Public Investment and Economic Activity in Mexico, 1925-1981

Referee Report

1 Summary

The paper empirically investigates the role that public investment may have played in Mexico, in the period from 1925 to 1981. The authors argue that this is a suitable period to analyze the effects of public investments on economic activity since it starts right after the end of the Mexican Civil War until the beginning of the mid-1980 economic liberalization that the Country undertook by signing trade agreements with other Latin American Countries. Such period is characterized by a strong protectionism, an industrialization policy based on import substitution; on the provision of public infrastructures (for instance, transport and communications), as well as on a strong public support of the energy industry's development.

Investigating the time series statistical properties of GDP, public investment (also disaggregated by type of investment) and private investment, the authors find cointegrating, i.e. long-run, relationships between the variables and a long-run positive correlation between public investment and economic activity. The findings suggest that public investment has fostered the development of Mexican economy by also crowding resources into the private sector.

2 Main Contribution

The main contribution of the paper is surely the construction of an historical database for public and private investment, the former being also disaggregated into five components: agricultural development, transport and communications, industrial and social development, government administration.

The research question is clear and supported by a solid, transparent, effective narrative: in fact, the time horizon they analyze can easily resemble the case of a closed economy with fixed exchange rate. There is a well established stream of literature and Keynesian prescriptions that recognize it as a scenario in which public investment, and in general government expenditure increase, has the highest multiplier effect.

3 Major Comments

3.1 Literature Review

I believe the authors should let the literary review part be more exhaustive because:

- it may contain also contain the more recent and relevant findings concerning the role of expansionary fiscal policy, of course with a greater focus on why public investments-type of intervention may have larger effects (Demetriades and Mamuneas (2000) just as an example);
- it may contain some references to developing countries (Ramirez and Nazmi (2003) as an example)
- it may describe the main findings of those reference papers that had focused on the Mexican experience. What are their main findings? Are authors' findings compatible with existing literature? In Section III there is only mention to the results obtained in Lachler and Aschauer (1998) and Nazmi and Ramirez (1997).

3.2 Econometric Analysis

The econometric analysis is clear, but not exhaustive. Preliminary batteries tests for unitroot, structural break and cointegration are convincing and strongly suggest the presence of more than one cointegrating relationships between the variables of interest.

However, authors do not include any structural analysis (impulse response and variance decomposition analysis): an easy-to-implement Choleski factorization of the covariance matrix of the reduced-form residuals, with a suggested recursive causal order (G_t, I_t, GDP_t) , may deliver interesting hints. An interpretation of the long-run equilibrium conditions that authors find lacks: for example, which shocks may have permanent effects? Authors should motive the reason why they do not explore further the implications of their econometric model.

In Section III.2 (Empirical analysis and results - Cointegration Analysis), cointegration results are analyzed. In particular, column 6 of Table 2 shows the estimated parameters of the cointegration relationship. It is not clear, however, how the long-run equilibrium equations listed in column 6 may refer to the cointegrating vector estimated in the VEC model. Given the VEC representation of the form:

$$\Delta y_t = \Pi y_{t-1} + \sum_{k=1}^{n-1} \Gamma_k \Delta y_{t-k} + u_t$$
 (1)

 y_t represents the *n*-dimensional vector of endogenous variables, $\Pi = \alpha \beta'$ is the cointegrating matrix, Γ_k are $n \times n$ matrices of estimated coefficients for the lagged first differences. The Johansen procedure exploits the fact that the rank *r* of the matrix Π is informative about the number of cointegrating relationships. Both α and β are $n \times r$ full column rank matrices: the former is the matrix of loadings that ensure convergence to the long-run equilibrium; the latter contains *r* linearly independent cointegrating vectors for which $\beta' y_{t-1}$ is stationary.

In a system of three equations with two cointegrating relationships (n = 3, r = 2), the

reader would expect that the long-run equilibrium conditions are of the form:

$$GDP_t = \hat{\beta}_{12}G_t + \hat{\beta}_{13}I_t \tag{2}$$

$$GDP_t = \hat{\beta}_{23}G_t + \hat{\beta}_{23}I_t \tag{3}$$

under a unit normalization of the cointegrating vector. A more precise and explicit specification of the cointegrating vectors/relationship is suggested.

Throughout the paper, the authors stress the positive "impact" of public investment to GDP. This is not what estimates can tell precisely, though. For two particular reasons:

- Having not identified the VEC model, it is imprecise to look at the estimates as being impact coefficients. Structural impulses response functions would be more informative;
- 2. Table 2 contains long-run elasticities, that are proportional to the long-run change of one variable, let's say GDP_t , when G_t increases. This is different to say that public investment has a direct impact on GDP, at least in the short-run. For a proper interpretation of cointegrating coefficients we refer to Lutkepohl (1994)

4 Minor Comments

- In commenting Graph (3), it's *private investment*, not public, that never exceeded 5 percent of GDP before 1955 and reached 10 percent (and more) afterwards. On the contrary, *public investment* stayed lower than 5 percent for almost all the period under analysis.
- Still while commenting Graph (3), "at the end of the sample [...], *total public investment* represented 20 percent of GDP" is probably referring again to private investment instead.

- At page 9 there is a typo in repeating twice "impact of each of each investment component..."
- At page 9 "The second column of Table 2 shows the order of the VEC". The VEC model is just a representation of the estimated VAR. The VEC model has a (*p* − 1)-lag specification with respect to its VAR representation. To which value the order in Table 2 refers?
- Table A2's title is partially written in Spanish

References

- Demetriades, P. O. and T. P. Mamuneas (2000). Intertemporal output and employment effects of public infrastructure capital: evidence from 12 oecd economies. *The Economic Journal* 110(465), 687–712.
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