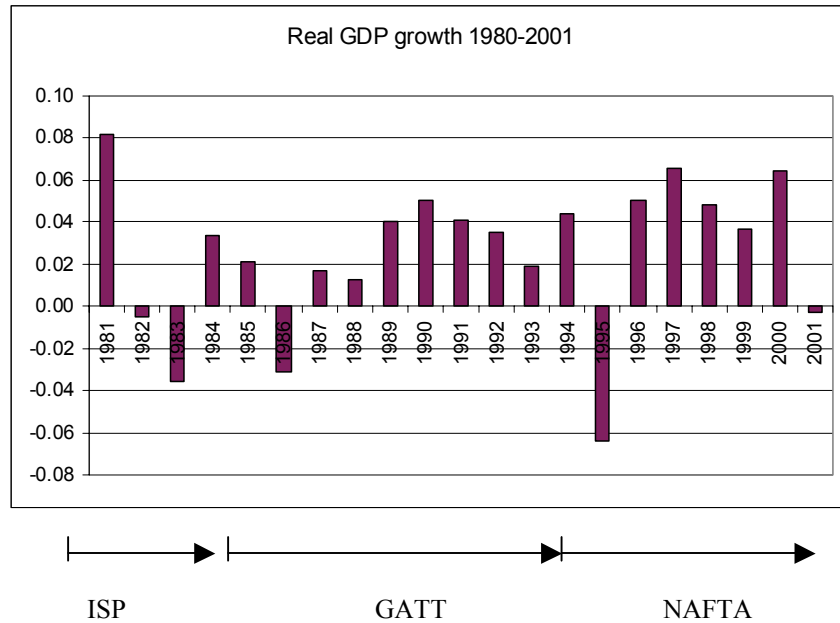
⁴ This variable has been highly discussed in the literature due to its endogeneity problems. Inequality causes social unrest and therefore political instability. On the other hand, political instability measured as political regimes overthrow, strikes, killings and crime, make the powerful grab wealth from the oppressed, causing inequality. See Benabou (1996), Alesina & Perotti (1996).

⁵ In case the period is shortened due to availability of some variables, we make it clear on the text.

Economic overview.

Mexico exhibited strong economic growth until the debt crisis in 1982. Collapse of growth continued during the financial crisis 1986, and finally with the currency crisis in 1994 (see Figure 1).

Figure 1. Economic Growth in Mexico



Mexico moved from an economic model of import substitution policies (ISP) and a government expenditure-led growth system, to export-led growth. And according to Székely (1995) it has passed through two stages: 1) a period of inflation control and strong contraction (1983-1989); and 2) partial recovery of growth (1989-up to date).

According to Cardenas (2001), Mexico enjoys relative price stability in comparison with the Latin America average, but the Mexican population growth rate was one of the highest (see Table1).

Table 1. Mexico: an Overview of Some Socio-Economic Variables

	Years	Mexico	Latin America
Annual Inflation (%)	1950-1954	12.2	17.0
	1955-1970	4.5	18.0
	1971-1982	24.3	67.0
	1983-1988	91.2	255.0
	1989-2000	19.0	125.0
Population Growth	1930-1950	2.3	2.2
	1951-1970	3.2	2.8
	1971-1980	2.9	2.7
	1981-2000	2.1	2.0
	Years	Mexico	
Currency Devaluations	See next column	1938, 1948-1949, 1954, 1976, 1982-1987, 1994	
Trade Reform	Starts in 1985 1994	GATT NAFTA And other Free Trade Agreements with Chile, Colombia, Panama, Venezuela, Central America and EU.	
Privatisation	Starts in 1980	Major Sectors like telecommunications, transport and banks are affected except oil.	

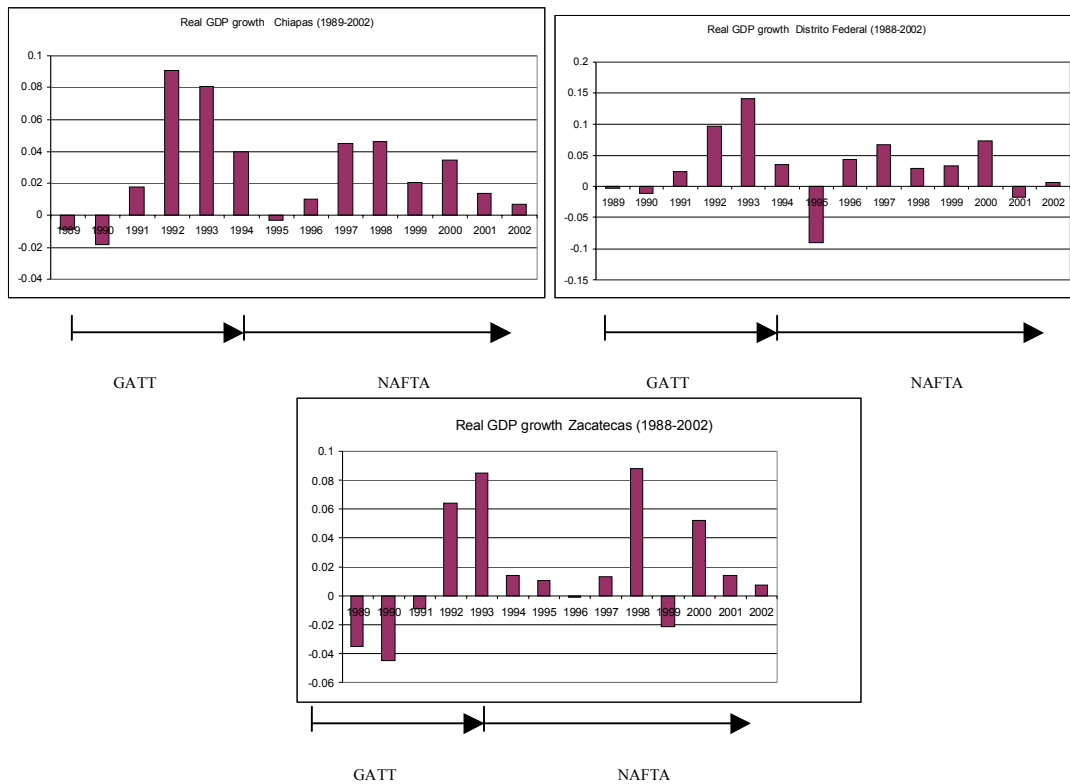
* Source: Cardenas (2001).

It is worthy to point out that most of the research carried out to analyse how these events have affected the Mexican economy are performed at a national level. Regional effects are hardly considered in the literature. It is important to carry out an analysis at Federal Entity level because they vary in location, natural resources, weather conditions, ethnic composition, population density, importance of the media⁶, urbanization and government expenditure allocation by the central government, among other factors. For example, is enough to see that a very different pattern of economic growth, described in Figure 1, emerges if we analyse economic growth at Federal Entity level (see Figure 2).

⁶ See Díaz-Cayeros (1995).

Chiapas, which is a state that has a high concentration of indigenous people⁷, has one of the lowest Gross State Product (GSP) growth. It seems not to have been affected by the currency crisis of 1994, as much as Distrito Federal (D.F.) which is the capital of the country. In year 1999, the whole economy, and the states of Chiapas and D.F. have a positive rate of growth, whereas states like Zacatecas suffered from a negative rate of growth. This simple example alerts us that the sources of economic growth across states are different from the ones we can find if we consider the economy as a whole, without accounting for regional differences.

Figure 2. Economic Growth for 3 Federal Entities: Chiapas, Distrito Federal and Zacatecas.



⁷ See Ortega- Díaz(2004).

Political Overview.

In the political context, the Mexican system is ruled by three powers: 1) the executive power represented by the president; 2) the legislative power represented by the senates and deputies in the congress; and 3) the judiciary. Mexico was ruled by the PRI party from 1929 to 2000, and now is ruled by PAN, researchers called this event an alternation in the party in power. Given that PAN has not the majority of members in the congress; this creates barriers to implement new social and economical policies. For example, one of the urgent laws about reforming the Federal Fiscal System has been held up because the members of the congress cannot reach a consensus. This happens mainly because the congress is now pluralistic and the majority of its members belong to a party different from that of the executive power (see Table 2).

Table 2. Composition of the Members of the Congress by Political Party.

(Data for december of each year)

Year	Political Parties																	
	Total	Alianza para el Cambio ^{1/}	Alianza por México ^{2/}	PAN	PRI	PPS	PRD 3/	PRT 4/	PARM 5/	PT 6/	PVEM 7/	PDM	PCM	PMT 8/	PSUM 9/	PST 10/	PFCRN 11/	FDN
Member of the Senate																		
1964	64			64														
1970	64			64														
1976	64			64														
1982	64			64														
1988	64			60		4												
1991	64			1	61		2											
1994	128			25	95		8											
1997	128			33	77		15			1	2							
2000 ^{12/}	128	(50)	(17)	46	60		15			2	4							
Deputies																		
1964	210			20	175	10			5									
1967	212			20	177	10			5									
1970	213			20	178	10			5									
1973	231			25	189	10			7									
1976	237			20	195	12			10									
1979	400			43	296	11			12			10	18			10		
1982	400			51	299	10						12		17		11		
1985	400			41	289	11	12	6	11			12		6		12		
1988	500			101	260	32	19		25								34	29
1991	500			89	320	12	41		15								23	
1994	500			119	300		71			10								
1997	500			122	239		125			6	8							
2000 ^{13/}	500	(223)	(66)	207	211		51			8	16							

Data obtained from the Mexican Government Secretary

Section 3. Data.

Most of the data used in this chapter comes from the National Institute of Statistics, Geography and Informatics (INEGI).

GSP Gross State Product comes from INEGI, as in chapter four; it is used at 1993 prices.

Inequality is the Gini coefficient of the income of the household survey (using ENIGH 1989-2000), see table 21 in chapter four for the summary statistics.

Schooling is measured by Female and Male Literacy rates using ENIGH for 1989-2000.

Pop65 is the share of population of 65 years or more in 1980, 90, 97, 2000, and comes from the Population Census, INEGI.

Depriva is the deprivation index for 1990, calculated by Sempere & Sobarzo (1998).

Government Expenditure.

EXP is government expenditure in 1989-2000.

EXP-cntr is government expenditure in public construction 1989-2000.

There is no data on government expenditure for the government of Mexico City that could be comparable to the rest of the Entities. The Federal System is centralised, and Mexico City is the Federal Entity that perceives and administrates all taxes, it is regarded

as an outlier in the sample⁸. Therefore through this entire chapter, whenever we use government expenditure, we will only consider 31 states.

Government expenditure at municipal level is divided in seven accounts, but not all of them are available. We obtained the state level government expenditure by adding all the “municipios” that belong to the same state. This Government expenditure level is lower and differs from that of the government expenditure at state level, because the latter includes expenditure for the whole state. Similarly, if we add the government expenditures of the 32 Federal Entities, the result is lower and differs from the total of the national economy because the later includes the expenditure as a nation.

Table 3. Government Expenditure Accounts and their Correlations Coefficients

t-1	Growth(t)	Total Expenditure(t-1)	Years available
Total Expenditure	0.1423 (0.0085)	1	1989-2000
Administration	0.0365 (0.4829)	0.9716 (0.0000)	1989-2000
Construction	0.0040 (0.9382)	0.8984 (0.0000)	1989-2000
Debt	0.0522 (0.3178)	0.6927 (0.0000)	1989-2000
Disponibilidades	0.0428 (0.4186)	0.7759 (0.0000)	1989-2000
Third Parties	0.0207 (0.7553)	0.5419 (0.0000)	1989-2000
Other	-0.0808 (0.6829)	---- (1.0000)	2000
Transfers	-0.3285 (0.0000)	0.7885 (0.0000)	1995-2000

* Standard Errors are in brackets.

Political Instability

In order to calculate the political instability variable, we use the principal component method. This method finds the maximum variance among variables that explain the same event and are highly correlated with each other (see Asteriou & Siriopoulos, 2000). We

8 See Díaz-Cayeros (1995) for a whole description of the Mexican Federal System, and Sempere &

consider that federal crime, common crime and strikes capture social unrest and therefore a certain degree of political instability. They cannot be included at the same time in a regression, because they create multicollinearity problems.

Therefore, using the principal components method we can express political instability as a linear combination of crime variables and strikes. The method of principal components makes possible that a larger set of variables can be expressed as a linear combination of a smaller set of variables that are linearly independent. In our case, we only have three variables, so the set remains the same.

This technique consists of constructing a new set of variables (N_i) out of a larger set (L_j) where $j=1, \dots, n$. The new variables are linear combinations of L_j and are called the principal components. The “ a ’s” are called the loadings and are calculated such that all N ’s are orthogonal to each other. The first N is the principal components that account for the largest variance among the L ’s, the second component accounts for the remaining variation, and so on.

$$\begin{aligned} N_{11} &= a_{11}L_{11} + a_{12}L_{12} + \dots + a_{1n}L_{1n} \\ N_{21} &= a_{21}L_{21} + a_{22}L_{22} + \dots + a_{2n}L_{1n} \\ &\dots\dots\dots \\ N_{n1} &= a_{n1}L_{n1} + a_{n2}L_{n2} + \dots + a_{nn}L_{nn} \end{aligned}$$

Once we obtain the a ’s, we use them to estimate the N ’s. In our case, the results are shown in tables 4 and 5.

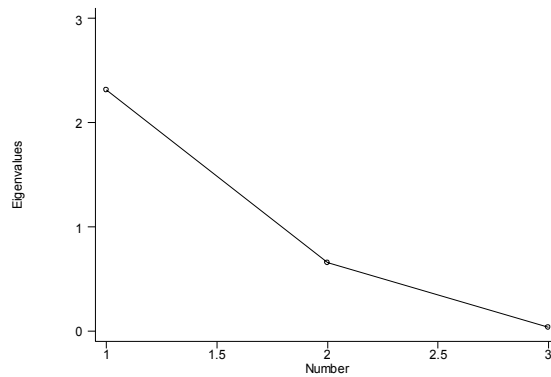
Table 4. Principal Components

Component	Eigenvector	Difference	Proportion	Cumulative
1	2.31322	1.65989	0.7711	0.7711
2	0.65333	0.61987	0.2178	0.9888
3	0.03346	--	0.0112	1.0000

Table 5. Eigenvectors

	1	2	3
Common Crime	0.62550	0.34691	0.69886
Federal Crime	0.63208	0.29982	0.71455
Strikes	0.45742	0.88869	0.03173

Figure 3. Eigenvectors



$$\text{Political Instability} = 0.6255 * \text{Common Crime} + 0.63208 * \text{Federal Crime} + 0.45742 * \text{Strikes}.$$

The three variables come from INEGI. Some problems with these variables are the following:

1. Data on suspected criminals is available for 1990 to 2000, but on convicted criminals is only available for the period 1996 to 2000.

2. Sometimes the data reports more sentenced criminals than suspected, in a given year.
3. Strikes have to be treated differently given that for zero strikes the log does not exist, they are available from 1989 to 2000.

Section 4. Fiscal Framework.

In this section, we follow the structural form equation described in Perotti (1996). We see in Chapter 1, that up until 1996, most of the models of inequality and growth use a reduced-form growth equation where income inequality is added as one more explanatory variable in a standard economic growth regression. Perotti (1996) suggests that it is not enough to estimate the growth equation in its reduced form but that it is necessary to look for the channel through which inequality influences economic growth. We can estimate this relationship following three steps. The first step is to decide which approach we will follow amongst fiscal policy, political instability, investment in human capital with borrowing constraints, or joint decisions on fertility and education. Once we have chosen an approach, the second step consists of identifying the channels through which inequality affects growth and using these channels as instrumental variables. The third step is to estimate the growth equation. In our case, due to data availability, we will consider the fiscal approach; therefore we have the following two options, to estimate the effects of inequality on growth:

- Perotti's reduced-form equation will be that growth increases when equality (inequality) increases (decreases).
- Perotti's three step approach in a fiscal framework would be as follows:
 - Step 1: Growth increases when distortionary taxation decreases;
 - Step 2: Government redistributive expenditure and distortionary taxation decreases when equality (inequality) increases (decreases); and
 - Step 3: Growth increases when equality (inequality) increases (decreases).

Therefore, the Fiscal approach would not only require performing an ordinary OLS regression but also applying two-stage instrumentation that may be more accurate according to Perotti.

The original aim of the current section was to implement the structural form for the 32 states of Mexico for 1960 to 2000. However, due to data availability in government expenditure variables among states, we are implementing the fiscal approach for the period 1989-2001 based on the household surveys.

We estimate the following structural equation.

$$Growth_{it} = \beta_1 GSP_{i,t-1} + \beta_2 EXP_{i,t-1} + \beta_3 Male_literacy_{i,t-1} + \beta_4 Female_literacy + z_i + e_{it}$$

Equation 1

$$EXP_{it-1} = \gamma_1 Inequality_{i,t-1} + \gamma_2 POP65_{i,t-1} + \gamma_3 Deprivation_{i,t-1} + v_i + u_{it}$$

Equation 2

where z_i, v_i are state effects and u_{it}, e_{it} are the error term.

We use government expenditure of the counties⁹, aggregated by state, as a measure of redistributive government expenditure. This measure is used, as it is the one easily available from INEGI. Government expenditure is the result of adding the expenditure on administrative issues, construction and public fostering, transfers, debt, disposable expenditure, third parties, and other expenses. From all of these, it is considered that only the expenditure in construction and public fostering is the one that plays a major role of redistribution. Therefore, we re-estimate the model using this measure instead of the total government expenditure. In addition, we use the share of the population who is more than 65 years old (POP65) due to the fact that they require more expenditure on health care. If government expenditure is effective, we would also expect that the deprivation index¹⁰ would be reduced, unfortunately we do not have a series of deprivation index. We have only one observation of this index for each state, so we used this index as a dummy variable to account for the level of development of the state.

According to Perotti's theory, we would expect to find a negative relation between taxation and growth, given the distortionary effects of taxation, and a positive relation between income inequality and demand for redistribution. Our results differ from those of Perotti (1996), in the sense that the expenditure in each Federal Entity is not financed directly from the Federal Entity's taxation. Part of the income used as government expenditure for each state comes from the federal government by formula, such that

⁹ Municipios.

¹⁰ See Sempere & Sobarzo (1998).

poorer states are not self-financing their own expenditures, (see Cayeros, 1995). Richer States may raise around 90% of their own government expenditure but poorer states may just gather 20% of it. The remaining 10% and 80%, respectively come from the central government. It is a well know fact that the Mexican Government has been fighting in the last years to reform its Federal system of taxation. Therefore, even if the Federal government increases taxation, that relationship is not directly linked with an increase in government expenditure in the states.

The estimation is performed using FE and RE estimator, the GMM estimator is not use in this context because the method uses the instruments and provides only the final estimate for the coefficient of government expenditure and literacy. We want to obtain the estimates of the first stage estimation (inequality, pop65) and the second stage estimates (expenditure and literacy). FE and RE allow us to do that, again a Hausman test allows to decide which estimator is better. In Table 6 we report only the modal that was not rejected with the Hausman test. In our case the RE estimator is rejected in favour of the FE estimator wheather we consider female and male literacy variables (columns 1 and 2), or just one pooled measure of literacy (columns 3 and 4). Results show that the more unequal the distribution of income, the higher total government expenditure We interpret this finding as a society with high income inequality demands more redistribution. However, the results are not statistically significant.

Columns (5) and (6) in Table 6 show the results when we include period dummies, in this case we the RE estimator is not rejected, and the coefficient of inequality is positive and

significant as well as the coefficient of total government expenditure. This results suggest that the overall relation between inequality and growth is positive and significant when we control for time effects.

Table 6. Structural Estimation of the Fiscal Approach.

Estimation Method	(Growth) FE (1)	(EXP) FE (2)	(Growth) FE (3)	(EXP) FE (4)	(Growth) RE t-dummy (5)	(EXP) RE t-dummy (6)
GSP _{t-1}	-0.515** (0.055)		-0.497** (0.055)		-0.006 (0.005)	
Inequality _{t-1}		0.367 (0.230)		0.367 (0.229)		1.876** (0.334)
F-Literacy _{t-1}	0.103 (0.088)					
M-Literacy _{t-1}	-0.333** (0.120)					
Literacy _{t-1}			-0.152* (0.077)		0.025 (0.024)	
EXP _{t-1}	0.053** (0.006)		0.053** (0.007)		0.010* (0.005)	
Pop65 _{t-1}		4.539** (0.281)		4.538** (0.281)		-1.162** (0.231)
Depriva						-0.410** (0.086)
Obs	341	341	341	341	341	341
Hausman	chi2(4) = 71.81 Prob>chi2 = 0.00		chi2(3) = 65.34		chi2(13) = 7.60 Prob>chi2 = 0.8686	
Period	1989-2001	1989-2001	1989-2001	1989-2001	1989-2001	1989-2001

Standard errors are in brackets. Growth represents the average growth rate 1989-2002. Significance in this table is *5%, ** 1%.

One interesting fact is that the higher the share of the population aged 65 or more, the higher the government expenditure will be which is consistent with Perotti (1996)'s argument about older people needing more social care, social security, and thus more government expenditure. However, the previous argument collapses when we include period dummies.

When the estimation is repeated but alternating the different Government expenditure components instead of total Government expenditure, the relationship between expenditure and growth is still positive and significant for all components, but the relationship between expenditure and inequality is only positive and significant in columns (2), (3) and (4). (see Table 7).

Table 7. Structural Estimation. Fiscal Approach

Estimation Method	(Growth) FE (1)	(Growth) RE (2)	(Growth) FE (3)	(Growth) FE (4)	(Growth) FE (5)
GSP _{t-1}	-0.623** (0.074)	-0.0201* (0.010)	-0.548** (0.052)	-0.612** (0.102)	-0.409** (0.063)
F-Literacy _{t-1}	0.006 (0.101)	0.046 (0.059)	0.036 (0.083)	0.115 (0.152)	0.099 (0.127)
M-Literacy _{t-1}	-0.278* .1381943	-0.017 (0.094)	-0.293* (0.115)	-0.508* (0.216)	-0.357** (0.177)
EXP-Cntr _{t-1}	0.059** (0.009)	0.016** (0.006)			
EXP-Admon _{t-1}			0.053** (0.006)		
EXP-Debt _t				0.047** (0.010)	
EXP-Dispon _t					0.020** (0.004)
1 st Step Inequality _{t-1}	0.324 (0.324)	2.433** (0.513)	0.471* (0.208)	1.581* (0.821)	-0.561 (1.362)
Obs	341	341	372	372	372
Hausman	chi2(4) = 47.89	Prob>chi2 = 0.00	chi2(4) =95.33	chi2(4) =50.82	chi2(4) =68.08
Period	1989-2001	1989-2001	1989-2001	1989-2001	1989-2001

Standard errors are in brackets. Growth represents the average growth rate 1989-2002. Significance in this table is *5%, ** 1%.

An explanation of why economic growth and government expenditure are positively related is the fact that government expenditure enters in the equation of national accounts via all the growth enhancing expenditure like construction. However, only 20% of it, is

spent on that account, the remaining is devoted to debt payments and public administration.

A simple correlation analysis will show us that expenditure in construction is positively correlated to Growth whereas transfers expenses and other expenses are negatively correlated¹¹.

Finally, Perotti's structural form with a fiscal approach shows that the relation between inequality and growth is positive. Results remain the same when we introduce deprivation as a proxy for well-being of the population in each state, but it varies when we include period dummies. These results resemble case 2 of Alesina & Rodrik (1995) where this phenomenon will arise only under the assumption that government expenditure is beneficial for everyone in the same way.

Section 5. Political Approach and Sources of Growth.

Following Barro & Lee (1994) and Rodrik (1998) we analyse the sources of economic growth for Mexico. Different from Barro and Lee (1994) that were interested in distinguishing between fast and slow growers, we are interested in the effects that inequality have on growth when we consider political instability variables. Following

¹¹ Future research should use a time series of how much of this government expenditure is devoted to programs of poverty and inequality alleviation. Unfortunately, this data is scarce at the Federal Entity level, but once it is available, it will be very helpful to disentangle the effect of government expenditure as a channel through which inequality affects economic growth.

Barro and Lee(1994) and Rodrik (1998), in this section, we do no longer use a structural equation.

The reduced-form equation to be estimated is:

$$\begin{aligned} Growth_{it} = & \beta_1 GSP_{i,t-1} + \beta_2 Inequality_{i,t-1} + \beta_3 Male_Lit_{t-1} + \beta_4 Fem_Lit_{t-1} \\ & + \beta_5 Gov_Exp_{t-1} + \beta_6 Pol_Inst_{t-1} + \alpha_i + \eta_t + u_{it} \end{aligned}$$

Equation 3

where $i = \{1, \dots, 32\}$ is the panel variable and, $t = \{1989, \dots, 2000\}$ is the time variable. α_i are the unobservable individual effect, η_t are unobserved time effect and u_{it} is the remainder stochastic disturbance term.

Therefore, following the discussions in Ortega-Díaz (2004), the GMM estimator can be used again as the best way to estimate equation 3. We should remember that because the estimation involves a lagged dependant variable in the right hand side of the equation, Fixed Effects estimator is inefficient and we would have to perform the estimation using Arellano & Bond estimator.

Table 8 shows the results of estimating equation 3. Using a Hausman test, RE is rejected in favour of FE, but FE is not valid, so we use GMM estimator instead.

Table 8. Sources of Growth (1990-2000).

Estimation Method	Fixed Effect (1)	Random Effect (2)	Arellano and Bond (3)	Arellano and Bond (4)	Arellano and Bond (5)
GSP _{t-1}	-0.510*** (0.048)	-0.018* (0.010)	0.174*** (0.050)	0.175*** (0.050)	0.445*** (0.137)
Inequality _{t-1}	0.119*** (0.027)	0.090*** (0.027)	0.192*** (0.025)	0.187*** (0.026)	-0.047 (0.048)
Male Literacy _{t-1}	-0.307** (0.123)	-0.014 (0.094)	-0.328*** (0.133)	-0.337*** (0.133)	0.138 (0.172)
Female Literacy _{t-1}	0.132 (0.091)	0.081 (0.058)	-0.021 (0.091)	-0.012 (0.092)	0.167 (0.174)
Government Exp. _{t-1}	0.037*** (0.006)	0.001 (0.005)	0.031** (0.015)	0.032** (0.015)	-0.012 (0.027)
Politic. Instability _{t-1}	0.023* (0.013)	-0.003 (0.006)	0.015 (0.017)	-	-
Strikes _{t-1}	-	-	-	-0.0006 ** (0.0002)	-0.0003 (0.0004)
C. Crimes _{t-1} (susp.)	-	-	-	0.0135 (0.0150)	-
F. Crimes _{t-1} (susp.)	-	-	-	-0.0004 (0.012)	-
C. Crimes _{t-1} (conv.)	-	-	-	-	0.022 (0.024)
F. Crimes _{t-1} (conv.)	-	-	-	-	0.011 (0.018)
R-squared	0.3245	0.0459	-	-	-
States	31	31	31	31	31
Obs.	310	310	279	279	93
Hausman Test	chi2(6) =159.76 Prob>chi2 =0.0		-	-	-
Breusch-Pagan	chi2(1) =2.81 Prob>chi2 =0.0934		-	-	-
Sargan Test	-	-	chi2(77)=280 Prob>chi2 = 0	chi2(77)= 274 Prob > chi2 = 0	chi2(77)=35.3 Prob>chi2 = 1
A&B acov res 1 st	-	-	z = -3.38 Pr >z= 0.0007	z = -3.61 Pr > z = 0.0003	Z = -3.72 Pr>z = 0.0002
A&B acov res 2 nd	-	-	z = -2.84 Pr> z =0.0046	z = -2.94 Pr > z = 0.0032	z = 0.56 Pr>z = 0.5724

Notes: Dependent variable is average annual per capita growth. Standard errors are in parenthesis. R-squared is the within R-squared for the fixed effects model and the overall R-squared for random effects. Significant at *10%, **5%, *** 1%.

A&B acov res 1st and 2nd is the Arellano-Bond test that average autocovariance in residuals of order 1 and 2 , respectively is 0.

Looking at the A & B test, we find that the no autocorrelation of second order is violated, so we perform the two-step GMM estimation finding that this condition is still violated,

although the standard errors improve.¹² This implies that the problem can be solved by using period dummies to control for the autocorrelation caused by the observations being too close one from another. It is worth to point out that this time we have yearly observation, whereas in Ortega-Díaz (1994) for example, observations were obtained on a decade basis. After using dummy variables per period the A&B test that 2nd order autocovariance is zero cannot be rejected, obtaining that the coefficient of inequality in column (3) is negative but not significant.

The literacy variables are still showing the partial correlation effect and only male literacy is significant. Government expenditure has a positive and significant coefficient, meaning that it is beneficial for growth. The political instability variable is non-significant, therefore we decided to use the crime variables and strike variable instead.

Columns (4) and (5) suffer from multicollinearity problem due to the inclusion of variables that are highly correlated (crime and strikes). Column (5) can be discarded as the data available is too small due to the convicted crimes variable. Column (4) shows that the crime variables are positive but non-significant. And the strike variable is negative and very significant. This can be interpreted as the more strikes, causes less economic growth.

Subsequently we break up the data into two periods: GATT (1990-1994) and NAFTA (1994-2000) and re-estimate equation 3. This time A& B do not have problems of second order autocorrelation. The coefficients of inequality and government expenditure are

¹² Inequality = 0.198 (0.013) but A&B acov res 2nd is $z = -3.52$ ($\Pr > z = 0.0004$).

always positive and statically significant. Political Instability is positive and only significant for NAFTA period. See Tables 9 and 10.

Table 9. Sources of Growth (1990-1994) GATT Period.

Estimation Method	Fixed Effect (1)	Random Effect (2)	Arellano and Bond (3)	Arellano and Bond (4)
GSP _{t-1}	-0.713*** (0.065)	-0.011 (0.016)	0.004 (0.073)	0.008 (0.074)
Inequality _{t-1}	0.110*** (0.033)	0.103*** (0.036)	0.103*** (0.035)	0.107*** (0.037)
Male Literacy _{t-1}	-0.342** (0.173)	0.036 (0.135)	-0.368** (0.193)	-0.380** (0.196)
Female Lit _{t-1}	0.140 (0.120)	-0.023 (0.085)	0.002 (0.134)	0.011 (0.136)
Government Exp. _{t-1}	0.155*** (0.016)	0.015 (0.010)	0.073*** (0.028)	0.071*** (0.028)
Politic. Instability _{t-1}	0.024 (0.019)	-0.018 (0.011)	-0.005 (0.019)	-
Strikes _{t-1}	-	-	-	-0.0001 (0.0002)
C. Crimes _{t-1} (susp.)	-	-	-	-0.013 (0.016)
F. Crimes _{t-1} (susp.)	-	-	-	0.001 (0.013)
C. Crimes _{t-1} (conv.)	-	-	-	-
F. Crimes _{t-1} (conv.)	-	-	-	-
R-squared	0.6613	0.1074	-	-
States	31	31	31	31
Obs.	124	124	93	93
Hausman Test	chi2(6) =164.16 Prob>chi2 =0		-	-
Breusch-Pagan	chi2(1) = 3.41 Prob>chi2 =0.0647		-	-
Sargan Test	-	-	chi2(77)= 51.89 Prob>chi2 =0.98	chi2(77) = 50.97 Prob>chi2 =0.99
A&B acov res 1 st	-	-	z = -0.94 Pr > z = 0.3455	z = -0.97 Pr > z = 0.3298
A&B acov res 2 nd	-	-	z = -1.23 Pr > z = 0.2200	z = -1.27 Pr > z = 0.2032

Notes: Dependent variable is average annual per capita growth. Standard errors are in parenthesis. R-squared is the within R-squared for the fixed effects model and the overall R-squared for random effects. Significant at *10%, **5%, *** 1%. A&B acov res 1st and 2nd is the Arellano-Bond test that average autocovariance in residuals of order 1 and 2, respectively is 0.

The effect of the political instability variable has a significant effect for the NAFTA for the unexpected sign. It is not usual that political instability would help to increase economic growth and mostly for this period.

Table 10. Sources of Growth (1994-2000) by NAFTA Period.

Estimation Method	Fixed Effect (1)	Random Effect (2)	Arellano and Bond (3)	Arellano and Bond (4)	Arellano and Bond (5)
GSP _{t-1}	-0.657*** (0.068)	-0.018 (0.011)	-0.476*** (0.076)	-0.501*** (0.077)	0.118 (0.197)
Inequality _{t-1}	0.086 *** (0.034)	0.027 (0.033)	0.276 *** (0.036)	0.276*** (0.037)	-0.041 (0.045)
Male Literacy _{t-1}	-0.168 (0.0146)	-0.063 (0.108)	-0.356*** (0.178)	-0.315* (0.180)	0.128 (0.160)
Female Literacy _{t-1}	0.053 (0.112)	0.109* (0.065)	0.067 (0.144)	0.016 (0.146)	0.191 (0.164)
Government Exp. _{t-1}	0.051*** (0.007)	0.016*** (0.006)	0.069 (0.020)	0.060*** (0.021)	-0.002 (0.026)
Politic. Instability _{t-1}	0.020 (0.019)	-0.007 (0.007)	0.040* (0.024)	-	-
Strikes _{t-1}	-	-	-	-0.001* (0.0006)	-0.0003 (0.0004)
C. Crimes _{t-1} (susp.)	-	-	-	0.049*** (0.021)	-
F. Crimes _{t-1} (susp.)	-	-	-	-0.017 (0.016)	-
C. Crimes _{t-1} (conv.)	-	-	-	-	0.011 (0.023)
F. Crimes _{t-1} (conv.)	-	-	-	-	0.001 (0.017)
R-squared	0.4003	0.0678	-	-	-
States	31	31	31	31	31
Obs.	217	217	217	217	93
Hausman Test	chi2(6) =162.17 Prob>chi2 = 0		-	-	-
Breusch-Pagan	chi2(1) = 5.06 Prob>chi2 = 0.0245		-	-	-
Sargan Test	-	-	chi2(77)=45.36 Prob>chi2=0.99	chi2(77)= 41 Prob>chi2= 0.9	chi2(77)= 25.54 Prob> chi2 = 1
A&B acov res 1 st	-	-	z = -0.32 Pr > z = 0.7490	z = -0.38 Pr > z = 0.7018	z = -1.62 Pr > z = 0.1
A&B acov res 2 nd	-	-	z = -1.51 Pr > z = 0.1307	z = -1.59 Pr > z = 0.1113	z = 1.02 Pr > z = 0.30

Notes: Dependent variable is average annual per capita growth. Standard errors are in parenthesis. R-squared is the within R-squared for the fixed effects model and the overall R-squared for random effects. Significant at *10%, **5%, *** 1%. A&B acov res 1st and 2nd is the Arellano-Bond test that average autocovariance in residuals of order 1 and 2 , respectively is 0.

The NAFTA coincides with the 1994 economic crisis that led to increase in crime and killing, marches, strikes, unemployment and slow down growth. Therefore the coefficient of political instability in column (3) is unexpected. The coefficient of strikes in column (4) is sensible, because it is negative and significant, but the coefficient of common crimes is not of the expected sign.

Table 11. Sources of Growth (1994-2000) by NAFTA Period & FDI

Estimation Method	Fixed Effect (1)	Random Effect (2)	Arellano and Bond (3)	Arellano and Bond (4)	Arellano and Bond (5)
GSP _{t-1}	-0.900*** (0.068)	-0.031* (0.016)	-0.124*** (0.045)	-0.126*** (0.046)	0.109 (0.203)
Inequality _{t-1}	-0.002 (0.041)	-0.0002 (0.043)	-0.010 (0.026)	-0.007 (0.026)	-0.032 (0.042)
Male Literacy _{t-1}	-0.238 (0.157)	-0.059 (0.127)	0.113 (0.115)	0.122 (0.116)	0.119 (0.148)
Female Literacy _{t-1}	0.188 (0.117)	.0123 (0.078)	-0.067 (0.082)	-0.074 (0.083)	0.116 (0.150)
Government Exp. _{t-1}	0.084*** (0.008)	0.024 (0.007)	-0.034 (0.015)	-0.029* (0.016)	-0.013 (0.024)
Politic. Instability _{t-1}	0.044** (0.021)	-0.015 (0.009)	0.009 (0.015)	-	-
FDI _{t-1}	-0.0009 (0.003)	0.002 (0.002)	-0.00008 (0.001)	0.00008 (0.001)	0.002 (0.002)
Strikes _{t-1}	-	-	-	-0.0005 (0.0003)	-0.0003 (0.0004)
C. Crimes (susp.) _{t-1}	-	-	-	0.003 (0.014)	-
F. Crimes (susp.) _{t-1}	-	-	-	0.010 (0.010)	-
C. Crimes (conv.) _{t-1}	-	-	-	-	-0.003 (0.022)
F. Crimes (conv.) _{t-1}	-	-	-	-	0.011 (0.016)
R-squared	0.6241	0.1043	-	-	-
States	31	31	31	31	31
Obs.	180	180	144	144	87
Hausman Test	chi2(7) = 193.4 Prob>chi2 = 0		-	-	-
Breusch-Pagan	chi2(1) = 5.74 Prob>chi2 = 0.0166		-	-	-
Sargan Test	-	-	chi2(77)= 58.47 Prob>chi2=0.94	chi2(77)= 55 Prob>chi2=0.9	chi2(77)=23.2 Prob>chi2 = 1
A&B acov res 1st	-	-	z = 2.57 Pr > z = 0.0102	z = 2.14 Pr > z = 0.0325	z = -1.44 Pr > z = 0.149
A&B acov res 2nd	-	-	z = 1.38 Pr > z = 0.1676	z = 1.21 Pr > z = 0.2267	z = 1.55 Pr > z = 0.12

Notes: Dependent variable is average annual per capita growth. Standard errors are in parenthesis. R-squared is the within R-squared for the fixed effects model and the overall R-squared for random effects. Significant at *10%, **5%, *** 1%.

Given that during the NAFTA period there have been many movements (inflows and outflows) of foreign direct investment (FDI), we also include this variable this variable in

equation 3 to test if this is an important source of growth. The FDI variable is only available at the Federal Entity level for the NAFTA period.

We re-estimate equation (3) for the NAFTA period including this variable and find very interesting results. In Table 10 we show the results without using FDI, and in Table 11 the estimations using FDI, we can see that several coefficients became non-significant to the inclusion of this variable. The coefficient of government expenditure is only positive and significant in columns (1) and (4). The coefficient of inequality that have been positive and significant, changes sign and is not significant.

Following Rodrik (1998), we can interpret these results, as FDI causing an increase in inequality due to fast capital accumulation in few hands, and at the same time FDI increases growth, implying that inequality and growth should be moving in different directions, therefore causing the inequality coefficient to become negative, but the effect is not strong enough to make it significant.

We can conclude from this section that the relationship between inequality and growth is still positive when we include variables like political instability and government expenditure in the growth equation. The most significant coefficient across estimation techniques and period is government expenditure, so we consider that the main source of growth is government expenditure. When FDI effects are not taken into account another source of growth is inequality. The inclusion of FDI as a physical capital variable has

serious implication in defining the relationship between inequality and growth for the NAFTA period because changes the significance and sign of the coefficient of inequality.

Section 6. Some Determinants of Income Inequality.

According to Aghion, Caroli & Garcia-Peñaloza (1999), not only are the channels through which inequality affects economic growth important, but also the determinants of income inequality. To this regard, the literature is full of cross-country studies that regress the variable of income inequality on a set of socio-political and economic variables trying to account for the one that seems to have the highest effect on inequality.

We regress inequality, measured by the Gini coefficient, on the following set of variables {political instability, share of the population aged 65 or more “POP65”, fertility rate, crimes, strikes, total government expenditure, and disaggregated measures of government expenditure}.

Several authors also consider the economic cycle, measured by the inflation rate and trade openness measured by the share of exports minus imports in GDP. We cannot use these two because there is not a developed time series indicator to measure inflation at Federal Entity Level, it only exist for some metropolitan areas. In the case of trade openness, there are not enough data points.

In this section, it is not necessary to use Arellano and Bond Technique, as we are not dealing lagged endogenous variables. Performing a Hausman test, Random Effects are rejected in favour of Fixed Effects. We are only reporting the estimates for fixed effects and only for the set of variables with significant coefficients.

Table 12. Determinants of Income Inequality.

Estimation Method	Fixed Effect (1990-2000) (1)	Fixed Effect (1990-2000) (2)	Fixed Effect (1989-2001) (3)	Fixed Effect (1989-2000) (4)	Fixed Effect (1995-2001) (5)	Fixed Effect (1990-2001) (6)
GSP _{t-1}	-0.396 *** (0.078)	-0.4057*** (0.080)	-0.351 *** (0.062)	-0.585** * (0.089)	-0.340 (0.277)	-0.485*** (0.093)
Politic. Instability _{t-1}	0.079*** (0.024)	-	-	-	-	-
POP65 _{t-1}	-	-	0.256*** (0.060)	-	-	-
C. Crimes _{t-1} (susp.)	-	0.061*** (0.022)	-	-	-	-
F. Crimes _{t-1} (susp.)	-	0.019 (0.021)	-	-	-	-
Government Exp. _{t-1}	-	-	-	0.058*** (0.009)	-	-
Gov. Exp in Constr. _{t-1}	-	-	-	-	-0.033 (0.026)	-
Gov. Exp in Admtrve _{t-1}	-	-	-	-	0.096* (0.055)	-
Gov. Exp in Debt. _{t-1}	-	-	-	-	0.015 (0.014)	-
Gov. Exp in Dispon. _{t-1}	-	-	-	-	-0.003 (0.013)	-
Gov. Exp in Third. _{t-1}	-	-	-	-	0.001 (0.004)	-
Gov. Exp in Trans _{t-1}	-	-	-	-	-0.009 (0.018)	-
Fertility _{t-1}	-	-	-	-	-	-0.265*** (0.078)
Constant	-0.332* (0.180)	-0.315* (0.177)	-0.216* (0.125)	-0.444*** (0.156)	0.780 (0.295)	-1.234 ** (0.511)
R-squared	0.0822	0.0831	0.0809	0.1297	0.0564	0.0864
States	31	31	31	31	31	31
Obs.	320	320	416	341	130	320
Hausman Test	chi2(2)=19.9 Prob>chi2=0	chi2(2)=20.4 Prob>chi2=0	chi2(2)=24.62 Prob>chi2=0	chi2(2)= 34.9 Prob>chi2=0	chi2(2)= 7.76 Prob>chi2=0.35	chi2(2)= 20.8 Prob>chi2=0
Breusch-Pagan	chi2(1)= 1.16 Prob>chi2=0	chi2(1)= 30.6 Prob>chi2= 0	chi2(1)= 91.4 Prob>chi2= 0	chi2(1)= 41.4 Prob>chi2= 0	chi2(1)= 5.03 Prob>chi2=0.24	chi2(1)= 52.9 Prob>chi2=0.00

Notes: Dependent variable is inequality measures by the Gini coefficient. Standard errors are in the second row of each cell. R-squared is the within R-squared for the fixed effects . Significant at *10%, **5%, *** 1% .

Table 12 shows that the higher the coefficient of political instability is, the higher inequality will be. The same for the share of the population aged 65 or more, the higher this share of the population is, the higher the inequality. A result that is somehow puzzling is that the higher the fertility rate is, the lower the inequality would be. It would have been expected that the higher the fertility rate is, the lower the possibilities of investment in education are, as in Barro & Lee; and then the higher the skilled premium is, so that income inequality is higher (Ljungqvist (1993)). An interesting result is that total government expenditure increases inequality, but when we disaggregate this measure in its components, we find that that the productive expenditure, like the expenditure in construction that is growth enhancing, reduces inequality. Whereas expenditure in administration (usually inefficient) increases inequality, this last result coincides with our calculations of TFP growth in Ortega-Díaz (2004-2) that suggest that the sector of bureaucracy, social and community management exhibit in most of the Federal Entities a negative productivity. Results may suggest that inefficient government expenditure increases inequality.

Section 7. Conclusions.

In the first part of this work we used a structural equation considering Perotti's fiscal approach, using government expenditure measures to account for re-distributive fiscal effects. The estimation of the structural equation is interpreted as taking into account the fiscal effects of inequality on growth. We found that the relationship is positive but not significant, and the analysis requires improvements in the explanatory variables involved,

explicitly, we need better measures to calculate a fiscal measure closely related to income redistribution.

In the second part of this paper, we analyse the sources of economic growth, and find that government expenditure and income inequality are the explanatory variables which coefficient remains positive and significant in most of the cases; therefore we regarded both as the main sources of economic growth. The political instability variable in most of the cases is not significant. The relationship between inequality and growth is positive in most of the estimations but it becomes negative and not significant when we include a physical capital variable like foreign direct investment (FDI), which is available for the period 1994 to 2001.

The brief study of the determinants of income inequality, in the third part of this paper, shows that income inequality is highly influenced by political instability, and that a higher initial per capita GSP decreases inequality.

Finally, we can conclude from this chapter that income inequality and economic , growth are, in most of the cases positively related.

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