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Cart before the horse? The saving–growth nexus in Mexico

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Abstract

Using recent developments in econometric techniques, we show that the conventionally accepted view that higher saving rate causes higher economic growth does not hold for Mexico. In fact, the causality goes in the opposite direction.

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1. Introduction

In a typical model of economic growth such as the Solow (1956) model, a clear connection is made between saving and economic growth. The conventional wisdom says: higher saving leads to higher investment which in turn leads to higher economic growth. The presumption is that higher saving precedes economic growth and higher saving causes economic growth. The belief in these models leads to strong macroeconomic policy recommendations for development. As a result, for many years, the World Bank has recommended that developing countries should pay close attention to policies that lead to higher saving rate in order to boost economic growth.

Recently Gavin et al. (1997) have raised questions about this fundamental belief. They argue that ‘‘Higher growth rate precedes higher saving rather than the reverse.’’ And ‘‘The most powerful determinant of saving over the long run is economic growth.’’ (p. 13)

This view has raised much economic debate. In a review of this paper, Cohen (1997) declares ‘‘The paper by Gavin et al. (1997) is dangerous. It deduces that policy makers should not promote saving.’’ (p. 45)

The existence of a contemporaneous positive correlation between saving and growth is a robust empirical finding (see, for example, Modigliani, 1970, 1990 and Maddison, 1992). However, something odd started to emerge with Jappelli and Pagano (1996). Strong evidence seemed to emerge showing higher saving follows higher growth for different countries in different time periods.

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There are three main criticisms of Gavin et al. (1997): (1) Their analysis is based on a short time-span of data (1970–1993). In order to overcome this problem with the dataset, they had to resort to pooling data across different countries—an unsatisfactory solution. (2) They do not explicitly study the problem with unit roots, cointegration and Granger causality. (3) They do not separate out the effects of private and public saving. The growth models of Solow type implicitly assume that the connection between saving and growth is about private saving and growth.

In this paper, we explicitly confront all of these issues: We have a longer time series for one country (Mexico (1960–1996)), we rigorously explore econometric issues of unit roots, cointegration and causality, and we explicitly separate out public and private saving in our analysis.

Mexico has gone through some turbulent recent history. Every six years or so, Mexico seems to go through an economic crisis: in 1982, in 1988 and in 1994. The World Bank (1996) points out that the Mexican financial crisis of 1994 had a long gestation period and it blames low domestic saving as one of the main culprits of the problem. The Mexican strategy of development included the use of a predetermined nominal exchange rate anchor, fiscal and monetary restraints to lower inflation and a program of structural reforms including tax reforms, privatisation, deregulation and trade liberalisation. Before 1994, the current account deficit soared and very high flow of private capital inflows financed such deficits. Net capital inflows declined sharply in 1994 partly as a result of the investors' concern about the vulnerability of the economy. The increased capital inflow was accompanied by a reduction in private domestic saving. Public saving also declined sharply during the late 1980s but then recovered only to fall again.

The data sources are as follows: private and public saving data are from Ortiz (1997). Real GDP data are from the International Monetary Fund (1997). Annual data are in real terms for the period 1960–96. All variables are expressed in logarithmic forms so that the first differences give us the growth rates.

2. Econometric methodology and results

Before we start our analysis, it is important to study the unit root properties of the data. We use the Augmented Dickey–Fuller (ADF) test. The results of the unit root tests for variables in their levels and first differences are in Table 1. ln(PVSAV), ln(PUBSAV) and ln(GDP) stand for logarithms of total private saving, total public saving and GDP respectively. The results indicate that ln(PVSAV)

Table 1
Augmented Dickey–Fuller tests

Variable	Test statistic	Variable	Test statistic
ln(PVSAV)	−2.1957(0)	Δln(PVSAV)	−5.4149*(0)
ln(PUBSAV)	−5.0160(0)	Δln(PUBSAV)	−5.1652*(5)
ln(GDP)	−0.9744(0)	Δln(GDP)	−4.5003(0)

Note: Lags in parentheses are determined using the Akaike Information Criterion (AIC). The critical value at the 5% level for variables (with trends) in their levels is −3.5615. The critical values for variables without and with trends in their first differences are −2.9627 and −3.5671 respectively.
* Indicates no trend.

and ln(GDP) are I(1) while ln(PUBSAV) is I(0). We use a Johansen (1991) framework of cointegration tests. The general form of the vector error correction model is given by:

$$\Delta y_t = a_{oy} + a_{1y}t - \Pi_y z_{t-1} + \sum_{i=1}^{p-1} \Gamma_{iy}\Delta z_{t-i} + \Psi_y w_t + e_t, t = 1,2, \ldots n \tag{1}$$

where $z_t = (y'_t, x'_t)'$, y_t is an $m_y \times 1$ vector of endogenous variables I(1) variables and w_t is a $q \times 1$ vector of exogenous/deterministic variables I(0) variables. The results of the cointegration tests are given in Table 2. The number of lags used is one and it was determined by using the Akaike Information Criterion (AIC). The results indicate that according to both maximal eigenvalue and trace tests, there is one cointegrating vector. The normalized coefficients of ln(GDP) and ln(PVSAV) are -1.000 and 0.66073 respectively (note that ln(PUBSAV) is I(0)). This indicates that there is a long run positive relationship between these two variables as expected.

However, cointegration does not imply causality. We employ the block Granger noncausality tests (Granger, 1969). Consider the augmented vector autoregressive model:

$$z_t = a_0 + a_1 t + \sum_{i=1}^{p} \phi_i z_{t-i} + \Psi w_t + u_t \tag{2}$$

where z_t is an $m \times 1$ vector of jointly determined (endogenous) variables, t is a linear time trend, w_t is $q \times 1$ vector of exogenous variables, and u_t is an $m \times 1$ vector of unobserved disturbances. Let $z_t = (z'_{1t}, z'_{2t})'$, where z_{1t} and z_{2t} are $m_1 \times 1$ and $m_2 \times 1$ subsets of z_t, and $m = m_1 + m_2$. We can now have the block decomposition of (2) as follows:

$$z_{1t} = a_{10} + a_{11}t + \sum_{i=1}^{p} \phi_{i,11} z_{1,t-i} + \sum_{i=1}^{p} \phi_{i,12} z_{2,t-i} + \Psi_1 w_t + u_{1t} \tag{3}$$

$$z_{2t} = a_{20} + a_{21}t + \sum_{i=1}^{p} \phi_{i,21} z_{1,t-i} + \sum_{i=1}^{p} \phi_{i,22} z_{2,t-i} + \Psi_2 w_t + u_{2t} \tag{4}$$

The hypothesis that the subset z_{2t} do not "Granger cause" z_{1t} is given by H_G: $\phi_{12} = 0$ where

Table 2
Multivariate cointegration tests

Null	Alternative	Test statistic	Critical value*
Maximal Eigenvalue Tests			
$r=0$	$r=1$	23.8212**	19.2200
$r<=1$	$r=2$	3.2387	12.3900
Trace Tests			
$r=0$	$r>=1$	27.0599**	25.7700
$r<=1$	$r=2$	3.2387	12.3900

Note: The cointegration tests are for ln(GDP), ln(PVSAV) and ln(PUBSAV) which are I(1), I(1) and I(0) respectively. The lag order is one and was determined by using the Akaike Information Criterion (AIC).
* Critical values are for the 95% quantile.
** Significant at the 5% level.

Table 3
Multivariate Granger causality tests

Cause	Effect	Test stat.(*)	Probability(**)
Δln(GDP)	Δln(PVSAV) and Δln(PUBSAV)	18.62(3)	0.005(6)
Δln(PVSAV)	Δln(GDP) and Δln(PUBSAV)	14.99(3)	0.020(6)
Δln(PUBSAV)	Δln(GDP) and Δln(PVSAV)	14.87(3)	0.021(6)
Δln(PVSAV) and Δln(PUBSAV)	Δln(GDP)	6.95(3)	0.326(6)
Δln(PVSAV)	Δln(GDP)	0.49(1)	0.485(1)
Δln(GDP)	Δln(PVSAV)	2.37(1)	0.127(1)
Δln(PUBSAV)	Δln(GDP)	2.77(2)	0.250(2)
Δln(GDP)	Δln(PUBSAV)	1.02(2)	0.602(2)

Note: The test statistic indicates the χ^2 value. Δ stands for first difference.
* Indicates the number of lags which was determined by using the Akaike Information Criterion (AIC).
** Indicates the degrees of freedom of the χ^2 distribution.

$\phi_{12}=(\phi_{1,12}, \phi_{2,12} \dots, \phi_{1p,12})$. Since all three variables are stationary in their first differences, the tests are valid in the first differences of the variables (Canova (1995)). The results of multivariate (and bivariate) Granger causality tests are in Table 3. The results indicate that the growth of GDP Granger causes the growth of both private and public savings but there is not much evidence of reverse causality. The bivariate causality tests indicate that there is no causality flows in any direction. Thus, the bivariate causality tests (even though they are computationally easier) may give misleading results.

3. Conclusion

In this paper, we study the relationship among private saving, public saving and economic growth in Mexico. The results indicate that private saving and GDP have a long run relationship. The multivariate causality tests indicate that there is evidence that the growth of GDP Granger causes the growth of private and public savings. But we do not find any evidence of reverse causality. This result vindicates the assertion of Gavin et al. (1997). Our study corrects all the problems associated with their paper. Thus, the conventional wisdom that higher saving rate leads to higher economic growth does not seem to bear out when careful econometric tests are performed.

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