Reply to referee 2

We wish to thank the referee for his/her insightful comments, all of which we have taken on board. We are confident our paper has substantially improved thanks to your observations and suggestions. Below we list each comment, explain our response, and describe how these have been incorporated into the new version of the paper. We hope all these changes satisfy the referee.

Introduction

Comment 1

The author says that this article is the only that focuses in the period 1925 to 1981. However, some of the data start in 1939, and it seems that there is not much difference with other literature that start in 1950. Why are those previous 25 years to 1950 so relevant? Or, why it is expected different effects from previous works?

Response to comment 1

It should be noted that the referee's comment applies to only two of the six series analyzed in this article (i.e., industrial development and government administration). The others (total public investment, agricultural development, transport and communications, and social development) begin in 1925.

We employ the 25 years prior to 1950 because we do not want to employ any data after 1982. The economic literature recognizes that Mexico's development strategy changed around this time, i.e., the relationship among the variables we study (GDP and public and private investment) may be different in these two periods.[1] To take advantage of the asymptotic properties of the time-series methods employed (the longer the series employed, the more reliable the estimations) without mixing data from two periods in which the relationship between the variables may differ, we expand our dataset as far back as possible.

One of the main differences between our study and all the others that analyze the Mexican economy is that ours focuses exclusively on the period prior to the opening-up of the economy. We consider this to be a very important milestone, as prior to 1982 it was the State that took the lead in directing the country's economic development strategy by investing heavily in key strategic sectors—transport and communications (ports, roads, etc.) and industrial development (electricity and petroleum)—that have spillover effects on other economic sectors; after that date, public investment dramatically decreased, due in part to the 1982 debt crisis, and also the government's new economic strategy, one in which the private sector was expected to invest and to serve as the primary driving force behind the country's economic development.

Therefore, studies that use data from these two different periods—ones in which the country followed different growth strategies—estimate a different relationship between public and private investment and economic growth. As we shall discuss later, Ilzetzki, Mendoza, and

[1] Ramirez (1994) says "The onset of the debt crisis in 1982, and its immediate aftermath, however, left the Mexican government with no choice but to alter radically its overall development strategy. […] it began a process that culminated in the unprecedented opening of the Mexican economy to foreign competition and investment, as well as the total withdraw of the state from key sectors of the economy."

Végh (2013) point out that this is a very important issue; the relationship between public investment and output depends on key country-specific characteristics, such as trade openness and the exchange rate regime, characteristics that differed greatly before and after 1982.

The studies that use data starting in 1950 or later need to use data from after 1982 for the statistical reason mentioned above.

We understand that this point was not clear enough in our first draft, for which reason we have included a footnote in the introduction of the new version to make this point absolutely clear.

Comment 2
It seems to me that the real contribution of this paper is the analysis of desegregated components of public infrastructure. Can the author describe more about this point? and why is an important element that has been neglected in previous works. Those heterogeneous effects from Table 2 are very interesting and could also be commented more in the Introduction to motivate the paper.

Response to comment 2
We agree with the referee; the analysis disaggregated by component allows us to understand which type of public investment had the greatest impact on GDP in this specific period.

We are uncertain as to the reasons why previous works considered only total public investment in their analysis of this problem, though we believe it may be due to the lack of readily available information on public investment disaggregated by component.

Firstly, though the series for public investment disaggregated by component are available from INEGI, they are no longer updated by the institute and can only be found in printed form in a book titled *Estadísticas Históricas de México* (Historical Statistics of Mexico). Since 1996, INEGI has continued to report this data, but in a different form, now reporting expenditures on public infrastructure by Secretariat.

Secondly, a similar situation occurs with the private investment series for this period. That series was constructed by Cardenas (1994, 1996), therefore some researchers are unaware that the information is available and ready to use.

The paper was modified to discuss the heterogeneous effects results presented in Table 2 in more detail.

Comment 3
Can the author extend more on the policy implications of the paper? For example, one interesting result with policy implications is explained in Pag. 12, where the author mention that their findings constrast to Nazmi and Ramirez (1997) and Lachler and Aschauer (1998), "... who suggest that the positive impact of public investment on growth was at the expense of private investment.". However, "results indicate that public investment not only increases

the aggregate demand for goods and services but also generates positive benefits for the various factors of production and for the marginal productivity of private investment."

Response to comment 3
The results section now includes more discussion of the policy implications of the results.

Sources and Data

Comment 1
From Graph 1, What is the explanation for the fall in the GDP between 1925 and 1932? Could this be an argument for considering the years previous to 1950 as important?

Response to comment 1
As explained before, this is not the reason why we are using data from before 1950.

The fall in GDP from 1925 to 1932 was due to both internal and external causes. The military phase of the Mexican Revolution (1910–1920) was followed by a period of struggle among various groups around the country. One of the most important popular uprisings of this period was the Cristero War (1926–1929), a widespread struggle in central-western Mexico (the most important part of the country in terms of economic activity) in response to the imposition of anti-Catholic articles of the 1917 Mexican constitution. The conflict ended in 1929 after the church withdrew its support for the Cristero rebels.

Even though Mexico did not feel the effects of the Great Depression as directly as some other Latin American countries, there was a fall in Mexico's GDP after 1929. It was not until 1934 when peace had been restored that Mexico initiated its phase of economic industrialization and economic growth under the then President, General Lázaro Cárdenas.

Comment 2
According to the author: "Due to differences in the availability of information, the start years for the data on investment in industrial development and government administration are respectively, 1938 and 1939..." However, in Graph 4, it seems that the value for those components is zero in 1938 and 1939 respectively?

Response to comment 2
The amount of public investment in industrial development and government administration in the years 1938 and 1939 was very low, at that time each representing around 1% of total public investment. Over time, investment in industrial development became the most important component of public investment in the period analyzed, while investment in government administration remained the least important.

Comment 3
Does this data of public investment for Industrial Development considers public/private partnerships? How important is this kind of investment for the case of Mexico?

Response to comment 3
In Mexico, public/private partnerships are a relatively recent phenomenon. They started mainly after the end of our period of study (i.e., 1982). As a result of the lack of economic resources in the public sector, a need arose in this period to create cooperative ties between public and private entities in order to develop infrastructure and services at all levels of government.

Empirical Analysis and Results

Comment 1
How are the results comparable to others works that the author mention? Are these elasticities similar? If there already evidence documenting a positive association between public investment and GDP, why the period analyzed it is expected to differ from previous works? Do these other works explore the distinction between crowding-out and complementary effects or this is also a contribution of the paper?

Response to comment 1
We mentioned in the introduction and footnote 22 that our study relates to various previous works; however, there is only one on Mexico that estimates the elasticity of GDP with respect to public investment: Nazmi and Ramirez (1997). Consequently, there is only one with which our results are fully comparable.

In the results section of the paper we also mention other studies that have found evidence of a positive association between public investment and GDP for the case of Mexico and at the international level.

In this section, we also mention why we expected our results to be different from those of previous studies that use a different sample period. Ilzetzki, Mendoza, and Végh (2013) show that the response of output growth to different government expenditures depends on key country-specific characteristics, including: i) the country's openness or closedness to trade and ii) the country's exchange rate regime. Since previous works included data for the period after 1982 (since when, in sharp contrast to the period we are analyzing, our country has definitely become more open and has had a free-floating exchange rate), we expect our results to be different.

Finally, other studies have also analyzed the relationship between public and private investment. This was mentioned briefly in our first draft, but we have now included a broader discussion of this issue.

Concluding Remarks

Comment 1
The last paragraph of this section is a little bit disconnected and not well developed. Can the author expand more on the explanation that is giving and how is related with the results of the paper.

Response to comment 1

We agree with the referee. As presented, this paragraph was not well written and *seems* somewhat disconnected from the rest of the paper.

This comment made us realize how important this idea is for our paper, because it justifies the difference between our results and those of previous studies. Therefore, we have moved this paragraph to the results section and mention this notion when comparing our results with those of previous studies.

Comment 2
It would be nice if the author can add a paragraph with future research in this section. There are many things that the paper left, for example, to explore the causal mechanisms behind these results, such as the oil boom, or the SOEs, since the categories of public expenditure are still to aggregate, it is not clear if the explanations that the author gives are really causal effects of these findings. Or how much of the GDP variation is explained by public expenditure?

Response to comment 2
We agree with the referee: sometimes the causal effects of our results are unclear. We think the main problem is the data that is available for this period, which is not sufficiently disaggregated to enable a clear-cut estimation of the impact of specific types of investment on GDP. The analysis of the relationship between public investment and GDP in the period 1925–1981 has been done using the most disaggregated data we could find and we think it is very unlikely that more disaggregated data exist.

We have added a paragraph on future research in this section; please see the new version.

Minor Comments

Comment 1
The abstract should be rewritten in order to motivate more the results of the paper and clarify some aspects. For example, the author says in relation to the role of public investment in the post-revolutionary period, that: "...there is no concrete empirical evidence that that was the case." But in the introduction in Pag. 2. the works of Ramirez (1994), Nazmi and Ramirez (1997), Lachler and Aschauer (1998), and Noriega and Fontela (2007) are described as existing evidence that focus on the period following 1950. This is mentioned again the Concluding Remarks section, in relation to the role of public investment as engine of growth during the following the revolutionary war: "... previous literature provides no adequate version to support this assertion."

Response to comment 1
We wanted to make a distinction between our sample period, 1925–1981 (which includes the period immediately after the Revolutionary War), and the period used in other studies (typically the period 1950–1990), which is in the post-revolutionary period but not immediately after it.

We have rewritten the abstract to avoid this misunderstanding and hope the changes satisfy the referee.

Comment 2
The title of Table A2 is in spanish, as well as the label for Government Administration.

Response to comment 2
Table A2 is now in English; see the new version of the paper.

Comment 3
Typo in Line 5 of the first paragraph of the Cointegration Analysis section, in Pag. 9.

Response to comment 3
This has been corrected; please see the new version of the paper.