Are Stabilization Programs Expansionary? *

Federico Echenique [a] , Alvaro Forteza [b]

July 1998

Abstract

The empirical evidence presented in this paper casts doubts on the by now widely accepted "fact" that the exchange rate based stabilization programs are expansionary. Even though these programs were associated with output booms, no evidence of booms *caused by* the stabilization programs is found. Rather, positive external shocks seem to have caused both the output booms and the stabilization programs.

Keywords: Price stabilization; Inflation.

Journal of Economic Literature: E63; F30; F41; O54

---

* Comments by Adriana Cassoni, Maurice Obstfeld, Martín Rama, two anonymous referees from this journal, and participants in the XIV Latin American Meeting of the Econometric Society, and seminars at Aarhus University, Denmark, Gothenburg University, Sweden, and University of Vigo, Spain, were very useful in revising this paper. The usual disclaimer applies.

[a] Departamento de Economía, FCS, Universidad de la República, Uruguay, and Department of Economics, University of California at Berkeley, Fede@econ.berkeley.edu.

[b] Departamento de Economía, FCS, Universidad de la República, Uruguay. FAX (5982)481917, Alvaro@decon.edu.uy.

1. Introduction

Not long ago, the conventional macroeconomic wisdom taught that price stabilization programs cause an initial slowdown in the rate of growth of output, due to rigidities in nominal contracts (Fischer, 1988; Taylor 1980, among others). In recent years, this traditional view has been challenged. A large number of case studies and several comparative studies concluded that stabilizing from high inflation using the exchange rate as the nominal anchor is initially expansionary rather than contractionary (Kiguel and Liviatan, 1992; Végh, 1992; Reinhart and Végh, 1994; Reinhart and Végh, 1995; and Calvo and Végh, 1998; among others). According to this literature, exchange rate based stabilization (ERBS) programs cause a business cycle with an initial "boom" and a recession later. In this view, only the programs that use the quantity of money as the nominal anchor exhibit recessions from the very beginning. Easterly (1996) presents a further revision of the stylized facts associated with the stabilization programs. He presents evidence in support of the proposition that stabilization programs are always expansionary, not only in their initial phase.

The empirical proposition that price stabilization programs have systematic real effects - including domestic currency real appreciation, current account deficits and output cycles - stimulated the theoretical research. As a result, there is a growing theoretical literature aimed at identifying the mechanisms behind these stylized facts (e.g. Calvo, 1986; Helpman and Razin, 1987; Calvo and Végh, 1993; Roldós 1995a and b; Uribe, 1995).

The purpose of the present paper is to challenge the empirical

proposition that ERBS programs have been expansionary. Using data from Latin American countries, we found no evidence of output booms *caused by* the ERBS programs. Rather, external shocks explain the output booms that have been ascribed to the stabilization programs in previous studies. Besides, we present evidence that the ERBS programs were to some extent an endogenous response to the external shocks. Other things equal, Latin American governments seem to have been more willing to launch ERBS programs when the external conditions were relatively more favorable, and hence the coincidence of the booms and the stabilization programs.

Most of the empirical evidence that has been presented to support the proposition that the ERBS programs have been initially expansionary refers to Latin America. Therefore, it seems appropriate to focus on the same region to revise this hypothesis. Besides, there is no other region in the world that has experienced two and three digit annual rates of inflation for more than three decades. The stabilization policies have been at the top of the policy agenda in Latin America for all this period, and several comprehensive stabilization programs have been implemented. Hence, the region exhibits the policy variability that is necessary to identify statistical regularities. At the same time, even though Latin American countries are not homogeneous, they have been to a large extent submitted to similar external shocks. This helps to control for other sources of variation when evaluating the effects of the stabilization policies.

The identification of the episodes that should be classified as stabilization programs is not always clear. Indeed, deciding when

a program is actually in place, when it starts and when it finishes involves some degree of discretion. Easterly (1996) has recently emphasized this point, arguing that the recession-now-versus-recession-later hypothesis fails to hold, if the stabilization programs are identified using objective criterions based on inflation performance. He proposes an objective criterion for the selection of the stabilization episodes: inflation of over forty percent for two years or more followed by a period of two years or more of inflation below forty percent. Using this criterion, Easterly identifies 28 stabilization episodes in the 1960-1994 period, all over the world. He then shows that no recessions were associated with these episodes, the pattern being the same for exchange rate based and money based programs.

Even though the idea of using an objective criterion to date the stabilization programs is indeed appealing, Easterly's procedure and the results obtained are highly controversial. Above all, there seems to be a contradiction in defining the programs according to their results (the inflation rate) in order to analyze their results. There are episodes in which inflation went down mainly because of favorable external shocks, without the government having implemented a specific stabilization policy. There are also major stabilization attempts that failed to reduce inflation. This methodology biases the selection against unsuccessful programs. Hence, it is not surprising that the list of stabilization programs that emerges from Easterly's algorithm is controversial. For instance, only one stabilization program is found in Argentina in the period 1960-1994. Also, among the southern cone *tablitas,* only the Uruguayan appears in this list. So, while the point raised by Easterly cannot be dismissed, the

proposed solution looks worse than the problem it was designed to solve. The specific dating of the stabilization programs is indeed controversial, but the identification of the main stabilization attempts looks much less so, at least in Latin America in the last 30 years. Hence, we stick to the conventional list of stabilization programs (Reinhart and Végh, 1994).

The remainder of the paper is organized as follows. Section 2 presents a probit model for the ERBS programs. The analysis of the effects of the programs on GDP growth is presented in section 3. Section 4 ends the paper with some concluding remarks.

2. Explaining the ERBS programs

Given the high rates of inflation that many countries in Latin America exhibited from the sixties to the nineties, it is not surprising that several major stabilization programs were implemented in the region in this period. What is less obvious is that regional shocks conditioned the opportunities chosen to launch the programs. The ERBS programs in Latin America were roughly implemented simultaneously in several countries. A bunch of plans were implemented in the mid sixties, the *tablitas* in the late seventies, the "heterodox" plans in the mid eighties and then the plans of the late eighties and first half of the nineties. Not only were the programs launched together, they were also abandoned at the same time. Apart from contagion effects, this suggests that stabilizations were endogenous responses to a set of determinants common to various countries in the region. The analysis that follows makes this point more formally.

A probit model was estimated using panel data for the Latin American countries that implemented ERBS programs in the last three decades (see table 1). The dependent variable is a dummy variable that takes value one, if an ERBS program started in the country in that year, and 0 otherwise. The domestic explanatory variables are the lagged logarithm of inflation (LPI), the lagged logarithm of the international reserves to GDP ratio (LIR), and a dummy for parliamentary elections (PARELE), lagged two periods. The foreign explanatory variables are the percent increase in US stock prices (measured by the Standards and Poors 500 Index, SP500) and the rate of growth of GDP in industrial countries (IGDPG)(see the appendix for a description of the data).

Insert table 1

The coefficients are statistically significant at five percent at least, and exhibit the “right” signs. As to the domestic determinants, ERBS are more likely to be launched when inflation in the previous year was larger, when foreign reserves were higher, and in the second year after parliamentary elections. The first two results are natural, robust and self explanatory. The third seems to indicate that politicians are more willing to launch an ERBS during the early phase of the Congress period. Both the rate of growth of GDP in industrial countries and the return on US stocks are positively associated with the beginning of ERBS programs in Latin America. The qualitative results are robust to changes in the sample. Several interest rates in the US were also tested, but were either non significant or not robust to small changes in the sample.

These results seem to confirm that, *other things equal*, policymakers were more willing to launch ERBS programs when the international environment was relatively more favorable. It does not mean, of course, that only when facing good external conditions did Latin American governments start a stabilization program, for several domestic variables proved important in the decision. Our result is indeed consistent with the launching of some stabilization programs under unfavorable external conditions, as was the case of the Argentinian Austral plan in 1985. The external conditions were very negative for Argentina at that time, but an inflationary process that was running out of control left the government with few options (Canavese and Di Tella 1988).

3. The stabilization programs and the business cycle

The purpose of this section is to revise the empirical evidence on the business cycle associated to the ERBS programs in the light of the new "fact" raised in the previous section, namely that the ERBS programs were mostly launched under favorable external conditions.

Reinhart and Végh (1994) submit the stabilization-programs-business-cycle hypothesis to statistical scrutiny, using data from Latin America during the last three decades (1964-1993). They perform regression analysis with panel data on the seven Latin American countries that implemented stabilization programs in the period. The rate of growth of real GDP is the dependent variable and several dummies are designed to capture different stages of the stabilization programs. One such regression is reported in column 1 in table 2. E1, E2 and E3 take value one in the first,

second and third year of an ERBS program, respectively. E4 takes value one in the fourth and following years of an ERBS program. ME (for “money early”) is equal to one in the first year and ML (for “money late”) is equal to 1 in the last year of a money-based stabilization program. [1]

We detected some extreme values in our sample that significantly affected the results. According to the IMF, Brazilian real GDP grew at a rate of 23 per cent during 1965, the second year of the 1964 ERBS program. In order to avoid that the results were driven by this extreme observation, the Brazilian 1964 program was excluded from the sample. Hence, the analysis that follows is based on the five money based and eleven of the twelve exchange rate based stabilization programs implemented in Latin America since 1964 (see table A1 in the appendix for the list of programs).

The Reinhart-Végh-like regression reproduces very well the stylized business cycle that has been ascribed to the stabilization programs. In particular, an early boom and a recession later is found in the ERBS programs, while money based stabilization programs are associated with recessions from the very beginning.

However, the probit model showed that the initiation of the ERBS

[1] These are not exactly the Reinhart-Végh dummies. They included just two dummies for the ERBS programs, one for the first (“exchange early”) and one for the last year (“exchange late”). Adding the other two renders the estimation more robust, and specially increases the ability of the regression to capture the output booms, for some of them were actually visible during the second calendar year after the initiation of the ERBS programs.

programs was associated to the occurrence of particular circumstances that are likely to have an independent influence on growth. Hence, there is a potential selection bias in regression 1 of table 2, produced by the statistical association between the program dummies and the explanatory variables in our probit model.

Insert table 2

The second regression in table 2 controls for stock prices in the United States and GDP growth in industrial countries, both lagged one period, and for lagged domestic GDP growth. The first two regressors proved important in explaining the launching of ERBS programs, and are hence potential sources of bias if omitted. The inclusion of lagged GDP growth in the regression should improve the efficiency of the estimation.

The estimated coefficient associated to the second year of an ERBS program is now lower, and not significantly different from zero (at a 10 percent of confidence). Notice that industrial countries' GDP growth, and the percent increase in the US stock prices, significantly contributed to explain current GDP growth in Latin American countries. Apparently, at least part of the output booms observed in the region at the beginning of the ERBS programs could actually be ascribed to the external shocks.

The lack of robustness of the early boom is also apparent from the results of a sensitivity analysis along the lines of Leamer (1985), and Levine and Renelt (1995). The sensitivity of the estimations of the effects of the programs is analyzed running regressions that include the program dummies, the lagged

endogenous variable, and varying sets of controls. The control variables are organized in two subsets. The first includes the growth of the Standard & Poor 500 stock index (SP500), the Federal Reserve discount rate (DISC), the Federal Funds rate (FF), the treasury bills rate (TB), the Prime rate (PR), and the rate of return on US government 3-years bonds (GB). These variables are expected to capture external to the region conditions influencing capital flows to Latin America (Calvo, Leiderman and Reinhart, 1992 and 1993). The second subset of controls includes industrial countries' GDP growth (IGDPG), industrial countries' investment-GDP ratio (IINV), and the percent change in the terms of trade of each country (TOT). We started estimating all the combinations of these two subsets, taking one control variable from each subset lagged one period. Then, we estimated the same combinations using the contemporaneous and lagged values of the controls (except for the TOT where a second lag was included, avoiding the contemporaneous value). Thus, we ran 36 different combinations for each estimation method (fixed and random effects).

Table 3 summarizes the information from the regressions yielding the highest and lowest t-value for the parameter of interest. "Base" refers to the regression without controls. The Hausman test systematically fails to reject the hypothesis that the individual effects are uncorrelated with the regressors, thus random effects estimations should be consistent and more efficient than fixed effects estimations. Yet, both are reported since the test has low power in small samples.

Insert table 3

The E2 coefficient is positive in all the regressions, but it is

non robust. There are indeed some sets of controls that yield a positive and significant coefficient for this dummy, at least when fixed effects estimation is chosen, but other plausible controls render this coefficient non significant.[2] Besides, it is not surprising that some sets of controls do not modify the estimation of this coefficient. If our "story" is right, these controls should capture the common external shocks that *simultaneously* impact on the business cycle and the economic policy. This is a complex phenomenon that we can expect to capture only imperfectly, and it seems natural that some sets of controls work better than others. Hence, even though there seems to be larger than average rates of growth at the beginning of the ERBS programs, we cannot say that these rates of growth are really larger than expected, given previous growth and external shocks.

The E4 coefficient instead is always negative, with a lowest t-value of -1.846, corresponding to a P-value of 0.067. The negative ME coefficient is also robust in this set of regressions. In summary, recessions are generally more robust than booms. [3]

4. Concluding remarks

---

[2] Calvo and Végh (1998) have recently reported results of regressions in which the early booms remain after including some controls for external shocks. We get similar results when we choose regressors, samples, and methods of estimation similar to theirs. However, tables 2 and 3 show that these results are not robust.

[3] We estimated a set of regressions with country-standardized series to eliminate country wise heteroscedasticity. The results are qualitatively the same. We prefer to present the estimations with the original variables, because point estimates on the effects of the plans do not have a simple interpretation

The empirical evidence presented in this paper casts doubts on the by now widely accepted "fact" that the ERBS programs are expansionary. We show that previous comparative studies lacked controls, thus overestimating the positive effects of the stabilization policies on output. We found no significant positive effects of the ERBS programs on GDP growth when we included appropriate controls that capture the external shocks, while we still found the recessions.

A related "fact", that has been largely neglected in the literature, is that, other things equal, the launching of an ERBS program is more likely when the region faces favorable external conditions. Some recent theoretical literature provides plausible explanations of this link (Alesina and Drazen, 1991; Casella and Eichengreen, 1994; and Orphanides, 1996). Precisely this "fact" explains the overestimation of the effects of the stabilization programs in previous empirical studies. [4]

At the very least, the analysis in this paper suggests that the evidence on the booms caused by the stabilization programs should be carefully reassessed. Even if, after more empirical research, it is found that the ERBS programs can have some positive

---

with standardized series. Other results are available upon request.

[4] It should be mentioned here that Kiguel and Liviatan (1992) have already noticed that most ERBS programs were initiated under favorable external conditions. Also Simonsen (1988) and Ortiz (1988) identified external conditions that were favorable to Brazil when the Cruzado program was launched. A similar point was made by Bruno and Piterman (1988) and by Cukierman (1988) for the 1985 Israeli stabilization program. However, somehow surprisingly, no further consequences for the analysis of the "stylized facts" associated with the ERBS programs seem to have been derived from this observation.

independent effects on output, the magnitude of those effects is likely to be smaller than what has been considered so far.

It is interesting to notice, in this respect, that recent attempts to calibrate several models of the real effects of stabilization programs have basically failed to obtain output growth in the orders of magnitude that have been observed in actual experiences of the ERBS programs (Reinhart and Végh, 1994; Rebelo and Végh, 1995). The results in the present paper might help to explain those failures in a simple way: the models cannot reproduce such booms simply because they were not caused by the stabilization programs. Thus, maybe the models are basically correct when they predict at most modest production and consumption booms associated with the stabilization policies.

Appendix

Data

$DISC_t$ United States discount rate. Source: IFS of IMF.

$E1_{i,t}$ Dummy variable that takes value 1 during year t, if country i started an ERBS program from july of year t-1 to june of year t, and 0 otherwise. (See the dating of the programs in table A1).

$E2_{i,t}$ Dummy variable that takes value 1 during year t, if country i is in the second year of an ERBS program, and 0 otherwise, (analogous for $E3_{i,t}$).

$E4_{i,t}$ Dummy variable that takes value 1 during year t, if country i is in the fourth or following years of an ERBS program, and 0 otherwise.

FF_t United States federal funds rate. Source: IFS of IMF.

GB_t United States government bonds, 3 years maturity. Source: IFS of IMF.

$GDPG_{i,t}$ Rate of growth of real GDP in country i during year t. Source: IFS of IMF.

$IGDPG_t$ Industrial countries' GDP growth. Source: IFS of IMF.

$IINV_t$ Industrial countries' investment to GDP ratio. Source: IFS of IMF.

$LIR_{i,t}$ Logarithm of the ratio of nominal reserves to nominal GDP for country i at the end of year t. Source: IFS of IMF.

$LPI_{i,t}$ Logarithm of inflation in country i during year t. Source: IFS of IMF.

$ME_{i,t}$ Dummy variable that takes value 1 during year t, if country i is in the first year of a money based stabilization program, and 0 otherwise.

$ML_{i,t}$ Dummy variable that takes value 1 during year t, if country i is in the last year of a money based stabilization program, and 0 otherwise.

$PARELE_{i,t}$ Dummy variable that takes value 1 if the country i had a parliamentary election during year t, and 0 otherwise. Source: International Foundation for Election Systems, Washington DC.

PR_t Prime rate. Source: IFS of IMF.

$SP500_t$ First difference of the logarithm of the Standard and Poors 500 stock index. Source: Global Financial Data, Stock Market Indexes.

TB_t Treasury Bill rate. Source: IFS of IMF.

$TOT_{i,t}$ Percent change in the terms of trade for country i during year t. Source: ECLAC.

Major price stabilization programs in Latin America

The set of programs used in all estimations was taken from Reinhart and Végh (1994), save for the Brazilian “Plan Real” that started in 1994. The Mexican 1987 program was considered successful by the time this list was conformed, and its terminal date was arbitrarily set to five years. In light of posterior events, it could be more appropriate to set the final date of this program in December 1994. In any case, the qualitative results in this paper do not depend on this choice. Hence, in order to make the point in this paper neat, the original Reinhart and Végh list of programs and dating was used in the regressions reported here. Other estimations are available upon request.

Table A1
Major price stabilization programs in Latin America

Exchange rate based stabilization programs	
Brazil 1964	1964:03-1968:08
Argentina 1967	1967:03-1970:10
Uruguay 1968	1968:06-1971:12
Argentine *tablita*	1978:12-1981:02
Chilean *tablita*	1978:02-1982:06
Uruguayan *tablita*	1978:10-1982:10
Austral (Argentina)	1985:06-1986:09
Cruzado (Brazil)	1986:02-1986:11
Mexico 1987	1987:12-1992:02
Convertibility Program (Argentina)	1991:04-present
Uruguay 1991	1991:01-present
Brazil 1994	1994:04-present
Money-based stabilization programs	
Chile 1975	1975:04-1977:12
Bonex (Argentina)	1989:12-1991:01
Collor (Brazil)	1990:03-1991:01
Dominican Republic	1990:08-present
Peru	1990:08-present

Source: Reinhart and Végh (1994), save for Brazil 1994 that was added later.

References

Alesina, A. and A. Drazen, 1991, Why are stabilizations delayed? American Economic Review 81(5), 1170-1188.

Bruno, M. and S. Piterman, 1988, Israel's stabilization: a two year review, in M. Bruno, G. Di Tella, R. Dornbusch and S. Fischer, eds., Inflation stabilization, the experience of Israel, Argentina, Brazil, Bolivia and Mexico, (The MIT Press) 3-47.

Calvo, G., 1986, Temporary stabilization: predetermining exchange rates, Journal of Political Economy 94(6), 1319-29.

Calvo, G., L. Leiderman and C. Reinhart, 1992, Capital inflows to Latin America: the 1970s and the 1990s, IMF working paper, WP/92/85.

Calvo, G., L. Leiderman and C. Reinhart, 1993, The capital inflows problem: concepts and issues, IMF paper on policy analysis and assessment, PPAA/93/10.

Calvo, G. and C. Végh, 1993, Exchange rate based stabilization under imperfect credibility, in: H. Frisch and A. Worgotter, Open Economy Macroeconomics (London: Mac Millan) 3-28.

Calvo, G. and C. Végh, 1998, Inflation stabilization and BOP crises in developing countries, forthcoming in the Handbook of Macroeconomics, by J. Taylor and M. Woodford (North Holland), January.

Canavese, A. and G. Di Tella, 1988, Inflation stabilization or hyperinflation avoidance? The case of the Austral plan in Argentina: 1985-87, in: M. Bruno, G. Di Tella, R. Dornbusch, and S. Fischer, eds., Inflation stabilizaation, the experience of Israel, Argentina, Brazil, Bolivia and Mexico (The MIT Press) 153-190.

Casella, A. and B. Eichengreen, 1994, Can foreign aid accelerate stabilization?, NBER working paper 4694.

Cukierman, A. 1988, The end of high Israeli inflation: an experiment in heterodox stabilization, in: M. Bruno, G. Di Tella, R. Dornbusch and S. Fischer, eds., Inflation stabilization, the experience of Israel, Argentina, Brazil, Bolivia and Mexico (The MIT Press) 48-94.

Easterly, W., 1996, When is stabilization expansionary? Evidence form high inflation, Economic Policy - A European Forum 0(22), April, 65-98.

Fischer, S., 1988, Real balances, the exchange rate, and indexation: real variables in disinflation, Quarterly Journal of Economics 103(1), 27-49.

Helpman, E. and A. Razin, 1987, Exchange rate management: intertemporal trade-offs, American Economic Review 77, 107-123.

Kiguel, M. and N. Liviatan, 1992, The business cycle associated with exchange rate-based stabilizations, The world bank economic review 6(2), 279-305.

Leamer, E., 1985, Sensitivity analysis would help, American Economic Review 75, 308-13.

Levine, R. and D. Renelt, 1995, A Sensitivity Analysis of Cross-Country Growth Regressions, American Economic Review 82(4), 942-63.

Maddala, G., 1983: Limited Dependent and Qualitative Variables in Econometrics, (Cambridge University Press).

Orphanides, A., 1996, The timing of stabilizations, Journal of Economic Dynamics and Control 20, 257-279.

Ortiz, G., 1988, Comment to Simonsen, in: M. Bruno, G. Di Tella, R. Dornbusch and S. Fischer, eds., Inflation stabilization, the experience of Israel, Argentina, Brazil, Bolivia and Mexico (The MIT Press) 298-302.

Rebelo, S. and C. Végh, 1995, Real effects of exchange- rate-based stabilization: an analysis of competing theories, Working Paper, University of Rochester, NBER and IMF, may.

Reinhart, C. and C. Végh, 1994, Inflation stabilization in chronic inflation countries: the empirical evidence, mimeo, International Monetary Fund, july.

Reinhart, C. and C. Végh, 1995, Nominal interest rates, consumption booms, and lack of credibility: a quantitative examination, Journal of Development Economics 46, 357-378.

Roldós, J., 1995a, Supply-side effects of disinflation programs, IMF Staff Papers 42, 158-183.

Roldós, J., 1995b, On gradual disinflation, the real exchange rate, and the current account, International Monetary Fund working paper, September.

Simonsen, M. H., 1988, Price stabilization and incomes policies: theory and the Brazilian case study, in: M. Bruno, G. Di Tella, R. Dornbusch and S. Fischer, eds., Inflation stabilization, the experience of Israel, Argentina, Brazil, Bolivia and Mexico (The MIT Press).

Taylor, J., 1980, Aggregate dynamics and staggered contracts, Journal of Political Economy 88, 1-23.

Uribe, M. 1995, Exchange-rate based inflation stabilization: the initial real effects of credible plans, Board of Governors of the Federal Reserve System, International Finance Discussion Papers 503, March.

Végh, C. A., 1992, Stopping High Inflation, IMF Staff Papers 39, 626-695

Table 1: Probit model. Dependent variable: $E1_{i,t}$

Variables	Estimate	Error	t-statistic		P-value
$LPI_{i,t-1}$	0.615	0.166	3.704	***	[.000]
$LIR_{i,t-2}$	0.551	0.269	2.045	**	[.041]
$PARELE_{i,t-2}$	0.945	0.417	2.267	**	[.023]
$SP500_{t}$ -$SP500_{t-1}$	2.559	1.198	2.137	**	[.033]
$IGDPG_{t}$	40.874	16.777	2.436	**	[.015]
CONSTANT	3.366	4.193	0.803		[.422]
Number of observations					160
Number of positive observations					12
Pseudo R-Squared (Cragg and Uhler 1970)			a/		0.388
Pseudo R-Squared (McFadden 1974)			a/		0.328

Notes: Period of estimation: 1964 to 1995. Countries: Argentina, Brazil, Chile, Mexico and Uruguay. One, two and three stars indicate significance at 10, 5 and 1 per cent, respectively.
a/ See Maddala (1983). Sources: see the appendix.

Table 2: Real GDP Growth. Seven Latin American Countries 1964-1995

Variables	(1)	(2)	
		Fixed Effects	Random Effects
E1	0.006	0.005	0.002
	(0.341)	(0.353)	(0.165)
E2	0.029 *	0.024	0.020
	(1.786)	(1.512)	(1.335)
$E3_t$	0.007	-0.002	-0.008
	(0.374)	(-0.126)	(-0.465)
$E4_t$	-0.031 **	-0.032 **	-0.036 ***
	(-2.059)	(-2.138)	(-2.613)
ME_t	-0.068 ***	-0.047 **	-0.045 **
	(-3.058)	(-2.124)	(-2.148)
ML_t	0.021	0.025	0.026
	(0.904)	(1.117)	(1.219)
$SP500_{t-1}$	----	0.039 *	0.040 *
		(1.640)	(1.778)
$IGDPG_{t-1}$	----	0.330 *	0.303 *
		(1.730)	(1.660)
$GDPG_{t-1}$	----	0.255 ***	0.282 ***
		(3.698)	(4.367)
Constant	----	----	0.015 *
			(1.896)
Adj. R2	0.074	0.142	0.149
Hausman test	----	CHI(9 df) = 1.493	
H0: RE vs. FE		P-Value = 0.997	

Notes: t values in parentheses. One, two and three stars indicate significance at 10, 5 and 1 per cent, respectively. Fixed Effects estimation of equation (1). Sources: see the Appendix.

Table 3: Sensitivity analysis

A. FIXED EFFECTS

Variable	Extremes	Coeff	Std. Error	t	Adj-R2	Controls
E1	High	0.010	0.016	0.630	0.162	TOT_{t-1} TOT_{t-2} $SP500_t$ $SP500_{t-1}$
	Base	0.005	0.016	0.302	0.130	
	Low	0.004	0.015	0.250	0.183	$IGDPG_t$ $IGDPG_{t-1}$ FF_t FF_{t-1}
E2	High	0.034	0.016	2.092	0.169	$IGDPG_t$ $IGDPG_{t-1}$ $SP500_t$ $SP500_{t-1}$
	Base	0.026	0.016	1.606	0.130	
	Low	0.023	0.016	1.462	0.183	$IGDPG_t$ $IGDPG_{t-1}$ FF_t FF_{t-1}
E3	High	0.008	0.018	0.482	0.199	$IINV_{t-1}$ $PRIME_{t-1}$
	Base	-0.003	0.018	-0.156	0.130	
	Low	0.000	0.018	0.012	0.183	$IGDPG_t$ $IGDPG_{t-1}$ FF_t FF_{t-1}
E4	High	-0.037	0.015	-2.454	0.131	TOT_{t-1} $SP500_{t-1}$
	Base	-0.037	0.015	-2.450	0.130	
	Low	-0.027	0.015	-1.846	0.199	$IINV_{t-1}$ $PRIME_{t-1}$
ME	High	-0.053	0.021	-2.499	0.194	$IINV_{t-1}$ GB_{t-1}
	Base	-0.053	0.022	-2.408	0.130	
	Low	-0.041	0.022	-1.816	0.168	$SP500_t$ $SP500_{t-1}$ $IINV_t$ $IINV_{t-1}$
ML	High	0.034	0.022	1.507	0.169	$IGDPG_t$ $IGDPG_{t-1}$ $SP500_t$ $SP500_{t-1}$
	Base	0.019	0.022	0.847	0.130	
	Low	0.012	0.022	0.535	0.183	$IGDPG_t$ $IGDPG_{t-1}$ FF_t FF_{t-1}

Table 3 (cont.)

B. RANDOM EFFECTS

Variable	Extremes	Coeff	Std. Error	t	Adj-R2	Controls
E1	High	0.007	0.015	0.454	0.151	TOT_{t-1} TOT_{t-2} $SP500_t$ $SP500_{t-1}$
	Base	-0.001	0.015	0.100	0.119	
	Low	-0.000	0.015	-0.008	0.173	TOT_{t-1} $PRIME_{t-1}$
E2	High	0.029	0.015	1.929	0.156	$IGDPG_t$ $IGDPG_{t-1}$ $SP500_t$ $SP500_{t-1}$
	Base	0.022	0.017	1.441	0.119	
	Low	0.018	0.015	1.226	0.180	$IGDPG_t$ $IGDPG_{t-1}$ $PRIME_t$ $PRIME_{t-1}$
E3	High	-0.013	0.017	-0.788	0.151	TOT_{t-1} TOT_{t-2} $SP500_t$ $SP500_{t-1}$
	Base	-0.008	0.018	-0.467	0.119	
	Low	-0.000	0.017	-0.001	0.168	$IGDPG_{t-1}$ TB_{t-1}
E4	High	-0.040	0.014	-2.901	0.120	TOT_{t-1} $SP500_{t-1}$
	Base	-0.041	0.014	-2.957	0.119	
	Low	-0.034	0.014	-2.444	0.156	$IGDPG_t$ $IGDPG_{t-1}$ $SP500_t$ $SP500_{t-1}$
ME	High	-0.051	0.021	-2.430	0.148	$DISC_{t-1}$ $IINV_{t-1}$
	Base	-0.052	0.021	-2.427	0.119	
	Low	-0.039	0.021	-1.841	0.155	$SP500_t$ $SP500_{t-1}$ $IINV_t$ $IINV_{t-1}$
ML	High	0.035	0.021	1.637	0.156	$IGDPG_t$ $IGDPG_{t-1}$ $SP500_t$ $SP500_{t-1}$
	Base	0.020	0.022	0.939	0.119	
	Low	0.013	0.021	0.611	0.170	$IGDPG_t$ $IGDPG_{t-1}$ FF_t FF_{t-1}

Notes: Critical t values are 2.60, 1.97 and 1.65 at 10, 5, and 1 per cent, respectively. See the appendix for the sources and the list of variables.