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Path dependency and the allocation of public investment in Mexico

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Abstract. The distribution of public investment within federal states is often subject to significant political discretion. Yet one of the possible consequences of such discretion is the appearance of path dependency in the way in which public investment is distributed. Mexico offers a unique example of the effect of path dependency in resource allocation, as there has been no political competition over more than seventy years. The authors seek to examine the dynamic structure of the regional distribution of public investment empirically, to test for the existence of path dependency and the influence of the different federal governments in Mexico. They use time-series intervention analysis methodology to study the structure of, and the influence of government change in the allocation of, public investment in Mexico between 1971 and 1999. Findings suggest the existence of path dependency in the distribution of public investment in Mexico during all except for the most recent governments. In other words, federal government change made little difference to the way in which public investment was allocated. Path dependency was only broken in the 1990s, coinciding with the setting up of the North American economic integration process, which in turn led to the loss of public support for the single political party, the Partido Revolitcionario Institucional or PRI, which had been in power in Mexico over the last seventy years.

1 Introduction

In any country, regional policy functions either to reduce existing regional economic disparities—with the intention of improving regional cohesion—or to increase economic efficiency, with government supporting economic growth by expanding public investment in the most productive regions. Indeed, one of the traditional determinants of the allocation of regional funds is regional cohesion, which implies that public funds are distributed on the basis of some measure of need, perhaps grounded in performance indicators. On the other hand, public investment might also parallel differences in productivity in order to maximize economic growth; as Aschauer (1989) found a decrease in productive government services is a crucial part of the explanation for the general decline in productivity growth. Indeed, it has been found, particularly in developing countries, that economic growth objectives tend to rank highly on the economic policy agenda (Hirschman, 1958), and one might find profound differences in economic performance across region-states. Thus, a large share of public investment tends to be allocated in those regions where the return on investment will be maximized (Randolph et al, 1996). In the light of this evidence, we argue that public investment has been shown to exert a dual, although not necessarily balanced role, namely: it stands as a tool to smooth out regional inequalities as well as an instrumental variable to promote the country's overall (and regional) economic development.[1]

[1] Alternative instruments (for example, tax incentives for firms to locate in selected 'objective' regions, or to expand their production in those regions) might have only a limited application in countries where the public sector tax efficiency is questionable.

Besides efficiency and equity objectives, other factors have been shown to determine the spatial allocation of public investment. Indeed, public investment is significantly subject to government discretion and therefore country-specific political characteristics might be expected to be relevant determinants (Besley and Case, 1995). Interestingly, some studies find that political ideology and the style of the government in power stand as chief determinants of public investment (de Haan and Sturm, 1994). Furthermore, partisan determinants have shown to be relevant as well, such as the kind of government, for example, coalition versus majority governments, as it may be more difficult for large coalition and minority governments to reach agreement in balancing the budget (de Haan and Sturm, 1997). More recently, scholars in the public policy arena have adopted an explanation for the existence or absence of policy reform, widely referred to as 'path dependency'. Path dependency, or inertia in policymaking, occurs when public policy reform depends quantitatively and/or qualitatively on previous reforms in place, rather than on the efficiency or equitable grounds of the proposed reforms. Hence, those countries in which policy reforms are path dependent are unlikely to deviate from their previous paths so long as institutions and economic forces prevent a policy shift. That is, path dependency emphasizes the temporal nature of politics (Liebowitz and Margolis, 1995), particularly the limits which entrenched institutions and policies (that is, resource-allocation rules), impose on plausible alternatives at later points in time, given that adaptation increases the cost of change (Pierson, 2000). Mexico stands as an interesting study as a single party, the so-called Institutional Revolutionary Party (PRI), ruled central government for more than seventy years, until 2000. The specific effects of path dependency are likely to have occurred alongside the pursuit of the maintenance of the political equilibrium which has sustained a single-party political system during most of the 20th century.

In parallel with policy developments which may occur within a country, some Western countries are experiencing processes of trade integration which considerably limit the use of a number of instruments to fight regional inequalities. This is the case in Mexico: in the 1990s Mexico became involved in a trade-integration process, mainly with the USA and Canada. When this occurs, there are likely to be pressures on the allocation of public investment, which may result in changing the previous allocation rules. Indeed, under one possible rule, central governments will act to counter regional disparities resulting from differences in the success of regions in reaping benefits from the trade-integration process. However, recent work reveals that this is not necessarily the case; in particular, it is not the case in the European Union (De la Fuente and Vives, 1995). Public investment does not always meet the objective of reducing regional disparities, and there may be other objectives in place which are solely pro-efficiency.

Evidence from Mexico shows that trade intensity may be one explanation for this, in addition to the different positions of regions on the scale of conditional income distribution (Costa-Font and Rodríguez-Oreggia, 2005a). These results may indicate that regional policy may not have as its main objective the reduction of regional disparities and, thus, we should investigate alternative explanations. Interestingly, Rodríguez-Oreggia and Rodríguez-Pose (2004) find that efficiency has not been a key concern in the allocation of public investment among regions in Mexico. Thus, we believe that path dependency—in the form of 'third degree path dependency', as explained below—stands as a possible explanation both of the allocation of public investment and of policy reform in Mexico. On the other hand, the specific political mechanisms that result from there being a single party in government have been shown to lead to the 'pork-barrel effect' in the use of public investment (Costa-Font et al, 2003). However, the specific effect of political clientelism may have different effects depending on the government in power. In addition to government failure, it is worth

noting that Mexico has frequently been regarded as a benchmark country in which to examine empirically the validity of theories of regional economic integration, and the theory that Mexican economic activity relies on the vast agglomeration in Mexico City, the oil-producing regions, and the northern regions that border the USA.[2]

In this paper we empirically investigate the existence of path dependency in the distribution of public investment in Mexico under the conditions of a single party in power. We address two specific research questions. First we test for the existence of inertia in the allocation of public investment in Mexico—or first-degree path dependency, following Liebowitz and Margolis (1995).[3] Here, the underlying hypothesis is that a lack of political competition is likely to explain the maintainance of similar distributive criteria over time. Second, and consistent with the study of path dependency, we examine whether the political rhetoric of central state governments has influenced the distribution of public investment over time [third-degree path dependency (Liebowitz and Margolis, 1995)] leading to the revision of previous, suboptimal, policies. Hence, we test the hypothesis of whether changes in governments have had any appreciable effects on the geography of public investment. Third, we test whether the 'developmentist hypothesis'—whereby public investment is allocated to the most productive regions first within the development process (Hirschman, 1958)—has been influenced by regional policy changes that followed North American regional integration in the 1990s. We use empirical evidence from time series intervention analysis to examine the evolution of the regional allocation of public funds. These are well-known models that allow one to examine the effectiveness of policy interventions.

The paper is organized as follows. Next, we provide a brief summary of path dependence as a prevailing public policy phenomenon, and a description of the allocation of public funds to Mexican regions over the last two decades. In section 3 we present the empirical methodology, and in section 4 outline the results and the limitations of the methodology used. In the final section we give a summary of the main results obtained, and offer some conclusions.

2 Path dependency and the planning of public investment

2.1 Path dependency and regional planning

The term 'path dependency' refers to a relatively new institutionalist explanation of the absence of public policy change. The concept has been borrowed from the idea of 'lock-in' as explaining policy change from the theory of technology change (Arthur, 1989). In the public policy arena, path dependency implies that public policies prevail not so much as a result of their effectiveness in the achievement of the desired policy goals—namely, efficiency and regional cohesion—but because of the persistence of inertia (Wilsford, 1994) or a stochastic dependence on some initial conditions (for example, the maintenance of some initial political equilibrium).

A growing array of studies elaborate on what can be understood as being path dependency (Goldstone, 1998). Indeed, the specific formulation of the concept of path dependency varies, from a vague idea that 'history matters' (Liebowitz and Margolis, 1995), to the specific formulation of probability theory in which a stochastic process is path dependent if the probability distribution of a variable in the current period depends on the value of the system in the previous period. In this formulation, path dependency is considered as implying 'duration' or 'persistence',

[2] Mexico City is important because of its large skilled workforce, large consumer market, low distribution costs, and proximity to government decisionmakers. As a reuslt a signifcant share of economic activity concentrates there.

[3] We explain the Leibowitz and Margolis (1995) classification further in section 2.

which might be self-fulfilling processes over time whereby following a certain path makes it costly to change laws and institutions later on. Thus, marginal adjustments of individual agents may not offer the assurance of optimization or the revision of suboptimal outcomes (Liebowitz and Margolis, 1995).

Liebowitz and Margolis (1995) distinguish three different types of path dependency. 'First-degree path dependency' refers to the simple existence of an intertemporal relationship, with no implied error of prediction or claim of inefficiency. Another formulation, so-called 'second-degree path dependency', takes into account the absence of perfect information, so that decisionmakers do not recognize the inferiority of a chosen path in terms of achieving the intended policy goals (for example, because of the presence of some political constraints determining the preference for the status quo). Thus, in addition to intertemporal effects, path dependency leads to imperfect predictions, resulting in suboptimal actions—though not inefficiency. 'Third-degree dependency' involves not only the intertemporal effects which lead to erroneous outcomes, but in addition error being avoidable. This last concept of path dependency is the one to which public policy contributions normally refer. Indeed, the existence of a historical time pattern which explains the distribution of interests does not necessarily mean the existence of constraint on policymaking, unless it leads to an allocation of interests that fails to achieve the desired result. That is, as some critics put it (Kay, 2005), the observation that change has been temporarily limited is not sufficient to infer path dependency (in third-degree terminology); but, to demonstrate constrained change—and hence path dependency—it is necessary that 'what did not happen could not have happened'. One way to test whether path dependency has played a role is to examine the political conditions behind it. One condition which might foster path dependency is the lack of political competition. That is, under no political competition, administrative procedures and policymaking formulation might result from the consensus of the forces behind the policy status quo of the government in office. And any change to the consensus rule might affect the stability of the political party in government.

2.2 The allocation of public investment in Mexico

The allocation of public investment in Mexico is defined by federal government plans, and in particular the National Development Plan (in Spanish, 'Plan Nacional de Desarrollo'—PND). The PND is a document which, for every Mexican Presidential term—that is, every six years, outlines the pattern to be followed by the federal administration. All of the federal public administration programs are supposed to be in harmony with the PND. However, the PND is more a wishful political agenda than a realistic policy manual. The objectives have also been vague and contradictory, leaving room for lobbying and political considerations in decisions regarding where to allocate public investment.

Although Mexico is federally organized, the distribution of public investment has always been centralized and subject to the dogmas of the government in office. An important attempt to establish a system for the allocation of public investment was made in 1980, when Article 115 of the Constitution was amended to establish a system of federal sharing to the states in such a way that they could have earnings from federal revenues. The Fiscal Coordination Bill was also passed, establishing the National System of Fiscal Coordination. This law distributes resources through two funds. The first is the General Sharing Fund, established for state governments, which comprises a share of the national profit from mining and oil. The second is the Municipality Fund, which provides funding directly to municipalities. The General Sharing Fund is distributed according to three criteria: population; the share of federal tax earnings to each state; and the per capita transferred contributions over the last two years.

However, only about 20% of total federal earnings are distributed via a so-called General Sharing Fund, giving an overall picture of fiscal economic centralization. Although the states can impose some taxes, they depend for, on average, 50% of their revenue on the federal government. There is also evidence that the system of fiscal coordination has made the states more dependent on federal contributions, and that the greater concentration of revenue at the federal level has also lead to more dependence on central government (Ibarra et al, 1999). Whether one is speaking of taxation, distribution to states, or federal programs, the ultimate control of the amounts and directions of cash flows continues to rest with the federal government (Rodríguez, 1997). In this context, federal investment funding remains a very significant proportion of the state income, and hence it is important to analyze how that funding has been allocated during the different presidential terms.

From Mexican data from 1950 to 1990, Nazmi and Ramírez (1997) analyzed whether private investment had a greater effect on output than did public investment. They found a positive and significant effect of overall public sector investment on output growth in Mexico for this period. They also found no statistically significant difference between the contributions of private investment spending versus public investment expenditure to GDP growth. Their evidence suggests that public investment exerted a positive impact on economic growth at the expense of private investment. Further, Sha (1988) quantified the impact of public infrastructure on private productivity. He found the level of public infrastructure to be close to that desired by the industrial sector during the period 1970 – 83, and suggested that policy emphasis should be on better maintenance of the existing infrastructure, ensuring continuity in the existing level of services, rather than on new capital investment. Feltenstein and Ha (1999), drawing on time-series evidence, examined the relationship between public infrastructure and private output in sixteen sectors in Mexico, estimating specific cost functions with three types of infrastructure. Interestingly, their findings show that electricity and communications infrastructures have reduced sector-specific production cost, whereas transport infrastructure has led to an increase in the costs of sector-specific production. However, the authors recognized the lack of good explanations for these findings.

Another relevant issue that has been examined concerns the complementarities between public investment expenditure and private capital formation in Mexico. Ramírez (1994) argues that the government's unsystematic cuts in public spending might, in the long run, affect the gains of the liberalization process, given the drastic fall in the country's capital expenditure. He found that the deflationary measures implemented in the 1980s had a negative impact on gross private investment, and that changes in public investment preceded changes in private capital formation. He suggests that policymakers must pay heed to the composition of consumption and investment goods, and maintain an adequate level of investment in social and economic infrastructure. However, given that during the 1990s Mexico initiated a process of regional integration with other North American countries—the so-called NAFTA (North American Free Trade Area)—one might argue that trade has had an effect on the allocation of public investment to richer regions. Indeed, Costa-Font and Rodríguez-Oreggia (2005b) find evidence that trade acts as a mechanism fostering the concentration of economic activity in those regions that participate most intensively in the NAFTA.

Lächler and Aschauer (1998) found that, on the whole, public investment has crowded out private investment in Mexico, and that the positive relationship between public investment and productivity growth was dissipated in the 1990s. They suggest that an expansion of public investment could still have a positive impact on overall capital accumulation, which should lead to faster growth—in the absence of any decline

in productivity. That is, public investment expansion will not automatically lead to higher economic growth, although public investment is financed, or balanced, by equal reductions in government consumption expenditure.

Feltenstein and Ha (1999) showed how public provision of infrastructure may initially increase the productivity of private capital in Mexico. They conclude that small increases in public investment might be positive for the real economy, whereas large increases in public investment have negative repercussions. An explanation of these results can be found in our previous work (Costa-Font and Rodríguez-Oreggia, 2005a). We found that public investment exerts an effect only on the richest regions in Mexico; accordingly, the concentration of investment into a limited number of regions might be affected by diminishing scale effects.

With respect to the allocation of public infrastructure at the local level, Looney and Frederiksen (1981) examined the impact of economic and social infrastructure on regional income—following the suggestions of Hansen (1965), but using only data for 1970. Their findings suggest that policies favoring efficiency (maximisation of economic growth) have opened the door to wider economic disparity among Mexican regions. Although one might argue that, given the development strategy pursued by low-income countries, this outcome was inevitable, the logical consequence is the emergence of regional inequalities. Indeed, Gamboa and Messmacher (2003), as well as Rodríguez-Oreggia and Rodríguez-Pose (2004), find that public investment has had a fairly weak effect on regional growth in Mexico. However, what does seem to have had an effect during the 1970s was the rate of growth of public investment—but not the levels or stock of public infrastructure. Such findings stress the presence of a pork-barrel effect, as public investment may have been used with a view to electoral pay-off rather than other criteria (Costa-Font et al, 2003). Despite the existence of different and mixed conclusions, all the aforementioned works shed some light on the effects of public investment allocated by the central government in Mexico. However, the allocation of public investment has to be planned according to the government's objectives, which could be different in each presidential term—impacting in a different manner on productivity and on the differences between regions. Therefore, it is important to examine the government objectives of public investment, and how effectively that investment was allocated in any specific period.

3 Methodology and data

Given that this study is concerned with the identification of a secular trend in policy-making resulting from changes in political regimes, in the form of federal governments, we have employed a simple although well-established methodology which is used in economic forecasting. We use time-series analysis to examine data that consist of repeated observations on a single experimental unit which includes an interruption or so-called intervention. It is assumed that some stochastic process generates the values of the variable of interest, so that we are able to construct the best univariate representation of that variable. One major advantage of our methodology is that it allows the examination of the pattern of change over time, although it is necessary that attention be paid to the temporal structure of the data. The estimations of the slope, or change over time, and the dependency represent unique aspects of the time-series methodology that make it especially suitable to investigate the existence of path dependency.

The time-series methodology selected was a model classified as an ARIMA (auto-regressive integrated moving average) mathematically capturing the time dependence in data employed. If dependency were ignored, an estimate of error variance would be incorrect. Thus, time-series analysis takes dependency into account and therefore

yields accurate parameter estimates. Furthermore, with the inclusion of an additional variable measuring the existence of some government change it can be regarded as an 'intervention analysis', as in previous studies in regional policy (Morrison, 1993). The variable of interest is the annual change in the percentage of public investment allocated to specific regions, including an intervention—federal government—variable such as in Morrison (1993). The minimum number of observations required ranges between twenty and fifty, this study employs data from thirty years, which is sufficient to accomplish the data requirement and is a larger number of observations than included in previous work in the area.

Public investment data were gathered from the Statistical Annexes of the Presidential Address to the Nation (various years) for the period 1971–99. Monetary units were deflated to constant pesos, using the consumer price index. The number of geographical units is thirty two—the number of states in Mexico. The thirty-two states were grouped into six broader regions, as defined in table A1 in the appendix.

With this model we seek to identify how public investment is allocated across Mexican regions and the extent to which the political cycle determines the allocation. Because univariate distributions alone do not capture the presence of structural or institutional changes in the decisionmaking process, we used intervention analysis—following the work of Morrison (1993). However, unlike Morrison, we first tested for the existence of unit roots, employing the unit-root test of the ordinary least squares (OLS) regression model employed by Phillips and Perron (1988). The advantage is that we account for the fact that disturbances might be serially correlated with possible heteroscedasticity (Mills, 1990).

To estimate the ARIMA models we followed an iterative strategy to fit the models to the observed series, as in the old Box and Jenkins (1976) methodology. This methodology appears the most suitable to characterize the behavior of public funds as single political units across time, and it has been successfully employed to examine the distribution of public investment in developing countries before (Morrison, 1993). The ARIMA models include three types of parameters: autoregressive parameters (p); the number of differencing passes (d) which allow the data to be stationary; and moving-average parameters (q). In the notation introduced by Box and Jenkins, models are summarized as ARIMA (p, d, q) (Banerjee et al, 1993; Phillips and Perron, 1988). Given that the input series for the ARIMA needs to be stationary, that is, a constant mean, variance, and autocorrelation over time, the series need first to be differenced until they become stationary (this also often requires log transforming the data to stabilize the variance), and d reflects the number of times the series needed to be differenced. In order to determine the level of differencing necessary, one should examine the plot of the data and autocorrelogram. Ljung–Box Q-statistics serve as a check of whether the residuals from an ARIMA (p, d, q) model behave as a white-noise process and thus enables us to confirm that the selection of autoregressive and moving-average terms is correct. To identify the model structure, conventionally we examine the Q-statistics, and also visually—by observing the structure of the autocorrelgram.[4]

Having identified the model, the effect of a government change was examined by intervention analysis, allowing us to identify whether a variable regarded as an

[4] As is common practice, this methodology is defined 'intervention analysis'. Diagnostic checking is carried out employing the χ^2 statistical test as follows: $Q = (n - d)SR^2$, where n is the number of observations in the series, d is the degree of differencing of the variable of interests (public investment share), R^2 is the square of the autocorrelation coefficient of public investment share and the sum is taken over the range of 1 to k, the order of autocorrelation. The appropriate number of degrees of freedom is $k - d - 1$. If the computed value of Q is less than χ^2 statistic for $k - d - 1$ degrees of freedom, the model is judged to be adequate.

intervention (for example, government change) affects the behavior of the data (Phillips and Perron, 1988). We measured the effects of interventions in our study via a dummy variable capturing the effects of the political process or federal government regime (I_t), on the allocation investment over time (Y_t) as follows:

$$Y_t = \beta I_t + N_t ,$$

where N_t is the univariate noise component produced by the ARIMA process. If the intervention parameter β is statistically significant, then we conclude that the political regime does influence investment allocation. The assumption upon which we ground our model is that it is simply the change in the federal government, rather than any other changes that occur during the period in question, which determines the change in the allocation of public investment.

4 Results

As noted above, our objective is to examine the dynamics of the allocation of public expenditure, in order to investigate the existence of a specific time structure as well as the influence of government change. In practice, we looked at the influence of the different governments in shaping the geographical allocation of public investment over time. Descriptive analysis was used to examine graphically the observed patterns over time, as shown in figure 1. Interestingly, figure 1 shows that there are appreciable differences in the distribution of public investment across geographical areas. To confirm these results statistically we conducted a preliminary time-series analysis to confirm that there was a significant (and negative) time pattern in the allocation of public investment, as expected. That is, the dynamics of public investment register a reduction of total public investment levels that can be explained by the economic policy objectives. The majority of regions had their share of public expenditure reduced during the period in question. The exceptions were two areas: the Capital (Mexico City) and the oil-producing region (see table A2 in the appendix), which is consistent with the specific model of economic development that one would expect to find in middle-income countries (Randolph et al, 1996). Interestingly, for Mexico City funds there is a relatively constant allocation pattern over time, whereas in the

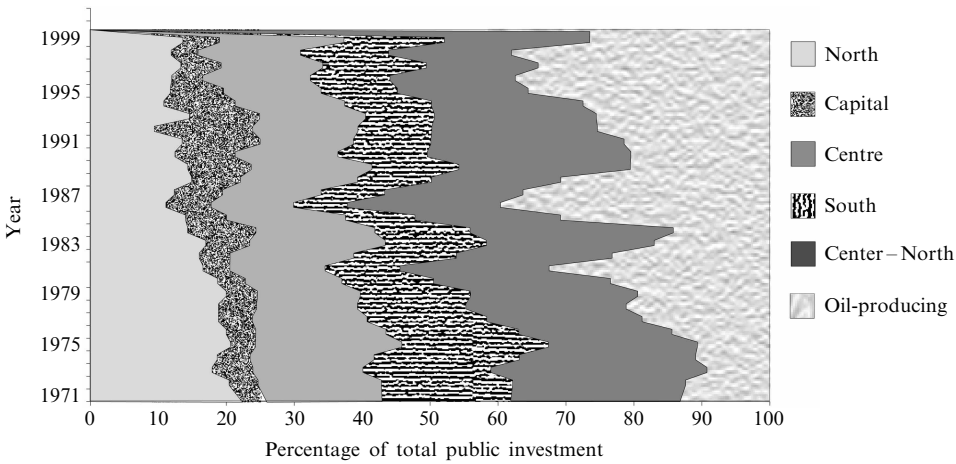

Figure 1. Regional allocation of public investment (% total) in Mexico from 1971 to 1999 (source: authors' calculations from data from INEGI and Statistical Annexes to the Presidential Address to the Nation — 1971 – 2002).

oil-producing regions the pattern is of increase, converging to the original (1971) pattern in the late 1990s.

Furthermore, another interesting pattern is that, although the population share of Mexico City has grown markedly, the oil-producing regions have a significantly reduced share of the population, which might indicate that activities taking place in that region were strongly capital intensive. In the early 1980s the oil-producing regions saw their share of public funds increased significantly and from that time onwards the share has remained unaltered, as table 1 shows. The North systematically saw its share of public funds unvaried—and slightly reduced—whilst its population share increased from 1985 to 1999. Besides location change, table 2 exhibits that the Zedillo government reduced the relative allocation of public funds to the Centre–North, thanks to effects of the trade integration process with the USA. The share of public funds allocated to the South of the country has remained relatively constant, although the population there has increased significantly (from 12% in 1980 to 13.5% in 1995), so that in per capita terms there has been a decline in the public support to this, which is, in turn, the poorest in Mexico (Costa-Font and Rodríguez-Oreggia, 2005a). However, this would seem to confirm the development strategy whereby 'public funds follow private funds'.

The governments that have most favored the oil-producing region were those of De la Madrid and Zedillo, especially Zedillo. In contrast, Salinas favored the capital—with a 60% rise in public investment during the period when he was in government. From this evidence one would expect to be able to identify political shifts in the allocation of public investment in Mexico. Indeed, different governments have differed

Table 1. Allocation of public investment and population across Mexican regions, before (1979–85) and after (1985–99) the change in Mexico's economic model to liberalize trade (source: authors' calculations from data from INEGI and Statistical Annexes to the Presidential Address to the Nation, various years).

Region	Public investment (%)		Population (%)	
	1979–85	1985–99	1979–85	1985–99
North	18.6	18.3	12.7	14.6
Capital	5.1	5.1	8.0	13.4
Centre	17.2	17.2	15.6	39.0
South	17.2	17.2	15.6	12.3
Centre–North	24.9	24.7	22.1	18.5
Oil-producing	17.3	18.2	30.0	2.3

Table 2. Allocation of the regional share of public investment by Mexican federal governments, in percentage (source: authors' own calculating using data from INEGI and Statistical Annexes to the Presidential Address to the Nation, various years).

Region	Government				
	Echeverría (1970–76)	López (1976–82)	De la Madrid (1982–88)	Salinas (1988–94)	Zedillo (1994–2000)
North	20	18	14	13	13
Capital	4	5	7	11	6
Centre	18	16	16	16	16
South	18	16	16	16	16
Centre–North	25	24	23	26	19
Oil-producing	12	23	28	23	34

in their policy priorities—effects which are seen over and above the influence of the business cycle. To explore the influence of government priorities in expenditure, temporal patterns in public investment need to be explained. To do this we employed an extended methodology, described in the previous section, known as intervention analysis. The aim of this methodology is to estimate the impact of certain intervention variables (for example, the role of government policy) on the allocation of public expenditure.

Turning to the results of our model, and following the Box and Jenkins (1976) methodology, the first stage is to determine whether the series examined is stationary (d), and to identify the model structure. Given that public investment is normally determined annually, we found no evidence of seasonality. Moreover, a nonstationary series is indicated by an autocorrelation plot with very slow decay—estimated by using the Phillips and Perron (1988) test, as shown in table 3. This table shows the values of the autocorrelation coefficients (AC) along with the partial autocorrelation coefficients (PAC) and the higher order serial correlation in the residuals test (Q-statistic), which confirms whether the data are stationary once we find the specific model structure. Results suggest that once public investment is differenced it is stationary, as the χ^2 tests suggest, and the variable does not contain a unit root so we can proceed to an investigation of the role of government policy in determining the allocation of public investment. We can conclude that the model fits a Box–Jenkins methodology. Once the time series have been differentiated, table 3 indicates that,

Table 3. Estimated correlogram, showing autocorrelation coefficients (AC) and partial autocorrelation coefficients (PAC) for ARIMA regressions (independent variable—share of public investment).

	Period			
	1	2	3	4
North				
AC	−0.4542	0.1328	−0.2373	0.2066
PAC	−0.4701	−0.1200	−0.3178	−0.0516
Q-statistic	6.4168	6.9870	8.8783	10.372
Capital				
AC	−0.1547	−0.0208	0.127	−0.4088
PAC	−0.1579	−0.0453	0.1279	−0.4798
Q-statistic	0.74421	3.75825	3.3005	7.1486
Centre				
AC	−0.0383	−0.2737	−0.2179	−0.1037
PAC	−0.0428	−0.2986	−0.2768	−0.3239
Q-statistic	0.04571	2.4664	4.0618	4.4380
South				
AC	0.4275	−0.0532	−0.2191	−0.1658
PAC	0.4421	−0.3329	−0.0820	−0.0330
Q-statistic	5.8685	5.9628	7.6222	8.6110
Centre–North				
AC	0.5424	0.1351	−0.1068	−0.1929
PAC	0.5492	−0.2209	−0.1068	−0.1088
Q-statistic	9.4463	10.054	10.448	11.786
Oil-producing				
AC	0.1555	−0.2731	−0.3994	−0.1383
PAC	0.1813	−0.3842	−0.3899	−0.2050
Q-statistic	0.75181	3.1623	8.5210	9.1909

Table 4. Estimated ARIMA models of public investment allocation for Mexican regions 1971 – 99.

Government	North		Capital		Centre		South		Centre – North		Oil-producing	
	coefficient	*t*-value	coefficient	*t*-value	coefficient	*t*-value	coefficient	*t*-value	coefficient	*t*-value	coefficient	*t*-value
Echeverría	0.001	0.025	−0.008	−0.090	−0.008	−0.090	0.025	1.2390	−0.006	−0.111	−0.0614	−0.652
Constant	−0.003	−1.934	0.001	0.236	0.001	0.236	0.0001	0.1340	−0.0021	−0.838	0.005	1.383
AR (1)	−0.002	−0.005	0.726	2.476	0.726	2.476	0.306	1.1770	0.4664	1.786	0.510	2.925
MA (1)	−0.629	−2.487	−0.100	−0.006	−0.139	−0.097	−0.138	−0.240	−0.210	−1.090	0.270	1.087
Q-test (χ^2)	12.800		25.05		25.0		24.1		18.15		18.95	
López	0.007	0.437	−0.010	−0.588	−0.010	−0.588	−0.0189	−0.994	−0.0101	−0.221	0.054	0.822
Constant	−0.003	−2.561	0.001	0.155	0.001	0.155	−0.0010	−1.464	−0.0020	−1.111	0.008	2.376
AR (1)	−0.024	−0.078	−0.058	−0.042	−0.058	−0.042	0.3254	0.841	0.4500	1.717	0.551	1.838
MA (1)	−0.678	−2.624	−0.126	−0.097	−0.126	−0.097	−0.028	−0.040	−0.1300	−0.980	0.402	0.003
Q-test (χ^2)	14.460		15.6		13.450		16.78		16.46		11.130	
De La Madrid	−0.017	−1.838	0.003	0.235	0.012	0.271	0.0031	0.2710	−0.011	−0.611	0.034	1.434
Constant	−0.004	−5.347	0.001	0.154	−0.001	0.001	−0.0007	−0.9400	−0.0018	−1.050	0.007	2.363
AR (1)	0.048	0.153	0.630	0.012	0.397	1.386	0.396	1.386	−0.090	−0.880	0.517	1.814
MA (1)	−0.821	−0.010	−0.164	−1.045	−0.090	−0.020	−0.270	−0.120	0.450	1.717	0.970	0.860
Q-test (χ^2)	11.21		11.36		15.70		14.23		16.31		19.98	
Salinas	−0.007	−0.494	0.0437	4.074	0.044	4.074	0.0008	0.045	0.0508	2.661	−0.080	−0.735
Constant	−0.003	−2.709	0.0007	0.707	0.001	0.707	−0.000	−1.016	−0.0029	−2.752	0.008	1.827
AR (1)	0.131	0.380	0.2951	0.841	0.295	0.841	0.397	1.491	0.217	0.945	0.526	1.469
MA (1)	−0.765	−3.217	−0.135	−1.020	−0.109	−0.082	−0.123	−0.190	−0.170	−1.120	0.670	0.486
Q-test (χ^2)	19.690		23.53		25.87		22.45		17.2		13.45	
Zedillo	0.027	2.244	−0.050	−2.640	−0.052	−2.640	0.0020	0.107	−0.044	−0.980	0.067	0.177
Constant	−0.004	−8.986	0.000	3.242	0.003	3.242	−0.0007	−0.861	−0.0006	−0.321	0.001	0.085
AR (1)	0.128	0.538	0.370	1.182	0.374	1.182	0.386	1.453	0.336	1.116	0.244	1.024
MA (1)	0.860	−0.450	−0.090	0.002	−1.000	−0.002	−0.033	−0.130	−0.189	−0.780	0.370	0.760
Q-test (χ^2)	6.210		29.15		29.150		20.12		15.15		1.01	

Note: χ^2 tests report evidence on whether the data case stationary (Q-statistic). Independent variable: share of public investment.

with the exception of the Northern and Southern groups of regions, the data can be explained by the ARIMA (1, 1, 0). That is, public expenditure could be predicted in Mexico by differentiating the expenditure value along with an autocorrelation coefficient.

We now arrive at the ultimate objective of our study, presented in table 4. All models were ultimately significant according to the χ^2 square coefficient of global significance. The first three time periods examined showed no effect on the allocation of public investment over time. Interestingly, it is not until the governments of Salinas and Zedillo that we find the coefficients of the intervention analysis becoming significant. These effects suggest a shift in the allocation of public investment, first to the Centre – North and the Capital and then to the North. These effects are in line with the liberalization process that has taken place in Mexico, with the most significant effects resulting from the regional integration process. Of particular interest is the effect of the last government, of Zedillo, on the North regions on the border with the USA. Indeed, Hanson (1998) found that trade liberalization shifted regional Mexican industrial employment so that it become negatively associated with distance to the US border after 1985. Agglomeration effects are noticeable in oil-producing regions and in the areas surrounding Mexico City.

Therefore, our results suggest that the influence of different federal governments in changing the allocation of public investment has been limited. In particular, the results suggest that the distribution of public investment follows some inertia, and thus support the hypothesis of path dependency in the allocation of public investment. Furthermore, this result is consistent with the fact that a single party has been ruling the country over the entire period examined. Indeed, the different governments in power have not produced time-related patterns of public expenditure. Interestingly, it was not until the federal government lost a significant amount of support that path dependency was reverted. Indeed, the issue that has led to the transformation of the decisionmaking process with regard to public investment is exogenous: namely, regional integration. However, one should bear in mind that regional integration and trade liberalization bring new interest groups and lobbies, which might not accommodate the rules of previous pseudodemocratic political structures and might demand new reforms and a greater degree of government responsiveness to the economic policy reforms which Mexico needs.

5 Conclusions

Path dependency and inertia can potentially become key in explaining regional policy change. This study attempts to show that this depends on the specific government institutional design. Yet the consequences of the allocation of public investment are especially remarkable, as public investment is regarded as a key policy instrument affecting regional development and regional cohesion. Mexico stands as an interesting country in which to examine how decisions on the distribution of public investment are formed given that the same political party has ruled the country for more than seventy years. In this paper we provide two lines of evidence suggesting the existence of path dependency.

First, we found clear-cut evidence of inertia—and, therefore, first-degree path dependency—indicating an interesting historical influence in the distribution of public investment, which resembles that of other middle-income countries (Randolph et al, 1996). This result is consistent with previous evidence indicating that the allocation of public investment in Mexico does not seem to be driven by criteria related to regional cohesion or efficiency: instead, it appears to vary depending on the political discretion of federal governments—consistent with previous studies (Costa-Font et al, 2003)—and seems to be used to enhance support for the incumbent party. Hence, our findings

pointing towards the existence of path dependency are a complementary explanation linked to political processes and the institutional design.

Second, presidential changes in Mexico seem to have had only weak effects on policy change, insofar as the effect of a change in federal government has had little influence on the way in which public funds are distributed over time. Interestingly, we find evidence of third-degree path dependency in that it was not until the political party in government experienced some loss of support that the pattern of public investment was shifted. Indeed, the political outlook changed during the 1980s and 1990s with an ongoing process of decentralization (Molinar and Weldon, 1994; Rodríguez, 1997). The decentralization process brought political stability to central government by providing an institutional basis through which opposition groups might bargain in the absence of effective political competition. Before 1990, the PRI controlled nearly every local (municipal) government in Mexico. However, by 1993 the percentage of municipalities governed by the PRI had dropped to 71%, and in 1995 to 55% (Costa-Font et al, 2003).[5] These results are to some extent unexpected, as a government as entrenched as the PRI has been in most of this period had the discretion to do whatever they wished, with only slight risk. Instead, it seems that the PRI government appears to have followed a 'growth-facilitating strategy', following the premises of a pure developmentist tradition. That is, a policy of investing wherever private growth was strongest, rather than counteracting private sector trends in the pursuit of regional cohesion.

One of the triggering factors for political change has been regional integration, given that a trade-enhancing factor seems to be channeling public investment (Costa-Font and Rodríquez-Oreggia, 2005b) and might have broken the preexisting path dependency. However, one might argue that regional integration acts as an institutional externality to Mexican regional policymaking which might enhance adaptation rather than path change. If this is so, an alternative interpretation of these results would be that there was no break for political reasons at the end of the period examined but, on the contrary, there was a continuation of the prior investment-allocation rule (of putting public money where private action was occurring), which was more pronounced in the North region as a result of economic integration patterns.

Finally, some caveats should be mentioned. On the one hand, the notion of path dependency has been criticized as being good at explaining inertia but not at predicting policy change (Crouch, 2001). On the other hand, it should be acknowledged that institutions acting as constraints to the reform of decisionmaking rules stand as strategic features which, although they can sometimes lead to inertia, might also foster policy innovation (Thelen, 2003). On the whole, this study suggests that although government change does not explain all the significant changes observed in the allocation of public investment, there is an alternative explanation which is tightly linked with the political process. That is, politics and institutional constraints might explain both the advent and the absence of policy reforms.

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[5] This indicates a striking change in the way in which local politics were conducted. In a few years, the PRI had lost control of nearly half of the municipalities—after decades in which the opposition had struggled to gain a foothold in local politics.

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Appendix

Table A1. Geographical classification of Mexican states (source: INEGI, 1970; 2000).

North	*Capital*	*Centre*
Baja California	Distrito Federal	México
Coahuila		Morelos
Chihuahua		Puebla
Nuevo León		Querétaro
Sonora		Michoacán
Tamaulipas		Guanajuato
		Hidalgo
		Tlaxcala
		Veracruz
16% population in 1970	14% population in 1970	36% population in 1970
17% population in 2000	9% population in 2000	41% population in 2000
South	*Centre – north*	*Oil-producing*
Chiapas	Aguascalientes	Campeche
Guerrero	Baja California Sur	Tabasco
Oaxaca	Colima	
Quintana Roo	Durango	
Yucatán	Jalisco	
	Nayarit	
	San Luis Potosí	
	Sinaloa	
	Zacatecas	
13% population in 1970	19% population in 1970	2% population in 1970
13% population in 2000	17% population in 2000	3% population in 2000

Table A2. Share of public investment allocation on time per Mexican area—ordinary least squares (OLS), with *t*-statistics shown in parentheses.

Region	Time	Constant
North	-3.7×10^{-5}** (−5.577)	0.073** (5.62)
Capital	-2.7×10^{-6} (−1.509)	0.006 (1.572)
Centre	-1.12×10^{-5}** (−5.737)	0.027** (5.789)
South	-4.0×10^{-4}** (−6.74)	0.08** (6.789)
Centre – North	-3.3×10^{-5}** (−4.914)	0.066** (4.961)
Oil producing	-1.3×10^{-4} (−1.621)	0.27 (1.649)

** Significant at the 1% level.