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Fiscal Policy and National Saving in Mexico, 1980-2006

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Abstract

This paper uses structural vector autoregressions (SVAR) to characterize the dynamic impact of fiscal policy on national saving. SVAR´s have extensively been used to characterize the impact of monetary policy on the economy but have not been applied as much to analyzing fiscal policy. This paper focuses on the impact of fiscal policy on national saving and the data used is adjusted for inflation and cyclical effects, rather than using traditional estimations by official entities. Our empirical analysis shows that fiscal policy has an important economic impact on national saving, any impact on private saving and a negative but non-significant effect on the output gap.

Resumen

Este trabajo utiliza un sistema de vectores autorregresivos (SVAR por sus siglas en inglés) para caracterizar el impacto dinámico de la política fiscal en el ahorro nacional. El SVAR ha sido ampliamente utilizado para caracterizar el impacto de la política monetaria en la economía, sin embargo, no ha sido lo suficientemente aplicado para analizar la política fiscal. Este trabajo se centra en el impacto de la política fiscal en el ahorro nacional y los datos utilizados han sido ajustados a la inflación y a los efectos cíclicos en lugar de utilizar las estimaciones tradicionales oficiales. Nuestro análisis empírico muestra que la política fiscal tiene un impacto económico importante en el ahorro nacional, un impacto menor en el ahorro privado y un efecto negativo, pero no relevante, en la brecha del producto.

Introduction

Throughout the three last decades the relationship between fiscal policy and national saving has been in the center of many theoretical and political debates, due to the repeated crisis episodes Mexico has been trough. The 1988 crisis, which had a worldwide effect, was caused by huge deficits that the government could not afford to repay. During the Tequila Crisis in 1994, the lack of national saving contributed to unleash huge macroeconomic problems. Although many authors, like Hernández and Villagómez (2001), claim that this lack of national saving was not the cause of this crisis, they explain that it contributed to accelerate the process, leaving the country with huge liquidity constraints, and mere access to capital markets, curtailing its possibilities for growth. In the aftermath of these events, public policy makers and economic theorists suggested raising national saving levels by maintaining sound finances, identifying fiscal policy as the most important transmission channel.

It is known that public deficits reduce national saving and investment, and contribute to cause a current account deficit. One common explanation for this phenomenon is that deficits tend to raise real interest rates, which lead, in the short run, to a negative effect on balance sheets inducing individuals to consume less, invest less and save more, just like a negative wealth effect. However, in the long run, eventually, this effect on saving will be reverted by the fall on output. Most economists agree that public deficits reduce, in the long run, domestic capital stocks, increase foreign debt, thus increasing the burden that future generations will have to deal with. There are other economists that believe that public deficits do not matter at all, since they will be offset by the same amount of private saving in the long run. Thus the impact of fiscal policy on national saving is somewhat of an unsolved question in macroeconomics.

This paper uses structural vector autoregressions (SVAR) to characterize the dynamic impact of fiscal policy on national saving. SVAR´s have extensively been used to characterize the impact of monetary policy on the economy (*e. g.* Sims and Zha, 1998; Bernanke and Mihov, 1998) but have not been applied as much to analyzing fiscal policy. This paper focus on the impact of fiscal policy on national saving and the data used is adjusted for inflation and cyclical effects following the work of Amador (2002), and Pastor and Villagómez (2007), rather than using official data provided by INEGI (Instituto Nacional de Estadística, Geografía e Informática).

1. Review of the Theoretical and Empirical Literature

There are three mayor theories that explain the relationship between fiscal policy and national saving.[1] The first one, as presented in macroeconomic textbooks, predicts that increases in government purchases and/or cuts in taxes reduce national saving. This is the traditional Keynesian view (Mankiw, 2007), where consumption is independent of government purchases and consumption increases whenever taxes net of transfer payments decrease. Distinctions between temporary *versus* permanent changes in fiscal policy do not matter.

A second view, based on the finite horizon life-cycle model (LCM), finds that the impact of changes in taxes net of transfer payments depends on the expected duration of the change. Temporary changes in taxes net of transfer payments according to this view have small impact on national saving. A different version of the finite LCM is the infinite LCM, which is similar to the permanent income model if there are operative intergenerational transfers (Barro, 1974). By introducing government's budgetary constraint in this model, the Ricardian Equivalence Theorem (RET) is obtained.

This third view holds that tax cuts that leave the present value of government spending constant have no impact on national saving. In this perspective, people, realizing that tax cuts with no change in the size of government imply just a deferment of taxes, save their tax cut. Therefore, the reduction in the government budgetary surplus is exactly offset by an increase in private saving leaving national saving at the same level.

In the RET view, the impact of changes in government purchases depends on whether they are considered to be temporary or permanent. Permanent increases in government purchases as percentage of output imply a permanent increase in taxes, thus provoking private saving to increase by the same amount of the increase in government purchases. In this case, there will be no impact on national saving as percentage of output. However, a temporary increase in government purchases will cause a smaller increase in private saving hence decreasing national saving.

To sum up, holding the present value of government purchases constant, increases in taxes net of transfer payments increase national saving according to the traditional Keynesian view, and have no impact on national saving according to the RET. The LCM is between the Keynesian view and the RET, if the tax change is perceived as permanent. All three alternative views of the impact of fiscal policy on national saving hold that increases in government purchases decrease national saving, particularly in the LCM and RET, if the change in government purchases is viewed as temporary.

[1] See Hayford (2005) for this discussion.

The empirical literature has addressed the impact of fiscal policy on national saving around the world and in Mexico. This literature has focused on which kind of data and method of estimation to use, proving sometimes that the RET holds and sometimes that the Keynesian view holds.[2] Gramlich (1989) addresses the importance of data adjustments when estimating the impact of fiscal policy on national saving, including adjustments for interest payments, and business cycle corrections. In a similar context Burnside, Schmidt-Hebbel and Servén (1999) have constructed the largest saving database including 150 countries. They find, in latter studies using GMM (general method of moments) and this database, that the RET does not hold in its strict version, *i.e.* government consumption is not offset totally by private saving, claiming that this is due to the strong assumptions the RET implies a priori. Similar studies, analyzing the substitutability or complementarity between public saving and private saving in a cross-country panel, have found that privet saving is, most of the times, a non-perfect substitute for public saving.[3]

However, in other type of studies, where the country-specific impact of fiscal policy on national saving is analyzed, it is found that the Keynesian view prevails. Recently, Pradahn and Upadhyaya (2001), using an error correction framework, find that increases in budget deficits reduce national saving. Blanchard and Perotti (2002) use structural vector autoregressions to characterize the dynamic response of output to tax and government spending shocks. They find that, consistent with standard textbook macroeconomics, positive shocks to government spending and negative shocks to taxes increase output. Hayford (2005) performs a similar analysis using, rather than a constructed measure of fiscal policy as in Blanchard and Perotti, data obtained from the Congressional Budget Office (CBO).

The impact of fiscal policy on national saving and different data-adjustments has been studied for Mexico as well. There are many different methodologies for adjusting saving data in Mexico, but the main outstanding adjustments are for gains and losses due to inflation, for advanced payments of debt due to external and internal inflation and for foreign interest payments.[4] These adjustments are important since the country has experienced high inflationary processes during the past two decades. Other type of adjustments are correcting for the business cycle, and seasonal adjustments in order to obtain structural measures of the variables.[5] "The logic behind structural measures is that one problem in identifying the effects of fiscal policy on national saving is that government revenues and transfer payments respond to fluctuations in economy activity as well as potentially

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[2] This discussion is based on Burnside, Schmidt-Hebbel and Servén (1998).

[3] See Haque and Montiel (1989), Campbell and Mankiw (1991), Corbo and Schmidt-Hebbel (1991), Karras (1994), Evans and Karras (1996), Khalid (1996), and Loayza, Schmidt-Hebel and Servén (2000).

[4] See Arrau and Oks (1992), Eggerstedt *et al.* (1995), Carstens and Gil Díaz (1996), Puchet (1996), Burnside, Schmidt-Hebbel and Servén (1998), and Amador (2002).

[5] See Pastor and Villagómez (2007).

cause fluctuations in economy activity. One way to deal with this problem is to control for the effects of cyclical fluctuations by using cyclical adjusted or structural measures of fiscal policy”.[6]

Several studies have addressed the impact of fiscal policy on national saving in Mexico, finding most of the times that the RET does not hold. Gómez Oliver (1989) shows independency between public saving and private saving, while Arrau and Van Wijberger (1991) and Oks (1992) conclude the same result by showing that consumers perceive public debt as wealth. Corbo and Schmidt-Hebbel (1992) obtain this result by showing the existence of consumer’s liquidity constraints.

However, other studies find that the RET holds partially, *i.e.* government purchases are not totally offset by private saving. Buira (1990) analyzes the contribution of its variables to the fall of national saving, finding private saving results to be the second most important variable, explaining 35% of the decrease. Burnside, Schmidt-Hebbel and Servén (1998) find that public saving has a negative and significant impact on private saving. Finally, the most recent study, made by Burnside (2000), using structural vector autoregressions (SVAR), finds that positive shocks on the world oil price, on the monetary policy of the U.S. and on the tax revenues of the Mexican government, have a negative effect on the Mexican private saving rate, while positive shocks on government consumption-innovations and on the peso depreciation rate have positive effect.

2. Variables and Methodology

The variables included in the analysis are the adjusted primary structural surplus[7] as a percentage of potential GDP, the output gap, and adjusted national[8] and private saving as a percentage of actual real GDP.

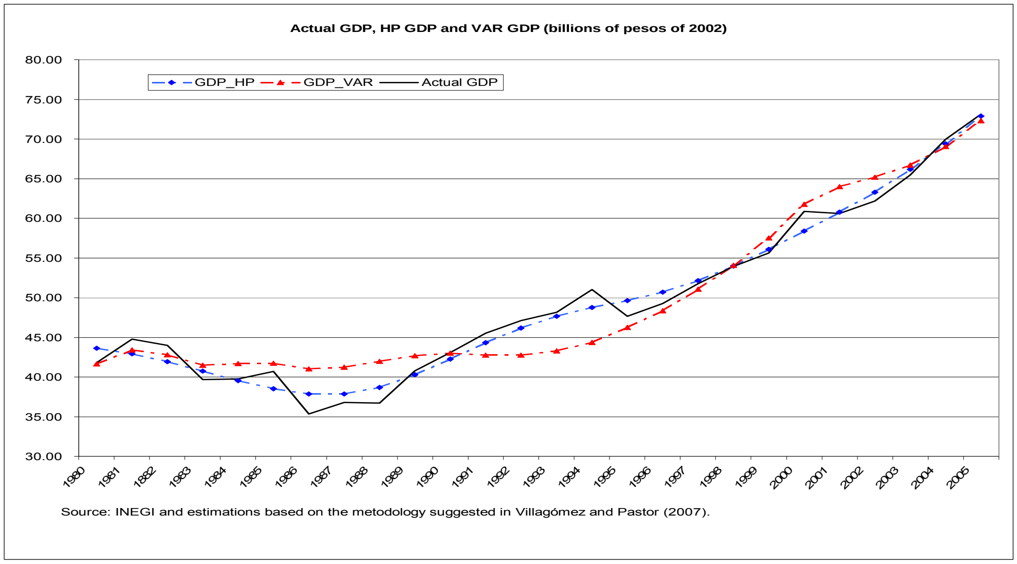
The potential GDP is what an economy can produce in a determined period of time without causing destabilizing inflationary pressures. Two measures of potential GDP were used in this study, one estimated trough the Hodrick-Prescott filter and the other trough a vector autoregressive model (VAR), following the discussion presented in Pastor and Villagómez (2007). As mentioned before, the reason for using potential GDP is to maintain the structural character of the primary surplus in order to avoid the series to respond to fluctuations in economy activity as well as to potentially cause fluctuations in economy activity. Variables taken as a percentage of these two measures of potential GDP were denoted with the ending _HP or _VAR.

[6] Hayford (2005), pp. 983.

[7] The primary surplus includes the public owned sector and leaves out the interest payments. Surplus is used instead of deficit because of ease of interpretation.

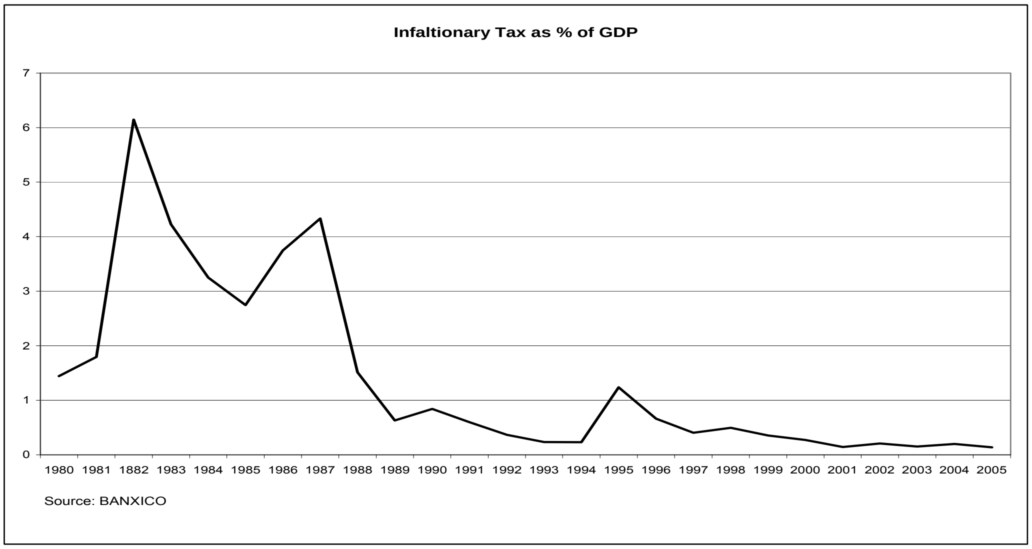
[8] In this paper the concept of national saving is what an economy saves inside its boundaries, without distinguishing between foreign and domestic saving.

Graph 1



Three adjustments were performed; following the discussion presented in Amador (2002), due to the high-inflation periods the country has been trough. The first adjustment was the inflation tax, which refers to the value loss of money due to inflation. When the economy goes trough a period of high inflation, money loses its purchasing power in terms of goods it can buy, although the nominal amount remains the same. This adjustment takes into account that the government can finance its expenditures by printing money; this was the case of Mexico before the Salinas period. This tax is estimated by multiplying the monetary base times the inflation of the corresponding period. This adjustment accounts for 6, 4.2 and 1.3% of annual GDP, when inflation reached 75% in 1982, 110% in 1988 and 32% in 1995 respectively (Graph 2).

Graph 2



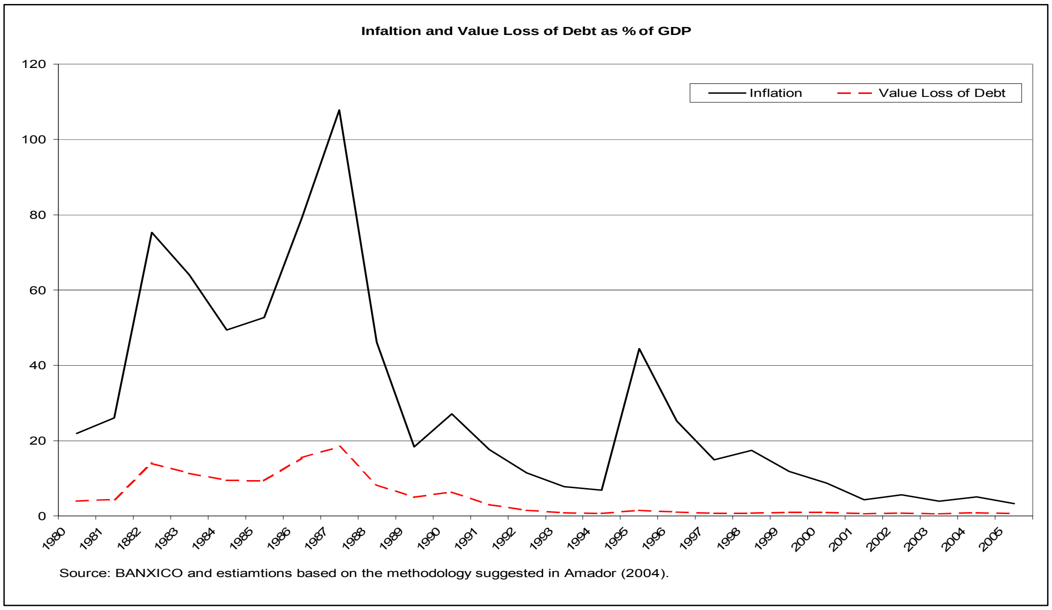
The second adjustment was for the value loss of internal and external debt, due to internal and external inflation, respectively. The spikes shown in Graph 3 correspond to the inflation in 1982 and 1987, where the value loss of debt accounted for 11.4 and 20% of annual GDP, respectively. The value loss of debt was calculated assuming that all debt was contracted with the U.S.[9]

The third adjustment was for capital flight. The capital flight is obtained by an indirect method, which consists in adding the debt flow and the FDI and subtracting the current account balance, the change in international reserves and the change in public assets abroad. This adjustment assumes that the debt flow and the FDI should finance the current account deficit or the accumulation of public reserves. The residual of these transfers is thus the capital flight, meaning, when positive, that capital is going out of the country or, when negative, that capital is flowing into the country. Finally, interest on Mexican assets held abroad are estimated with a weighted return rate and then added to this residual.[10]

[9] This is not true in reality; however, Amador suggests that this is a good approximation fore the real value loss, since most of the debt has been contracted with the U.S. and the rest with European countries and JAPSn, which have similar rate of inflation.

[10] For a more detailed explanation see Amador (2002).

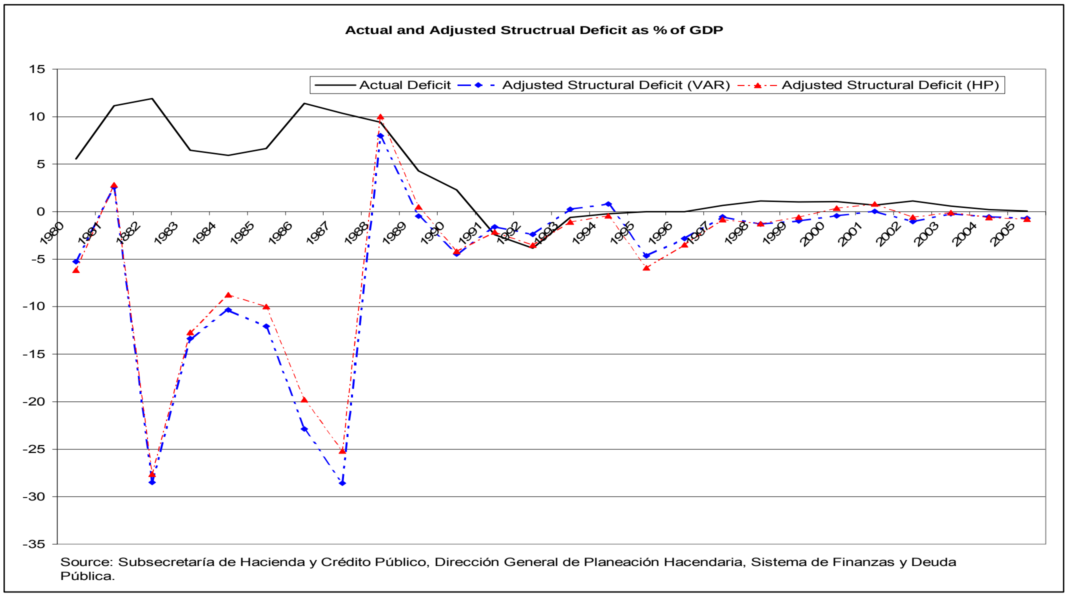
Graph 3



Primary structural surplus[11] is obtained by taking the difference between the budgetary income and expenses, adjusting the fiscal component of the budgetary income. This adjustment means multiplying the tax-income times the potential GDP to actual GDP ratio powered to the tax-income elasticity with regard to the actual GDP. To obtain the adjusted primary structural surplus (SUPA_HP or SUPA_VAR) as a percentage of potential GDP the inflation tax and the value loss of debt are added. In this case, just as with the traditional primary structural surplus, the inflation tax has to be adjusted by multiplying it times the potential GDP to actual GDP ratio powered to its elasticity with regard to the actual real GDP (Graph 4).

[11] Data was obtained from SHCP.

Graph 4



National saving was calculated as the difference between total saving and foreign saving. Total saving is the sum of gross capital formation and inventories variations, while foreign saving is just measured by the current account.[12] To obtain the adjusted national saving series as a percentage of GDP (ANS), the value loss of debt and the capital flight was subtracted from foreign saving. By taking the difference between total saving and the adjusted foreign saving series, adjusted national saving results. This new series, as Graph 5 shows, presents a deeper fall than the official series due to the capital repatriation during 1988-1993.

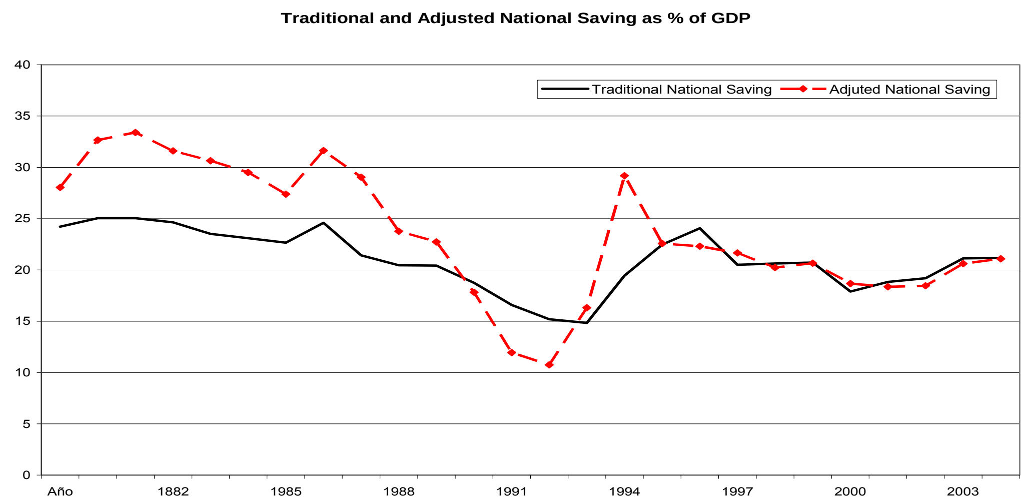
Private saving is calculated by subtracting public saving form national saving, while public saving is calculated by taking the difference between capital consumption (public investment) and the economic deficit[13] (Graph 6). To obtain the adjusted private series the difference between adjusted national saving and adjusted public saving is taken. Adjusted public saving is calculated by adding the inflation tax and the value loss of debt. The mayor difference between the official series and the adjusted series is, as Graph 7 shows, that the adjusted private saving series as percentage of GDP (APS) has

[12] All saving series were obtained from INEGI (Instituto Nacional de Estadística, Geografía e Informática).

[13] The economic deficit includes the public sector but does not discount interest payments as the primary deficit. Capital consumption is the sum of three components: consumption of physic investment, consumption of financial investment, and inside the net transference category (to other states and public sector dependencies) capital consumption.

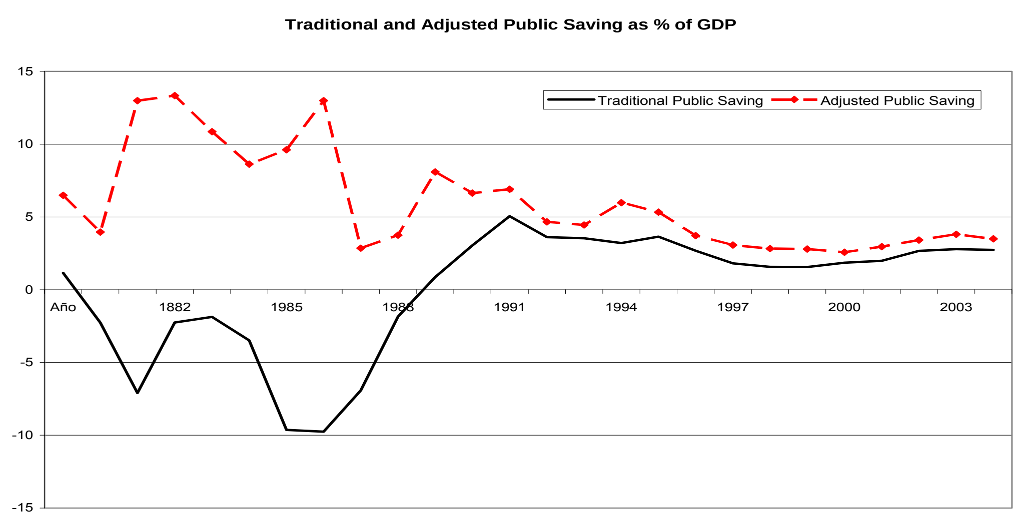
a deeper fall before the 1994 crisis, taking values of 6.18 and 5.19 (annual percentage) during the two years before the crisis.

Graph 5



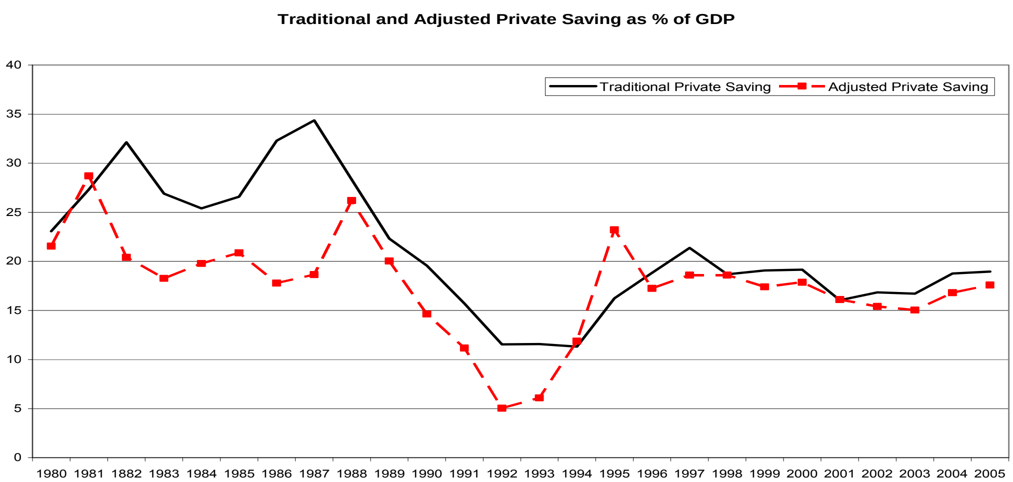
Source: INEGI and estimations based on the methodology suggested in Amador (2004).

Graph 6



Source: INEGI and estimations based on the methodology suggested in Amador (2004).

Graph 7

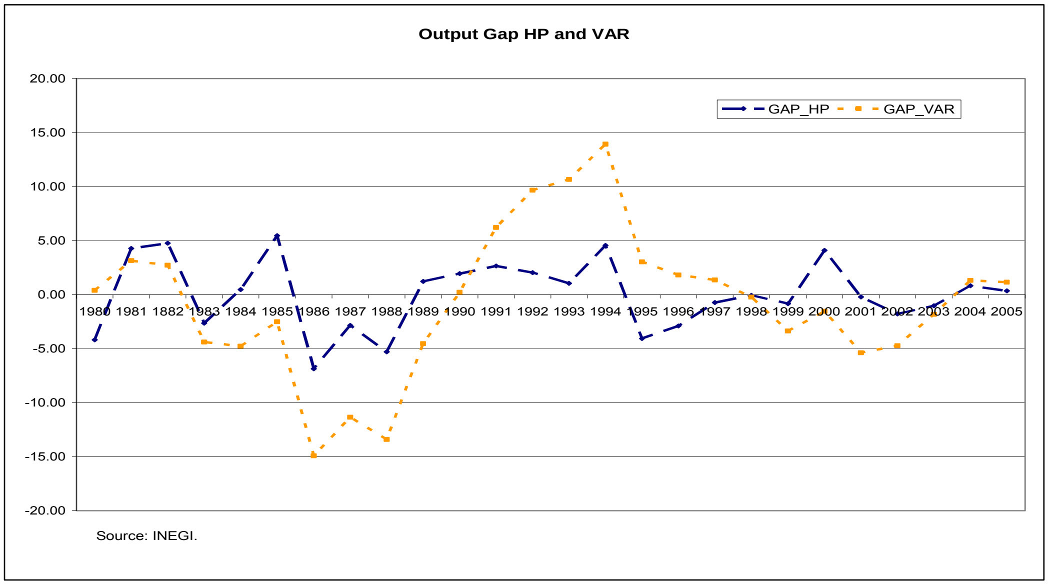


Source: INEGI and estimations based on the methodology suggested in Amador (2004).

Finally, the output gap is calculated as the deviation of actual GDP from potential GDP (Graph 8). This variable indicates if the economy is in an expansive or recessive phase. The output gap is included in the analysis because this variable represents the stabilization motive of fiscal policy; it reflects the trade-off between having mayor surpluses, which improve the budgetary sustainability, and having a negative impact in the short run on the output gap. There are two measures of output gap; one taking the HP-potential GDP, and the other taking the VAR-potential GDP, these two measures were denoted as GAP_HP and GAP_VAR, respectively.

Summing up, there are three mayor adjustments made on the series; the inflation tax, the value loss of debt and the capital flight. Adjusted primary structural surplus is calculated by correcting for the inflation tax and the value loss of debt, adjusted national saving was obtained by correcting foreign saving for the value loss of debt and the capital flight, while adjusted private saving was obtained as the residual of adjusted national saving and adjusted public saving, the latter being corrected by the inflation tax and the value loss of debt. The output gap is included because this variable represents the stabilization motive of fiscal policy. Variables measured as percentage of potential GDP were denoted with the endings HP and VAR.

Graph 8



3. Estimations and Results

As percentages of either potential GDP or actual GDP, all variables are bounded between 0 and 100% and hence on logical grounds are stationary variables. However, Table 1 shows some different results. Three Unit Root tests were performed: the Augmented Dickey-Fuller test (ADF), the Phillips Perron test (PP),[14] and the Kwiatkowski-Phillips-Schmidt-Shin test (KPSS). The first two tests have as null that the series are non-stationary, while the third one has the null of stationarity. The first two tests were proved against three alternative hypotheses; the real data generating process (DGP) includes a constant and a deterministic trend (model A), includes only a constant (model B) or neither (model C). ημ and ηζ denote the null hypothesis for the KPSS test, where ημ stands for level-stationarity and ηζ for trend-stationarity. The tests were performed in levels and first differences in order to determine the integration order.

Table 1 indicates that, while logically ANS, APS, SUPA_HP, SUPA_VAR, GAP_HP and GAP_VAR are bounded below by 0% and above by 100% within the sample period, only their differences and the level of GAP_HP appear to be stationary under the three tests and their models; however, the levels of ANS,

[14] The PP test is similar to the ADF test; however it adjusts for the lung run variance of the series. Generally if the non-stationarity of the series is coming form the lags of the exogenous variable it is recommended using the ADF test.

APS and GAP_VAR are stationary as well if only the PP and KPSS tests are taken into account. The only two series that appear as non stationary, at least under two tests, are SUPA_VAR and SUPA_HP. This result may be due to outliers in the series or structural changes in the sample period, which are not taken into account by these tests. Comparing Figure 1 and Figure 2, in Appendix C, it is shown that by taking the first differences of these two series one may be over differentiating them.

Table 1. Unit Root Tests

Variable	ADF			PP			KPSS	
	A	B	C	A	B	C	ημ	ηζ
aiat	-2.421 (5)	-1.941 (5)	-0.667 (5)	**-5.564 (7)**	**-4.498 (7)**	-0.780 (3)	**0.586 (8)**	0.100 (8)
Δaiat	**-4.637 (4)**	**-4.670 (4)**	**-4.690 (4)**	**-17.909 (4)**	**-18.018 (4)**	**-18.124 (4)**	0.014 (0)	0.013 (0)
apat	-2.343 (3)	-2.294 (3)	-0.683 (3)	**-6.491 (7)**	**-6.349 (7)**	-1.249 (7)	0.206 (8)	0.089 (8)
Δapat	**-10.674 (2)**	**-10.728 (2)**	**-10.783 (2)**	**-16.708 (2)**	**-16.802 (2)**	**-16.896 (2)**	0.038 (5)	0.032 (5)
supa_hpt	**-3.873 (4)**	-2.147 (0)	-1.708 (0)	-3.309 (3)	-2.213(4)	-1.686 (3)	**0.809 (8)**	0.107 (7)
Δsupa_hpt	**-4.672 (8)**	**-4.731 (8)**	**-4.729 (8)**	**-9.394 (1)**	**-9.434 (1)**	**-9.478 (1)**	0.049 (1)	0.042 (1)
supa_vart	**-3.723 (4)**	-2.107 (0)	-1.681 (0)	-3.230 (3)	-2.167 (4)	-1.657 (3)	**0.788 (8)**	0.106 (8)
Δsupa_vart	**-4.605 (8)**	**-4.664 (8)**	**-4.663 (8)**	**-9.375 (1)**	**-9.413 (1)**	**-9.458 (1)**	0.053 (1)	0.045 (1)
gap_hpt	**-4.556 (8)**	**-4.659 (8)**	**-4.690 (8)**	**-6.081 (7)**	**-6.119 (7)**	**-6.151 (7)**	0.041 (6)	0.041 (6)
Δgap_hpt	**-5.315 (8)**	**-5.297 (8)**	**-5.320 (8)**	**-15.996 (4)**	**-16.071 (4)**	**-16.149 (4)**	0.056 (9)	0.046 (9)
gap_vart	-3.089 (8)	-2.884 (8)	**-2.836 (8)**	-3.300 (9)	**-3.261 (9)**	**-3.253 (9)**	0.151 (8)	0.112 (8)
Δgap_vart	-2.895 (8)	-2.862 (8)	**-2.876 (8)**	**-16.080 (6)**	**-16.141 (6)**	**-16.226 (6)**	0.076 (9)	0.074 (9)

Note: Test statistics in bold indicates a rejection of the null hypothesis. Critical values at 5% significance level for the Augmented Dickey–Fuller and Phillips–Perron tests for a size T ¼ 100 are □3.45 including constant and trend (model A), □2.89 including constant (model B) and □1.95 without constant and trend (model C) (Maddala and Kim, 1998, p. 64). Zm and Zt is the KPSS test for the null hypothesis of stationarity around a level and deterministic linear trend, respectively. Both tests are calculated with a lag window size equal to 5. The 5% critical values for the two tests are 0.463 and 0.146, respectively (Kwiatkowsky et al., 1992, p. 166). Period: 1965–2001.

This could bias or provide inefficient estimates while doing the empirical analysis using the first differences of these series. However, in the empirical results reported below both the levels and the first differences are reported.

This paper uses structural vector autoregressions (SVAR) to characterize the dynamic impact of fiscal policy on national saving. The SVAR´s are estimated using quarterly data covering the period from the first quarter of 1980 to the first quarter of 2006, adding a total of 105 observations. The general specification of the structural form of the model is given by:

$$AX_t = B(L)X_{t-1} + \varepsilon_t \tag{1}$$

Where X_t is an *(nx1)* vector of endogenous variables, *A* is *(nxn)* parameter matrix with ones on the main diagonal and the off diagonal elements capturing the contemporaneous relationships between the variables, *B(L)* is polynomial matrix in the lag operator, and $_t$ is an *(nx1)* vector of structural shocks. The standard or reduced form VAR is given by:

$$X_t = D(L)X_{t-1} + \mu_t \tag{2}$$

Where $\mu_t = A^{-1}\varepsilon_t$. Given the estimates of the forecast errors of the standard form VAR $_t$, a necessary condition for identification of the structural shocks ε_t can be obtained by imposing *n(n-1)/2* restrictions on the *A* matrix.[15]

The SVAR was estimated for eight sets of variables, which are characterized depending on if the variables were taken as percentage of one of the two potential GDP´s (endings HP or VAR), if adjusted national (ANS) or adjusted private saving (APS) was used in the specification, or if the variables were in levels or in first differences. The private saving specification is included in order to control for the direct effect of fiscal policy on this variable, which in turn affects national saving.

The models were specified as follows: each model has two versions, in levels and in first differences. There are two models: Model 1 includes adjusted national saving (ANS), adjusted private saving (APS), and variables as percentage of the potential GDP estimated by the HP-filter. Model 2 includes the same variables but as percentage of potential GDP estimated by a VAR model. The variables were ordered from the most exogenous to the most endogenous, this is: first, the adjusted structural surplus, then the output gap and finally one of both adjusted savings. Written as a matrix $X_t^{'} = [a_t, b_t, c_t]$, (where *a* is the structural surplus, *b* is the output gap, and *c* is adjusted national saving or adjusted private saving), where $\varepsilon_t^{'} = [\varepsilon_t^a, \varepsilon_t^b, \varepsilon_t^c]$ are the corresponding structural shocks.

For the purpose of discussing identification and without loss of generality, rewriting equation (2) as:

$$\begin{bmatrix} 1 & d_{12} & d_{13} \\ d_{21} & 1 & d_{23} \\ d_{31} & d_{32} & 1 \end{bmatrix} \times \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} \varepsilon_t^a \\ \varepsilon_t^b \\ \varepsilon_t^c \end{bmatrix} \tag{3}$$

The necessary condition to just identify the structural shocks is to impose restrictions on three of the elements of the *A* matrix. “Given the inside lags of fiscal policy, Blanchard and Perotti (2002) argue that discretionary changes in fiscal policy will not respond contemporaneously to the economy”.[16] This implies that $d_{12}=d_{13}=0$ leaving one additional restriction to be imposed. One possibility is to set $d_{21}=0$, which implies that national saving does not depend contemporaneously on the output gap, an assumption that is difficult to defend. Perhaps, a more plausible alternative is to set $d_{23}=0$, which implies that the output gap does not depend contemporaneously on national saving, for example to shocks to consumption. One possible defense for this restriction is that the impact of shocks to national saving, for example due to

[15] See Enders (1995) or Lütkepohl (2002).

[16] Hayford (2005), pp. 985.

shocks to consumption, are initially absorbed by changes in inventories and only later impact the output gap.

Figure 1 shows the impulse-response function for Model 1. The VAR was estimated with constant and linear trend. The Akaike Information criterion suggested six lags for levels and five for first differences. The results show that adjusted national saving as percentage of actual GDP (ANS) responds positively to positive shock of the adjusted structural surplus as percentage of potential GDP measured by the HP-filter (SUPA_HP). The coefficients for this effect are significant at a 5% level (see Appendix A).

A negative effect on the output gap due to a positive shock to SUPA_HP can be observed as well. This would indicate that when the adjusted structural surplus increases output falls, this is logical since countercyclical government policies reduce expenditures and hence make output fall. However, the coefficient of this effect is non significant at a 5% level.

When adjusted private saving as percent of actual GDP (APS) is placed in the specification instead of adjusted national saving as percent of actual GDP (ANS), a quite interesting result appears. A positive shock to the adjusted structural surplus as percentage of GDP measured by the HP-filter has no effect on adjusted private saving as percentage of actual GDP. The coefficient of this effect is non significant at a 5% level (see Appendix A).

This result combined with the one obtained for the adjusted national saving would support the traditional textbook Keynesian view, where consumption and hence private saving are independent of government purchases and national saving increases whenever taxes net of transfer payments increase or government expenditure falls. These results are similar to those found in Gómez Oliver (1989), Arrau and Van Wijberger (1991), Oks (1992), Corbo and Schmidt-Hebbel (1992), who do not apply this kind of econometrical technique. However, it is contrasting to the results found in Buira (1994), Burnside, Schmidt-Hebbel and Servén (1998), and Burnside (2000), who do apply similar econometrical techniques but find that the RET holds in a partial manner. Those authors who claim that the RET does not hold argue that the assumptions made for this theory to hold are too strong and don't apply in countries like Mexico. Some of these assumptions are the non-existence of liquidity constraints, and the existence of rational farsighted individuals, which internalize the government budget restriction. The first assumption does not hold for Mexico without doubt, the second one is less credible as well, since many people do not think about the implication of intertemporal government budget restriction compliance.

Finally, one last interesting result is found; positive shocks to the output gap have zero effect on private saving, suggesting that the wealth effect caused due to an increase in income is netted out by the substitution effect, the coefficients for this effects are non significant at a 5% level. Using the first differences instead of levels reveals in Figure 2 that all effects are non significant and near zero, this could be because the series are stationary by taking their first differences or because estimations are misleading due to over differentiation of the series.

Figure 3 and Figure 4 show the results obtained for the variables measured as percentage of potential GDP estimated by the VAR model in levels and in first differences. The results are very similar to those obtained in the last model, because scaling the variables by one or the other potential GDP does not have great impact on the final results. Graph 1 shows both potential GDP´s and actual GDP; there is not great difference between both potential GDP´s, the only different thing is that the potential GDP estimated by the VAR model holds a more constant potential GDP-actual GDP ratio.

Figure 1. Adjusted National Saving and Adjusted Private Saving (HP) in Levels

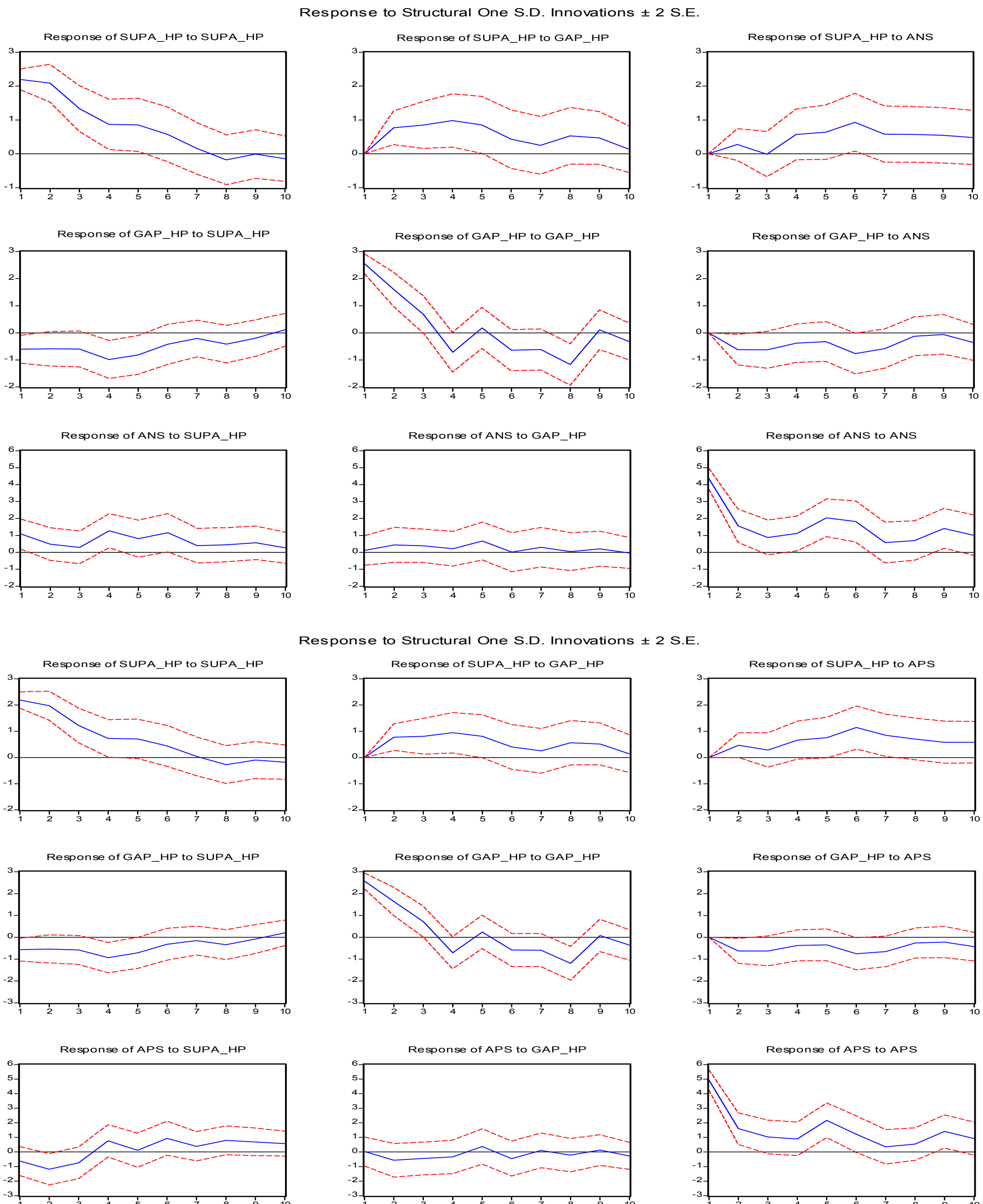


Figure 2. Adjusted National Saving and Adjusted Private Saving (HP) in First Differences

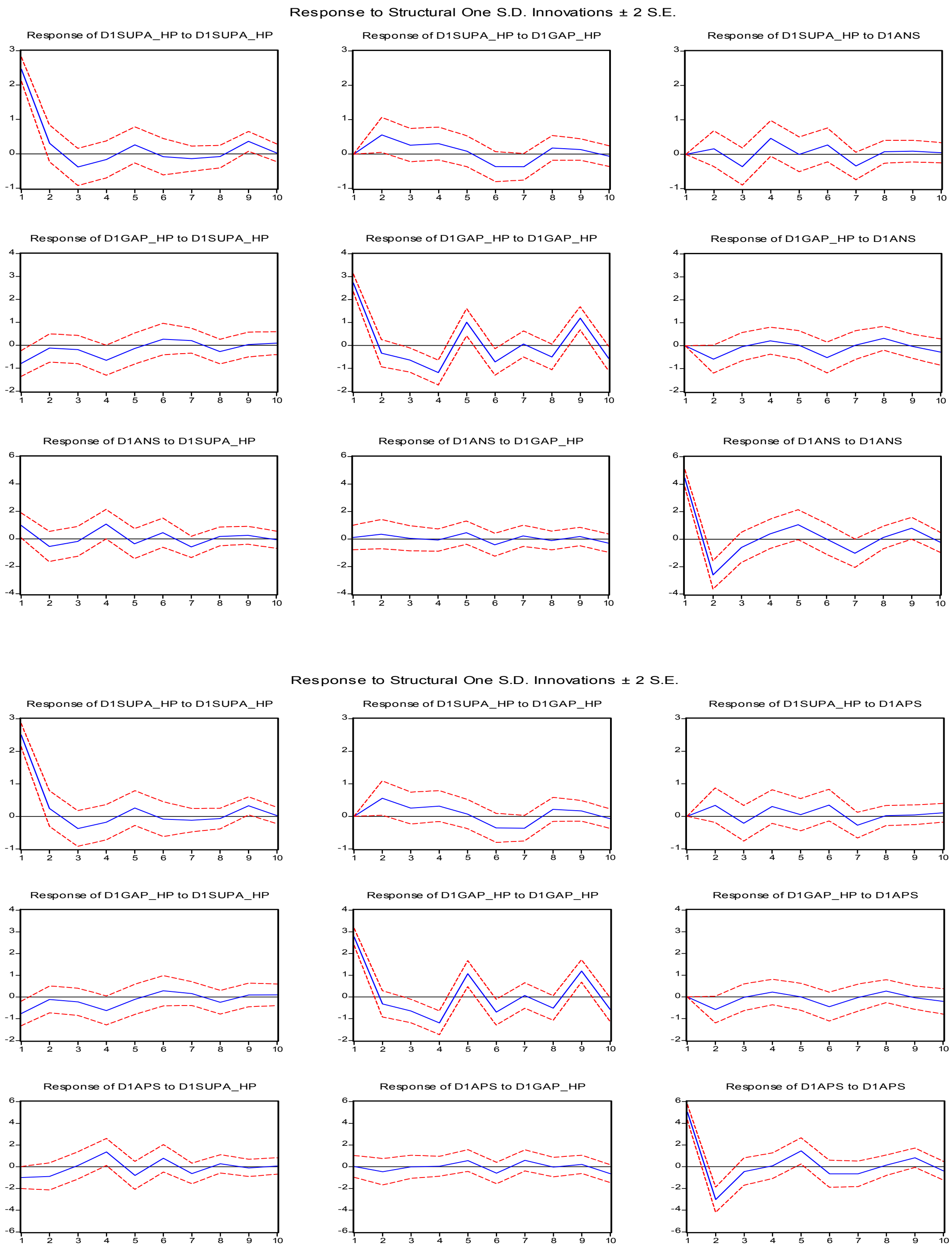
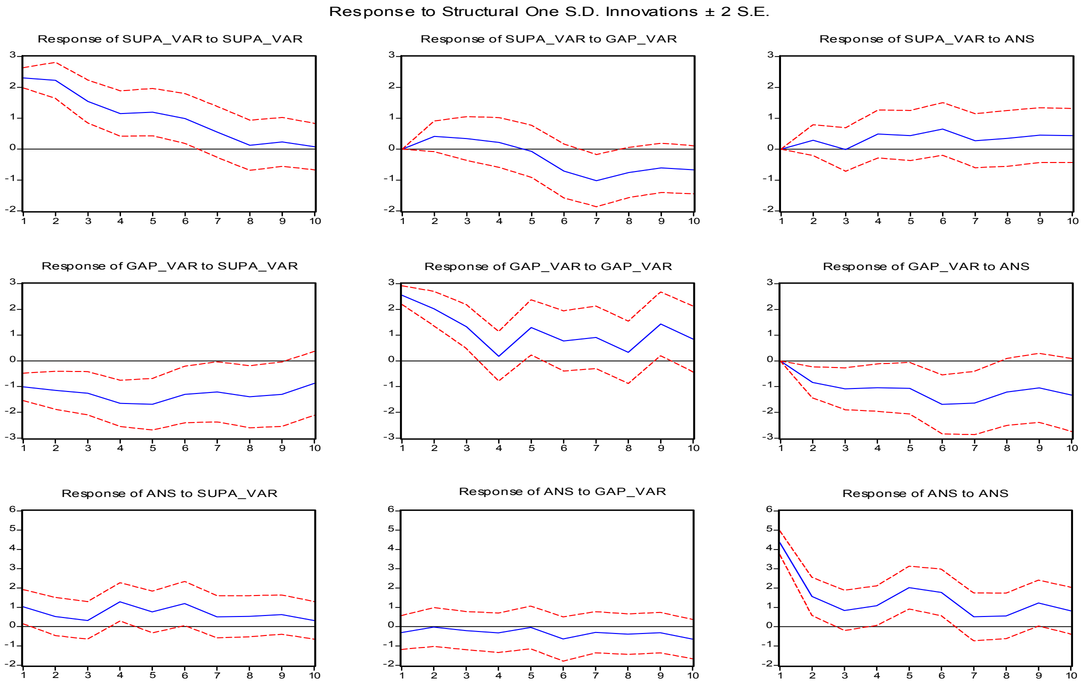


Figure 3. Adjusted National Saving and Adjusted Private Saving (VAR) in Levels



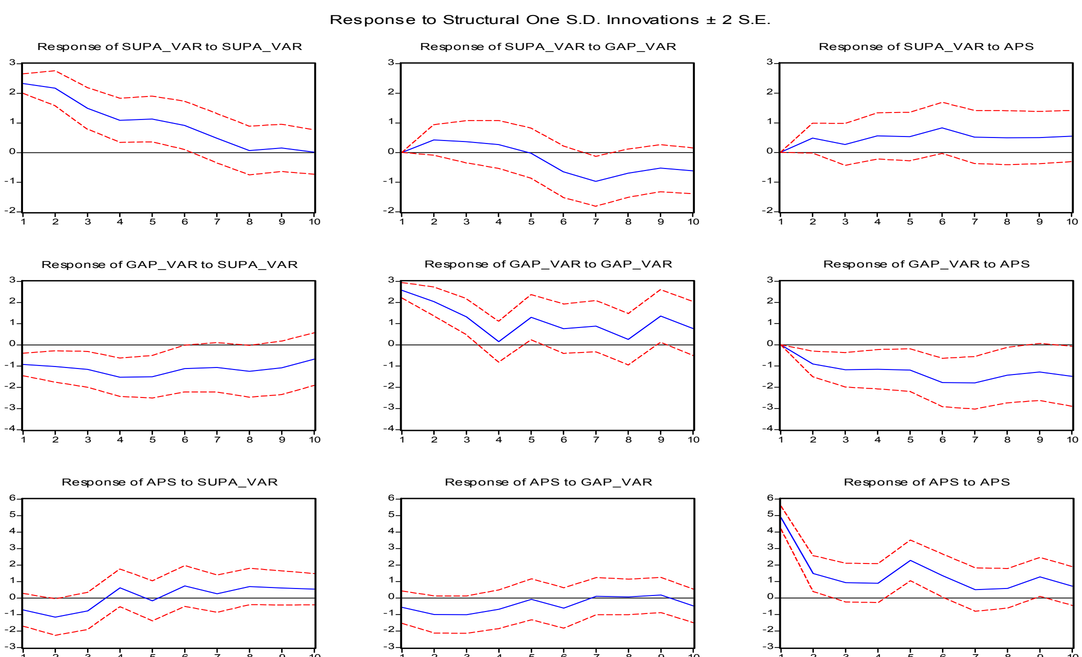
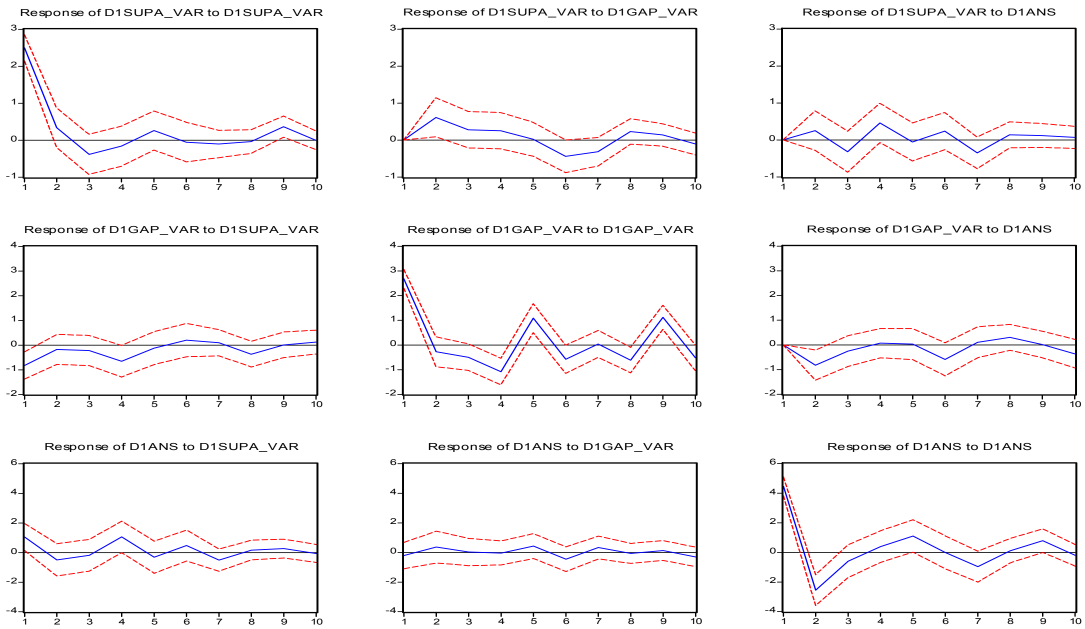
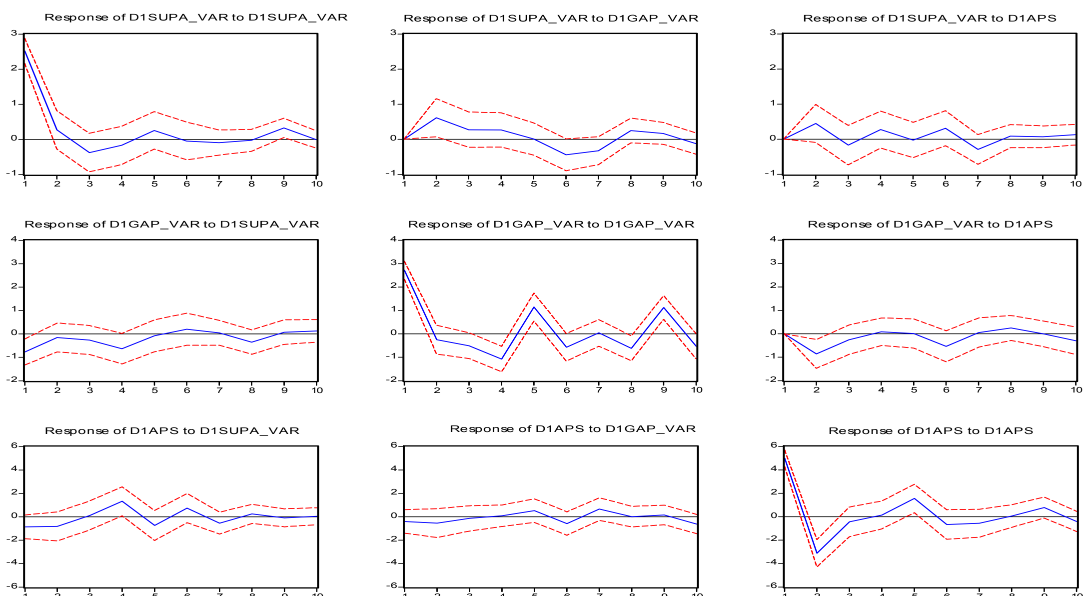


Figure 4. Adjusted National Saving and Adjusted Private Saving (VAR) in First Differences

Response to Structural One S.D. Innovations ± 2 S.E.



Response to Structural One S.D. Innovations ± 2 S.E.



Conclusions

The empirical analysis of this paper shows that fiscal policy has an important economic impact on national saving, any impact on private saving and a negative but non-significant effect on the output gap. This is consistent with the textbook Keynesian view, and with results obtained by Pradahn and Upadhyaya (2001), Blanchard and Perotti (2002), Hayford (2005) in United States, and Gómez Oliver (1989), Arrau and Van Wijberger (1991), Oks (1992), Corbo and Schmidt-Hebbel (1992) in Mexico. However, it is important to keep in mind that the estimation was made with adjusted series. Assuming that the adjustments are correct and relevant for the Mexican case, two major conclusions which affect policy formulation could be drawn. The first is that substitution effects facing a positive shock on the output gap net wealth effects out. The second is that adjusted national saving responds in a positive manner and adjusted private saving does not respond to positive shocks to the adjusted structural surplus. The policy formulation recommendation for the Mexican case that follows is that since fiscal policy and the output gap have no effect on private saving, the only way to increase national saving is to formulate policies that improve the government budgetary position. Throughout Mexican history, especially during the 1994 crisis, the country has suffered the consequences of low levels of national saving. High levels of national saving assure enough liquidity for bad times, and release the country of new and old debt commitments.

Recently, in the context of debt sustainability and official debt targets a new discussion has arisen. The response of actual public saving levels to the previous debt levels has shown different results for the EU. For further research it would be recommended to analyze this kind of relationship for the Mexican case in order to evaluate government's performance by perusing these debt targets.

Appendix

Appendix A

Model Ae=Bu where E[uu´]=1
Tipe of restriction:short run pattern matrix

A=

1	0	0
d(1)	1	0
d(2)	d(3)	1

B=

d(4)	0	0
0	d(5)	0
0	0	d(6)

	Model 1 (Levels)							
	SUPA_HP_ANS				SUPA_HP_APS			
	Coefficient	Std.Err.	z-Statistic	Prob.	Coefficient	Std.Err.	z-Statistic	Prob.
d(1)	0.276	0.116	2.374	0.018	0.259	0.118	2.191	0.029
d(2)	-0.504	0.204	-2.468	0.014	**0.283**	0.232	1.222	0.222
d(3)	**-0.049**	0.172	-0.283	0.777	**-0.013**	0.193	-0.070	0.944
d(4)	2.196	0.156	14.071	0.000	2.188	0.155	14.071	0.000
d(5)	2.540	0.180	14.071	0.000	2.570	0.183	14.071	0.000
d(6)	4.340	0.308	14.071	0.000	4.929	0.350	14.071	0.000

	Model 2 (Levels)							
	SUPA_VAR_ANS				SUPA_VAR_APS			
	Coefficient	Std.Err.	z-Statistic	Prob.	Coefficient	Std.Err.	z-Statistic	Prob.
d(1)	0.438	0.111	3.935	0.000	0.397	0.111	3.567	0.000
d(2)	-0.396	0.204	-1.940	0.052	**0.393**	0.224	1.755	0.079
d(3)	**0.119**	0.171	0.694	0.488	**0.216**	0.190	1.136	0.256
d(4)	2.306	0.164	14.071	0.000	2.327	0.165	14.071	0.000
d(5)	2.554	0.182	14.071	0.000	2.575	0.183	14.071	0.000
d(6)	4.352	0.309	14.071	0.000	4.876	0.347	14.071	0.000

	Model 1 (First Differences)							
	D1SUPA_HP_ANS				D1SUPA_HP_APS			
	Coefficient	Std.Err.	z-Statistic	Prob.	Coefficient	Std.Err.	z-Statistic	Prob.
d(1)	0.319	0.112	2.856	0.004	0.303	0.111	2.728	0.006
d(2)	-0.415	0.188	-2.208	0.027	**0.393**	0.209	1.885	0.059
d(3)	**-0.044**	0.163	-0.268	0.789	**-0.009**	0.182	-0.047	0.962
d(4)	2.467	0.175	14.071	0.000	2.501	0.178	14.071	0.000
d(5)	2.740	0.195	14.071	0.000	2.767	0.197	14.071	0.000
d(6)	4.435	0.315	14.071	0.000	5.007	0.356	14.071	0.000

	Model 2 (First Differences)							
	D1SUPA_VAR_ANS				D1SUPA_VAR_APS			
	Coefficient	Std.Err.	z-Statistic	Prob.	Coefficient	Std.Err.	z-Statistic	Prob.
d(1)	0.331	0.108	3.063	0.002	0.306	0.108	2.827	0.005
d(2)	-0.391	0.187	-2.085	0.037	**0.388**	0.206	1.880	0.060
d(3)	**0.081**	0.167	0.484	0.629	**0.151**	0.184	0.820	0.412
d(4)	2.496	0.177	14.071	0.000	2.521	0.179	14.071	0.000
d(5)	2.683	0.191	14.071	0.000	2.714	0.193	14.071	0.000
d(6)	4.447	0.316	14.071	0.000	4.979	0.354	14.071	0.000

NOTE: The coefficients in bold are significant at a 5% level. The signs of the coefficients are to be read oppsite wise.

Appendix B

Model 1

Response	Positive Shock on: SUPA_HP	GAP_HP	ANS
SUPA_HP	+	+	0
GAP_HP	-	0	-
ANS	+	0	+

Response	Positive Shock on: D1SUPA_HP	D1GAP_HP	D1ANS
D1SUPA_HP	0	0	0
GAP_HP	0	0	0
D1ANS	0	0	0

Response	Positive Shock on: SUPA_HP	GAP_HP	APS
SUPA_HP	+	+	+
GAP_HP	-	0	-
APS	0	0	+

Response	Positive Shock on: D1SUPA_HP	D1GAP_HP	D1APS
D1SUPA_HP	0	0	0
GAP_HP	0	0	0
D1APS	0	0	0

Model 2

Response	Positive Shock on: SUPA_VAR	GAP_VAR	ANS
SUPA_VAR	+	0	0
GAP_VAR	-	+	-
ANS	+	0	+

Response	Positive Shock on: D1SUPA_VAR	D1GAP_VAR	D1ANS
D1SUPA_VAR	0	0	0
GAP_VAR	0	0	0
D1ANS	0	0	0

Response	Positive Shock on: SUPA_VAR	GAP_VAR	APS
SUPA_VAR	+	0	+
GAP_VAR	-	+	-
APS	0	0	+

Response	Positive Shock on: D1SUPA_VAR	D1GAP_VAR	D1APS
D1SUPA_VAR	0	0	0
GAP_VAR	0	0	0
D1APS	0	0	0

Appendix C

Figure 1

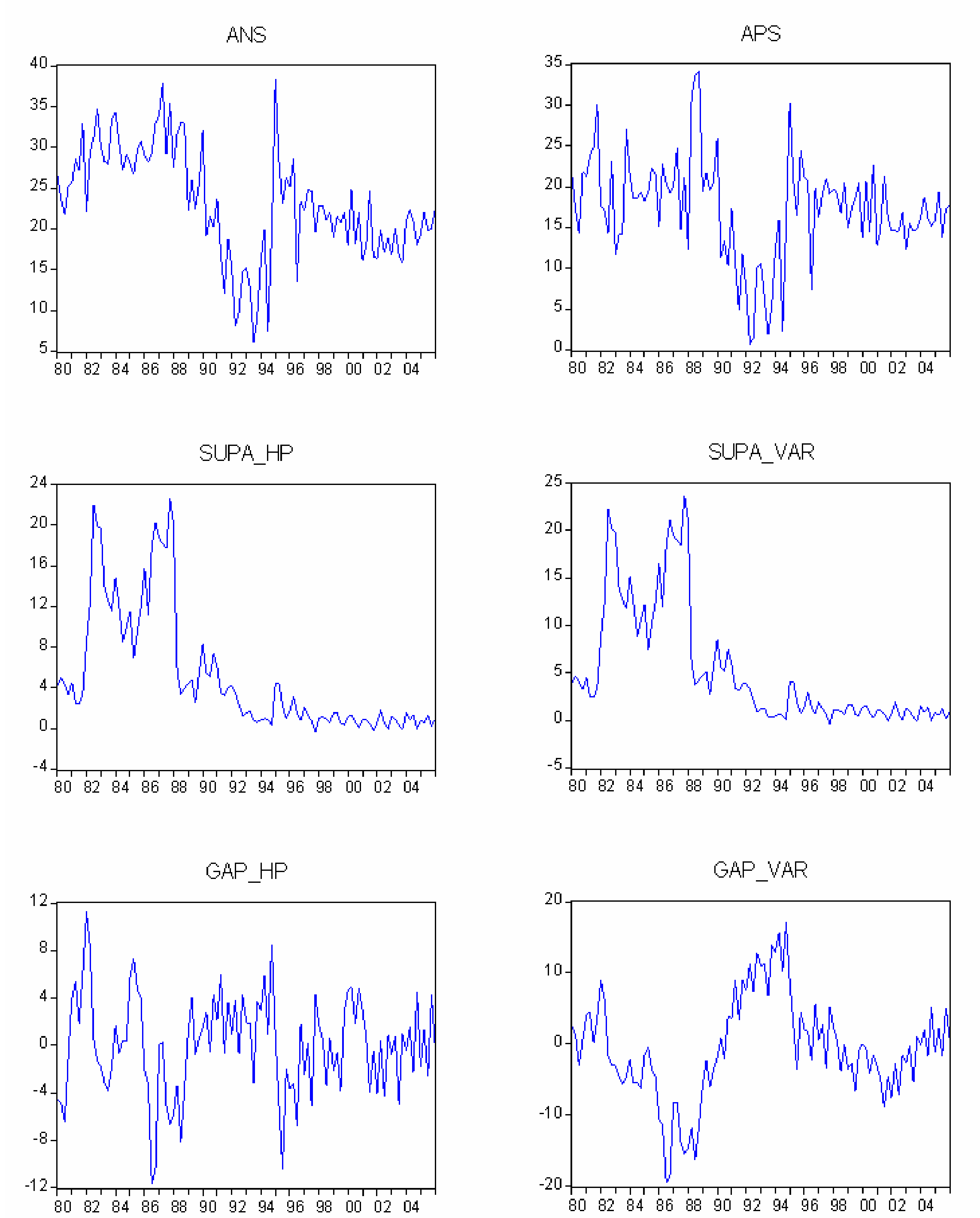
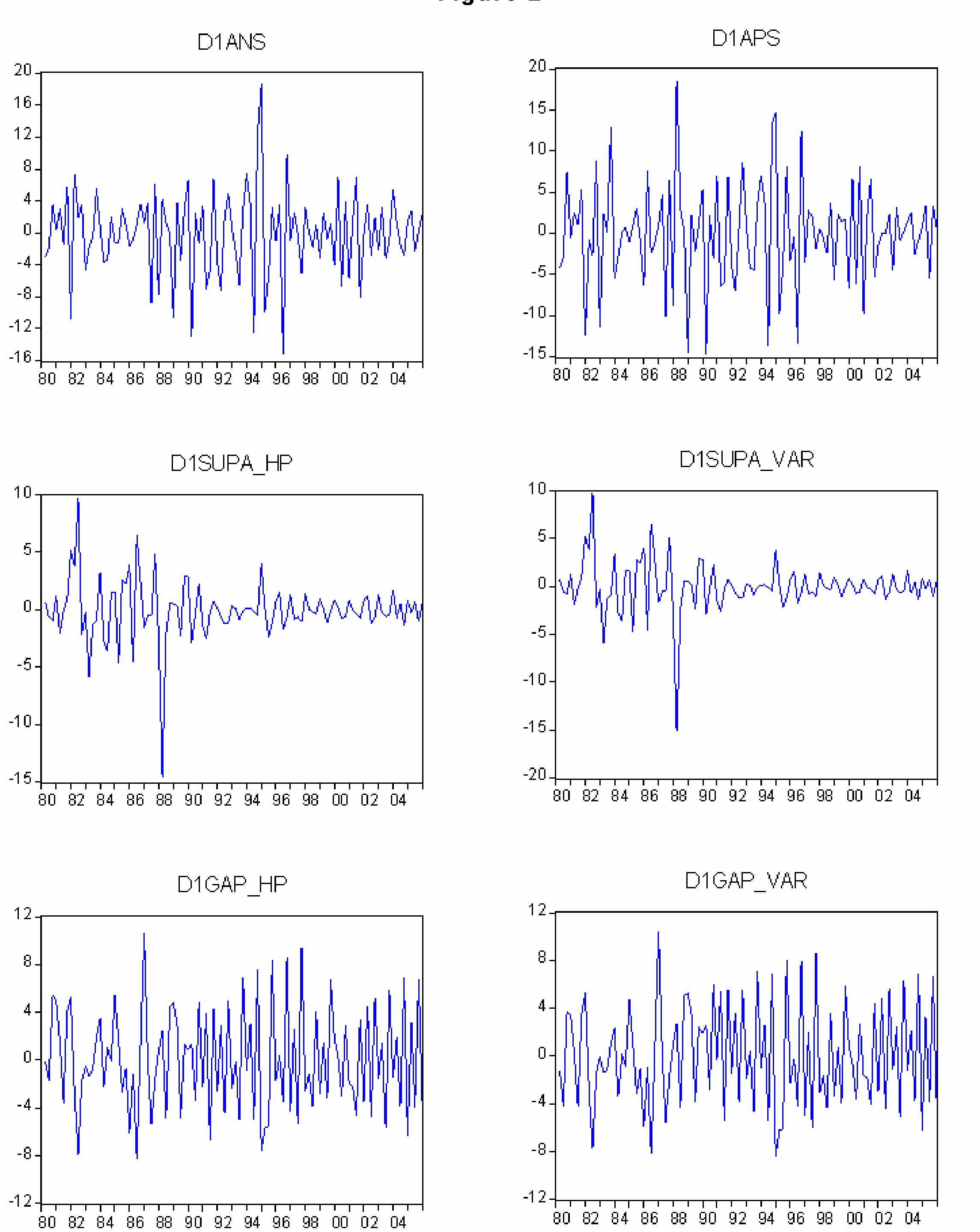


Figure 2


D1ANS
20
16
12
8
4
0
-4
-8
-12
-16
80 82 84 86 88 90 92 94 96 98 00 02 04
D1APS
20
15
10
5
0
-5
-10
-15
80 82 84 86 88 90 92 94 96 98 00 02 04
D1SUPA_HP
10
5
0
-5
-10
-15
80 82 84 86 88 90 92 94 96 98 00 02 04
D1SUPA_VAR
10
5
0
-5
-10
-15
-20
80 82 84 86 88 90 92 94 96 98 00 02 04
D1GAP_HP
12
8
4
0
-4
-8
-12
80 82 84 86 88 90 92 94 96 98 00 02 04
D1GAP_VAR
12
8
4
0
-4
-8
-12
80 82 84 86 88 90 92 94 96 98 00 02 04

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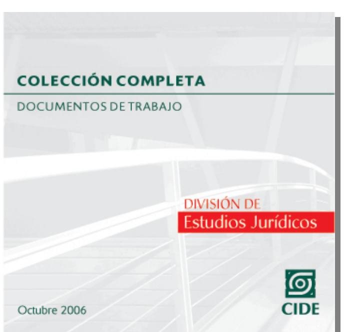

¡Próximamente! los CD de las colecciones completas de las Divisiones de Economía, Administración Pública, Estudios Internacionales y Estudios Políticos.