Capital mobility and macroeconomic volatility: evidence from Greece

Anastasios, Pappas

Athenian Policy Forum

June 2010

Capital Mobility and Macroeconomic Volatility: Evidence from Greece.

Anastasios P. Pappas[1]
University of the Aegean

Abstract. This paper focuses on the impact of full capital account liberalization on macroeconomic volatility in Greece. According to the standard neoclassical model, such liberalization is to be desired because, among other advantages, it may reduce macroeconomic volatility. The link between macroeconomic volatility and capital account openness in the Greek economy is investigated by applying a simple three-month rolling standard deviation of real GDP growth and real final (total) consumption growth combined with more formal econometric methods such as Granger causality test and multivariate regressions. There is no strong evidence for a stable relation between macroeconomic volatility and variables of financial openness. Thus other factors, such as exchange rate volatility and exogenous shocks rather than a full liberalization of capital movements, seem to be related to macroeconomic growth volatility in the Greek economy.

JEL Classification No: E32, E44, F30, F36, F41
Keywords: Volatility, Capital mobility, Gross domestic product growth, Consumption, Growth

1. Introduction

The relation between macroeconomic volatility and macroeconomic performance has been extensively investigated in recent years. In an early paper Ramey and Ramey (1995) find a significant negative relationship between output volatility and output growth. In other words they show that the more volatile economies tend to grow less. Since then the results of a considerable amount of research tends to support that increased macroeconomic volatility is linked to negative growth of GDP and its

[1] The author is a PhD student in the Department of Business Administration - University of the Aegean, Chios, Greece. E-mail: a.pappas@ba.aegean.gr , anastasios1977@gmail.com .
The paper was presented at the 84th Annual Conference of Western Economic Association International (WEAI) in Vancouver, Canada, June 29 - July 3, 2009. I would like to thank Alexander J. Kondonassis, Professor, University of Oklahoma, for his discussions and Alexander Volbert, Professor, Universities of Trier and Siegen (Germany) for his helpful comments. Also, I would like to thank Dimitris Seremetis and Apostolos Gotsias, Associate Professors of Applied Economics (University of the Aegean, Department of Business Administration) for their guidelines.

components, such as the total consumption.[2] However which factors affect macroeconomic volatility and in which way is a subject still being debated.

As to whether a link between capital mobility and macroeconomic volatility exists and now is also a matter that remains open. A standard argument of the advocates of the liberalization of capital mobility is that unrestricted capital movements tend to reduce macroeconomic volatility of host economies. That may happen because liberalized capital movements enhance the possibility of maintaining consumption level in the host country, in the event of adverse shocks such as temporary recession or natural disaster and of demographic trends (Obstfeld and Taylor, 1998; Obstfeld, 1998; Reisen, 1999). More specifically, according to Fischer and Reisen (1992, p.7):

> A*geing economies tend to post excess savings and hence a surplus in the balance of payments on current account which they will run down later (when old) in the form of net inflows. Or, a country which receives a temporary shock (such as bad harvests) will prefer to run a current account deficit to smooth consumption over time, instead of keeping consumption at all times equal to current income. Opening capital markets relieves such liquidity constraints.*

The aforementioned relationship has been empirically tested, but the results are far from conclusive. The theoretical argument that capital mobility and financial integration reduce macroeconomic volatility is supported by, among others, the research of Bekaert, Harvey and Lundblad (2004) and Herrera and Vincent (2008). More specifically, Bekaert, Harvey and Lundblad (2004) examine the effects of equity market liberalization and capital account openness on real consumption growth volatility. Their results strongly support the negative relationship between financial liberalization and consumption volatility. In a more recent paper Herrera and Vincent (2008) confirm also that more integrated financial markets to the international capital markets are associated with lower volatility of consumption.

Other researches fail to confirm the negative relationship between financial liberalization and macroeconomic volatility. Buch, Dopke and Pierdzioch (2002) confirm that during the decades of 1980 and 1990 the trend was that business cycle volatility was negatively correlated with the integration of financial markets. However, they find that in particular countries (Finland, Japan, Mexico, Norway and Turkey) business cycle volatility increased as the step of financial integration of their financial markets was becoming bigger. The common element of said countries is that all were severely hit by financial crises. Therefore, for these particular countries, financial integration induced financial crises which affected negatively their business

[2] Gavin and Hausmann (1996), Easterly, Islam and Stiglitz (2000), Fatas and Mihov (2003), Hnatkovska and Loayza (2003), Mobarak (2005), Kose, Prasad and Terrones (2006), Badinger (2008).

cycles by increasing their volatility. Thus their research fails to predict a stable relationship between financial liberalization and business cycle volatility over time. Similar are the results of Calderon, Loayza and Schmidt-Hebbel (2004) and those of Rincon (2007) who do not find strong evidences for the existence and the direction of the relationship between financial openness and macroeconomic volatility.

On the other hand, the study of Gavin and Hausmann (1996) finds that capital account openness is a significant cause of gross domestic product growth fluctuations for the Latin American economies. In the same directions are the results of the study of Easterly, Islam and Stiglitz (2000). They examined a sample of both OECD and developing economies and they conclude that financial openness contributes significantly to volatility of per capita GDP growth.

This paper has six main sections. Section 2 presents stylized facts concerning capital flows and macroeconomic volatility in Greece. Section 3 discusses the methodology which is applied in the paper and also refers to the variable selection and data set. Section 4 describes the econometric tests of the regressions. Section 5 presents the results of the analysis, and section 6 concludes the paper.

2. Greek Economy, Capital Mobility and Macroeconomic Volatility: Some Stylized Facts

The paper begins by trying to draw out a few stylized facts for the Greek economy. With the focus of the paper being on capital flows and macroeconomic volatility, it is useful to provide some information on the aforementioned parameters from the early 1980s onwards in an attempt to set the scene for the rest of the paper.

Figure 3 presents capital inflows in the Greek economy as an absolute number. During the decade of 1980 its volume remained quite stable between two and three billion U.S. dollars. Afterwards its volume became more volatile, reaching the nine billions U.S. dollars in 1998. The capital account remained permanently in surplus during the two decades as a necessity for financing the excessive and long-lasting deficits of the current account (Figure 4). Capital inflows were absorbed both from the public sector (mainly central government, central bank, public companies) and from the private sector (mainly FDI and real estate).

In May of 1994 the Greek government voted a law which allowed short-term capital to move totally freely inside and outside the Greek economy. The full liberalization of the capital account was a prerequisite for the entrance of Greece to the European Union. The full liberalization was followed by a severe speculative attack to the Greek currency. The speculative attack was successfully confronted by the Greek authorities who chose to raise the interest rates rather than to depreciate the currency.

For now the situation remains the same with the short-term capital being facilitated to enter into and exit from the Greek economy absolutely freely. According to the theoretical arguments in favour of the financial liberalization, this openness affects positive macroeconomic performance by lowering the volatility of output and consumption growth.

Indeed, according to Table 1, real macroeconomic volatility has decreased considerably since 1994. Two indicators of macroeconomic volatility are estimated: the volatility of real GDP growth and the volatility of real total consumption growth. For both variables, volatility is measured by the standard deviation of their growth rates.

However whether this decline can be attributed to the liberalization of the short-term capital flows that occurred in May, 1994, is not evident. The results are not clear even for applying a simple three-month rolling standard deviation (Figure 6). Gross domestic product growth volatility shows a decreasing trend for the decade of 1990; however the trend is reversed during the last two years of the decade. As far as the total consumption growth volatility is concerned, if the two spikes of the years 1985 and 1986 are deducted, the pattern of consumption volatility becomes quite similar throughout the two decades.

Thus, it is obvious that more formal econometric evidence is needed so as to clarify whether or not a link between capital account liberalization and macroeconomic volatility existed in Greece during the two decades of 1980 and 1990.

3. Methodology, Variable Selection and Data Set

The analysis includes both a Granger causality test (Granger, 1969) and multivariate regressions. The possibility of the existence of causality between macroeconomic volatility and financial openness will be investigated first by the Granger causality test. On the one hand, when a country sustains a fully open capital account it may attract foreign capital which supports domestic investment and domestic consumption, thus boosting the country's gross domestic product. As far as macroeconomic volatility is concerned, the fact that a country may be financed from abroad assists overcoming temporary recession by smoothing consumption and gross domestic product. On the other hand, substantial capital inflows may be transformed to large, volatile and unsustainable capital outflows which, among others, raise macroeconomic volatility.

However, the causality may go in the other direction since high macroeconomic volatility may cause increased capital flows. "Agents might decide to hold more international assets and thus to diversify risk to a greater degree if business cycle fluctuations are large. Hence, the observed degree of financial openness might be a consequence rather than a cause of business cycle volatility" (Buch, Dopke and Pierdzioch, 2002, p.14). Thus the Granger causality test allows us to check the causality in both directions. A time series is said to Granger-cause if the knowledge of up to t-1 helps to predict the value of Y in t and the opposite. If the values of X provide statistically significant information about future values of Y, through F-tests, then X variable is considered to Granger cause variable Y:

$$Y_t = {}_0 + \sum_{i=1}^{lags} {}_iY_{t\ i} + \sum_{i=1}^{lags} {}_iX_{t\ i} + u_t$$

$$X_t = {}_0 + \sum_{i=1}^{lags} {}_iY_{t\ i} + \sum_{i=1}^{lags} {}_iX_{t\ i} + e_t$$

The Granger causality test suffers from a basic drawback. It does not account for the interrelationship with other variables other than the two variables which are examined. Thus, by adding more independent variables, the results may be altered considerably. Therefore multivariate regressions are considered necessary for obtaining safer results. The model for the regressions will have the next general form:

$$VGDP = {}_0 + {}_1VCAPITAL + {}_2VPOLICY + {}_3EXOGENOUS + Ut,$$
$$VTC = {}_0 + {}_1VCAPITAL + {}_2VPOLICY + \alpha_3EXOGENOUS + Ut,$$

where VGDP and VTC are gross domestic product growth and total consumption growth volatility: VCAPITAL are variables related to the size and volatility of total capital flows; VPOLICY are variables approximating macroeconomic policy volatility and in particular monetary, fiscal and exchange rate policy volatility. The "policy" variables are always included in the regressions, while the variables consider capital mobility that will be introduced separately into the regressions, in order to reduce the possibility of multicollinearity[3]. Moreover, EXOGENOUS describes variables related to exogenous shocks to the Greek economy due to international financial crises, and Ut are the residuals of the regression.

More specifically, the dependent variables for both cases (Granger causality and multivariate regressions) will be the three-month rolling standard deviation of real GDP growth rate (Ramey and Ramey, 1995; Martin and Rogers, 2000) and real total consumption growth rate (Kose, Prasad, Rogoff and Wie, 2003) so as to estimate their volatility. To approximate the role of capital flows in Greece three independent variables are used. These are: total capital flows[4] as a percentage of GDP (Buch, Dopke and Pierdzioch, 2002); total capital flows to total foreign reserves held by the central bank (Petroulas, 2007); and the three-month rolling standard deviation of total capital flows rate of change as a proxy of capital flows volatility in Greece. The aforementioned variables will be tested so as to identify whether a Granger causality relationship exists or not.

Furthermore, for the case of multivariate regressions, independent variables approximating macroeconomic policy will be used so as to detect its short-term

[3] The total capital flows to total foreign reserves variable (CAPRES) has quite high correlation with both total capital flows as a percentage of GDP variable (CAPGDP) and capital flows volatility variable (CAPSTD) [see Table 5]

[4] Includes foreign direct investments, portfolio investments, external loans, real estate investments.

impact on macroeconomic variability. These variables are the six-month Treasury bill rate[5], measured as with its standard deviation so as to capture the effects of monetary policy volatility to GDP and to consumption volatility. For estimating the effects of fiscal policy volatility to macroeconomic volatility, the fiscal balance is used as an independent variable, measured as the standard deviation of its rate of change. Lastly, the exchange rate policy volatility is approximated using the exchange rate of ECU (European Currency Unit) to Greek drachma and measured as the standard deviation of its rate of change.

In order to capture the role of exogenous shocks to macroeconomic variability in the Greek economy, three dummy variables are introduced to the model. One dummy is related to the European exchange rate mechanism crisis (ERM) that took place during 1992. The dummy takes the value of one for the first three quarters of 1992, zero elsewhere. In addition a dummy variable for the Mexico financial crisis (MEX) the so called Tequila Crisis, is included taking the value of one for the two first quarters of 1995, zero otherwise. Finally, a dummy variable is included to capture the exogenous shocks of South Eastern Asian financial crisis (ASIA) to the Greek economy. The dummy takes the value of one for the last two quarters of 1997 and the first quarter of 1998.

The data are expressed in real terms and on a quarterly basis, covering a fourteen-year period, from 1984 to 1998, with the data source being the Bank of Greece. Data are deflated with the Greek Consumer Price Index (CPI). Where the variables are calculated in terms of rates of change ($_t$) this is specified as follows:

$$_t \quad \frac{t \quad t \quad 1}{\Delta_{t-1}} x100$$

4. Econometric Tests

The regression results pass various econometric tests. First, all variables pass the augmented Dickey-Fuller (Dickey and Fuller, 1979, 1981) and Phillips-Perron (Phillips and Perron, 1988) unit root tests (Table 6). The test for unit roots is considered essential in order to avoid spurious regressions[6]. Moreover, the tests of Breusch-Godfrey (1981) and Engle (1982) are employed in order to account for serial correlation of the error term and its variance, respectively. Furthermore White's (1980) heteroscedasticity test is employed. Finally the stability of the models is examined by the Ramsey test (1969) RESET test and CUSUM test (Brown, Durbin, and Evans, 1975), which is depicted in Figure 1.

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[5] Since the analysis is done in a short-term framework it would be expected that a shorter time money instrument, such as three months T-bill rate would be preferable for the model. However a six-month T-bill rate fits better to the model as it is indicated by improved R2, without altering the main results of the regressions.

[6] For a description of spurious regressions see Granger and Newbold, (1974) and Phillips (1986)

Table 1: Volatility (standard deviation) and Descriptive Statistics of Quarterly Growth Rates of Selected Variables

		Gross Domestic Product growth	Total Consumption growth
Full Sample 1984 Q2– 2000 Q4	Mean	0.542	0.604
	Median	0.462	-0.254
	Maximum	8.676	6.094
	Minimum	-9.300	-7.605
	Std. Dev.	**3.502**	**2.659**
	Skewness	0.032	0.055
	Kurtosis	2.840	3.030
	Observations	67	67
1984 Q2 –1994 Q1	Mean	0.298	0.468
	Median	0.683	-0.088
	Maximum	8.676	6.095
	Minimum	-9.300	-7.606
	Std. Dev.	**3.839**	**2.806**
	Skewness	-0.051	-0.234
	Kurtosis	2.749	3.203
	Observations	40	40
1994 Q2 – 2000 Q4	Mean	0.903	0.806
	Median	0.462	-0.362
	Maximum	6.989	5.764
	Minimum	-3.337	-1.986
	Std. Dev.	**2.966**	**2.467**
	Skewness	0.561	0.773
	Kurtosis	2.083	2.048
	Observations	27	27

Source: Author's calculations

Table 2: Tests of Granger Causality

	F-Statistic		Granger Cause	
Lags	1 quarter	2 quarters	1 quarter	2 quarters
CAPGDP to GDP	0.034	0.111	NO	NO
CAPGDP to TC	0.301	0.168	NO	NO
CAPRES to GDP	0.733	0.552	NO	NO
CAPRES to TC	0.171	0.183	NO	NO
CAPSTD to GDP	1.362	0.514	NO	NO
CAPSTD to TC	3.003***	1.169	YES	NO
GDP to CAPGDP	0.029	0.113	NO	NO
GDP to CAPRES	0.176	0.044	NO	NO
GDP to CAPSTD	3.258***	0.031	YES	NO
TC to CAPGDP	0.0502	0.376	NO	NO
TC to CAPRES	0.132	0.002	NO	NO
TC to CAPSTD	2.724***	0.037	YES	NO
Obs	**57**	**56**		

Notes: 1. Values refer to F-statistics.

2. The null hypothesis is that the 'x' variable does not Granger cause the 'y' variable. (***) impling that the null hypothesis is rejected at 1 percent significance level.

Table 3: Multivariate Regressions 1

Dependent Variable: **Volatility of GDP growth rate**

	Baseline	CAP1	CAP2	CAP3	EX1	EX2	EX3
constant	2.707***	2.713***	2.799***	2.921***	2.473***	2.545***	2.703***
	(0.438)	(0.457)	(0.492)	(0.453)	(0.465)	(0.501)	(0.46)
FISCAL	0.024	0.024	0.021	0.011	0.034	0.035	0.023
	(0.056)	(0.057)	(0.057)	(0.056)	(0.058)	(0.057)	(0.057)
TB6	-0.454	-0.449	-0.467	-0.551	-0.408	-0.372	-0.474
	(0.532)	(0.546)	(0.537)	(0.529)	(0.613)	(1.262)	(0.572)
EURO	0.436***	0.437***	0.452***	0.435***	0.459***	0.47***	0.46***
	(0.114)	(0.116)	(0.121)	(0.112)	(0.115)	(0.12)	(0.112)
CAPGDP		-0.002			0.008		
		(0.046)			(0.051)		
CAPRES			-0.005			-0.003	
			(0.013)			(0.013)	
CAPSTD				-0.0002			-0.0002
				(0.0002)			(0.0002)
ERM					2.358**	2.303**	2.283**
					(1.137)	(1.136)	(1.103)
MEX					-0.509	-0.512	-0.504
					(1.341)	(1.428)	(1.397)
ASIA					0.015	-0.15	-0.058
					(1.429)	(0.581)	(1.195)
Obs	*57*	*57*	*57*	*57*	*57*	*57*	*57*
R^2	0.26	0.26	0.26	0.29	0.32	0.32	0.35
Adj-R^2	0.21	0.20	0.20	0.23	0.22	0.22	0.26
RESET	0.191	0.189	0.305	0.607	0.41	0.469	0.932
B-G	0.749	0.73	0.716	0.687	0.593	0.552	0.539
ARCH	2.394	2.399	2.457	3.212	2.619	2.718	3.443
White	0.54	0.842	0.897	0.587	0.725	0.72	0.539

1. All independent variables are lagged by one quarter.
2. Standard errors are referred to in parentheses.
3. ***, **, * indicate significance level of 1 percent, 5 percent and 10 percent respectively.
4. RESET refers to Ramsey (1969) test for the stability of the regressions. The values refer to f-statistics. All the regressions are stable in the spirit of the particular test.
5. B-G refers to Breusch-Godfrey (1981) test for serial correlation of the error term. The values refer to f-statistics. Neither of the regressions face a serial correlation error at a 5 percent significance level.
6. ARCH refers to Engle (1982) test for serial correlation of the variance of the error term. The values refer to f-statistics. Neither of the regressions faces an error at a 5 percent significance level.
7. White refers to White (1980) test for heteroscedasticity. The values refer to f-statistics. Neither of the regressions faces a heteroskedasticity error at a 5 percent significance level.

Table 4: Multivariate Regressions 2

Dependent Variable: **Volatility of Total Consumption Growth**

	Baseline	CAP1	CAP2	CAP3	EX1	EX2	EX3
constant	2.251***	2.331***	2.412***	2.477***	2.206***	2.267***	2.363***
	(.323)	(0.334)	(0.36)	(0.326)	(0.341)	(0.367)	(0.331)
FISCAL	0.044	0.048	0.04	0.03	0.046	0.038	0.027
	(.041)	0.042	(0.042)	(0.04)	(0.042)	(0.042)	(0.041)
TB6	-0.605	-0.54	-0.629	-0.708*	-0.596	-0.695	-0.811*
	(0.392)	(0.399)	(0.393)	(0.38)	(0.45)	(0.427)	(0.411)
EURO	0.302***	0.312***	0.33***	0.301***	0.334***	0.347***	0.323***
	(0.084)	(0.085)	(0.01)	(0.081)	(0.085)	(0.088)	(0.08)
CAPGDP		-0.031			-0.029		
		(0.034)			(0.037)		
CAPRES			-0.01			-0.008	
			(0.088)			(0.01)	
CAPSTD				-0.0003**			-0.0003**
				(0.0001)			(0.0001)
ERM					1.484*	1.488*	1.51*
					(0.835)	(0.834)	(0.793)
MEX					1.052	1.026	1.044
					(1.049)	(1.049)	(0.859)
ASIA					-0.008	0.119	0.323
					(0.984)	(0.926)	(1.004)
Obs	57	57	57	57	57	57	57
R^2	0.27	0.28	0.29	0.34	0.34	0.34	0.4
Adj-R^2	0.23	0.23	0.23	0.29	0.25	0.25	0.31
RESET	0.002	0.0002	0.099	0.318	0.322	0.594	1.238
B-G	0.695	0.787	0.478	0.446	0.187	0.068	0.043
ARCH	0.092	0.282	0.006	0.019	0.691	0.251	0.27
White	0.739	1.341	1.637	1.355	1.303	1.645	1.538

1. All independent variables are lagged by one quarter.
2. Standard errors are referred into parentheses.
3. ***, **, * indicate significance level of 1 percent, 5 percent and 10 percent respectively
4. RESET refers to Ramsey (1969) test for the stability of the regressions. The values refer to f-statistics. All the regressions are stable in the spirit of that particular test.
5. B-G refers to Breusch-Godfrey (1981) test for serial correlation of the error term. The values refer to f-statistics. Neither of the regressions face a serial correlation error at a 5 percent significance level.
6. ARCH refers to Engle (1982) test for serial correlation of the variance of the error term. The values refer to f-statistics. Neither of the regressions faces an error at a 5 percent significance level.
7. White refers to White (1980) test for heteroscedasticity. The values refer to f-statistics. Neither of the regressions faces a heteroskedasticity error at a 5 percent significance level.

Table 5: Correlation Matrix

	GDP	FC	FISCAL	TB6	EURO	CAPGDP	CAPRES	CAPSTD
GDP	1.000	0.79	-0.086	-0.031	0.191	-0.019	0.033	-0.04
FC	0.79	1.000	-0.095	-0.064	0.183	-0.07	-0.061	-0.067
FISCAL	-0.086	-0.095	1.000	0.113	-0.03	0.136	-0.101	-0.159
TB6	-0.0307	-0.064	0.113	1.000	-0.247	0.164	-0.142	-0.134
EURO	0.191	0.183	-0.03	-0.247	1.000	0.086	0.332	0.027
CAPGDP	-0.019	-0.07	0.136	0.164	0.086	1.000	0.652	0.152
CAPRES	0.032	-0.064	-0.101	-0.1421	0.332	0.652	1.000	0.539
CAPSTD	-0.04	-0.067	-0.159	-0.135	0.027	0.152	0.539	1.000

Table 6: Tests for Unit-Roots

	ADF[1]		PP[2]	
Variable	Intercept	Trend & Intercept	Intercept	Trend & Intercept
GDP	-6.922***	-6.928***	-6.914***	-6.968***
FC	-6.886***	-7.071***	-7.213***	-9.440***
CAPGDP	-6.845***	-6.792***	-7.659***	-7.432***
CAPRES	-4.188***	-5.582***	-4.211***	-5.586***
CAPSTD	-4.511***	-4.773***	-4.382***	-4.833***
EURO	-4.482***	-4.635***	-4.482***	-4.634***
FISCAL	-6.036***	-6.453***	-5.972***	-6.791***
TB6	-5.987***	-8.345***	-6.23***	-8.472***

1. ADF refers to augmented Dickey - Fuller test.
2. PP refers to Phillips - Perron test.
3. *** indicate that the null hypothesis of a unit root is rejected at a 1 percent level.
4. Values refer to t-statistics. Critical values are obtained from McKinnon (1991)

Figure 1: CUSUM Test for the Stability of Models' Parameters (GDP growth rate volatility)

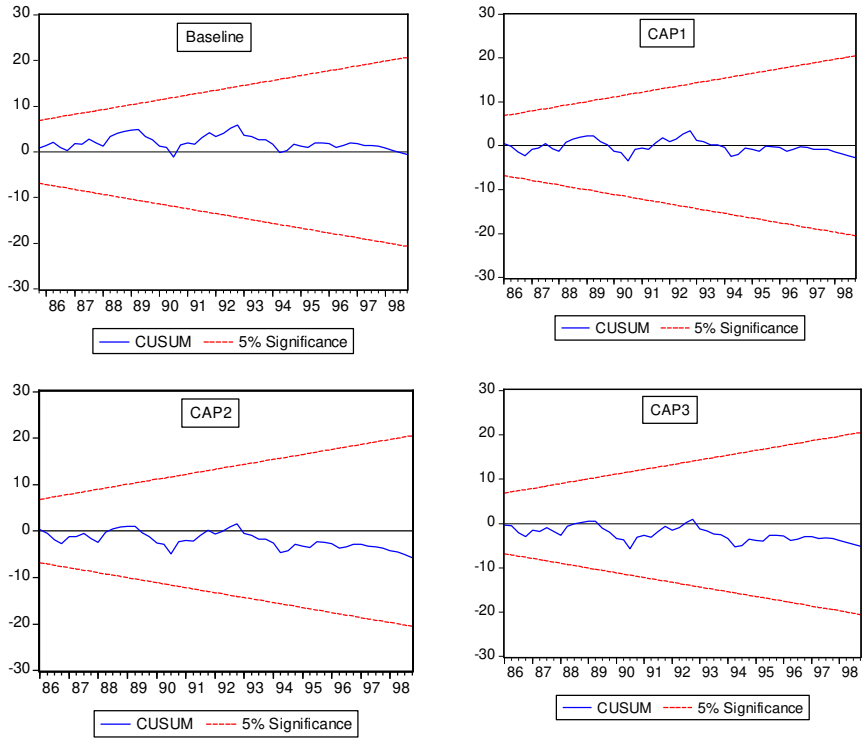


Figure 2: CUSUM Test for the Stability of Models' Parameters (Total Consumption growth rate volatility)

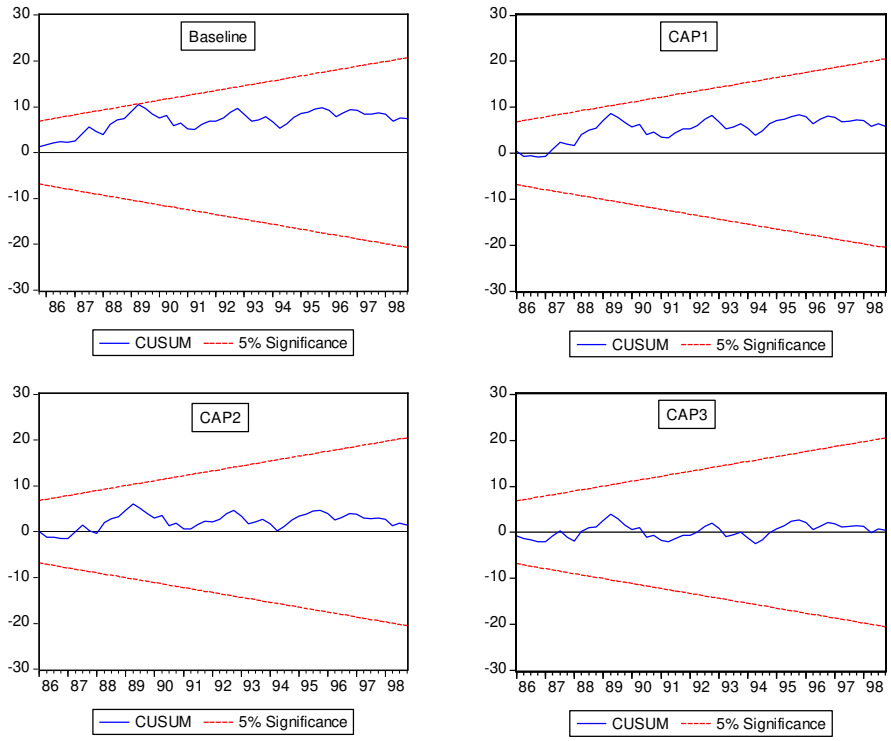
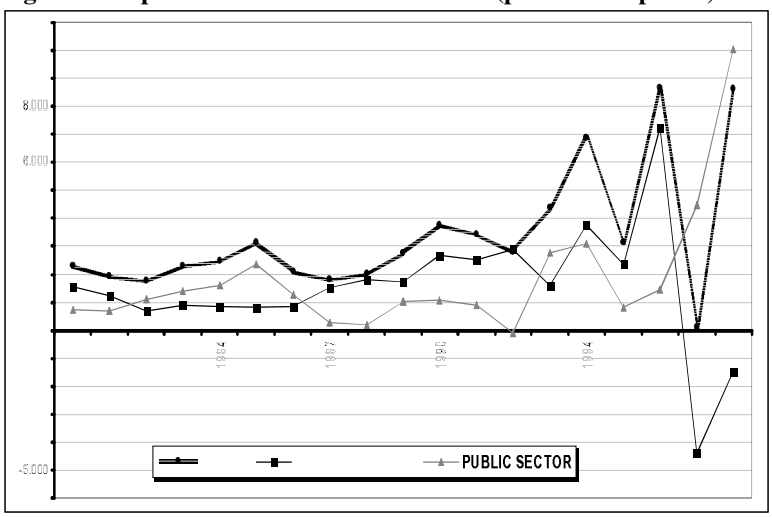
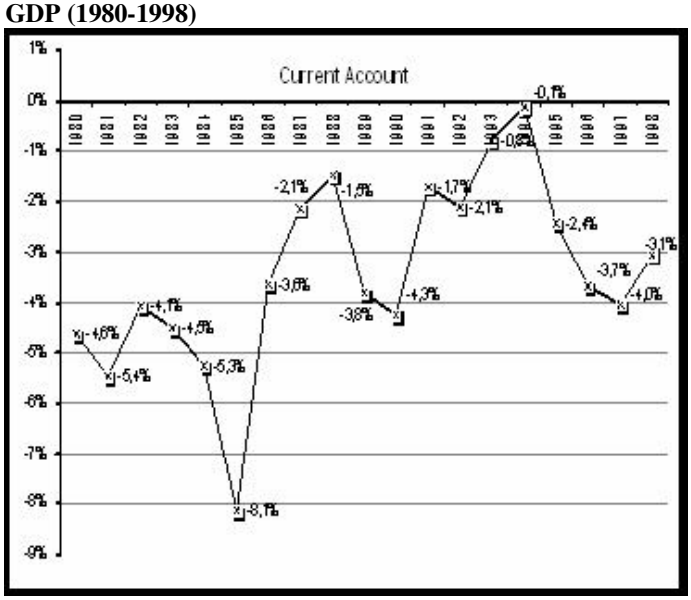


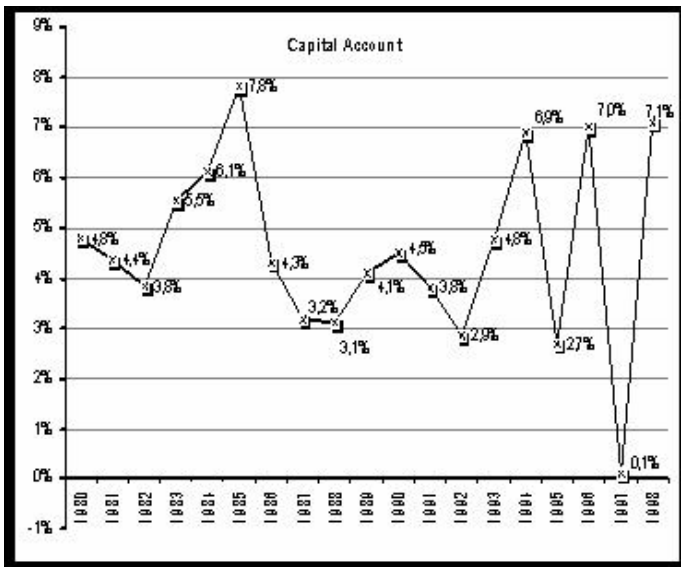
Figure 3: Capital Flows - Total and Sectoral (private and public) in million USD



Source: Bank of Greece

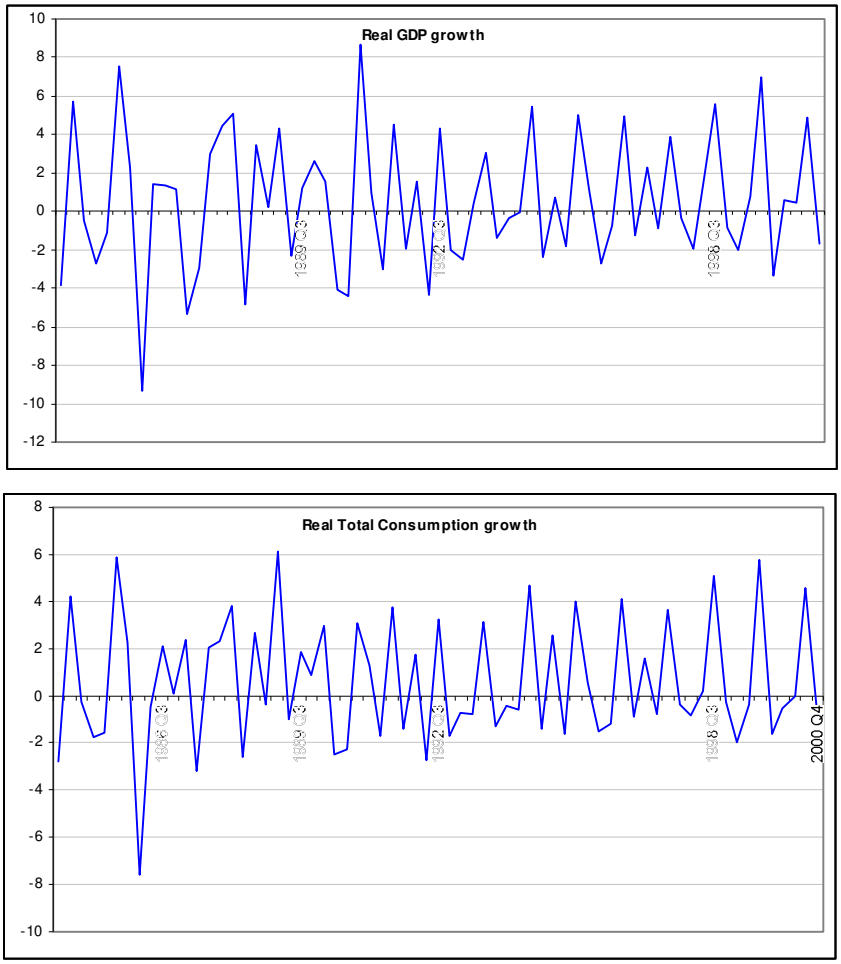
Figure 4: Current and Capital Account deficit/surplus as a percentage of Greek GDP (1980-1998)





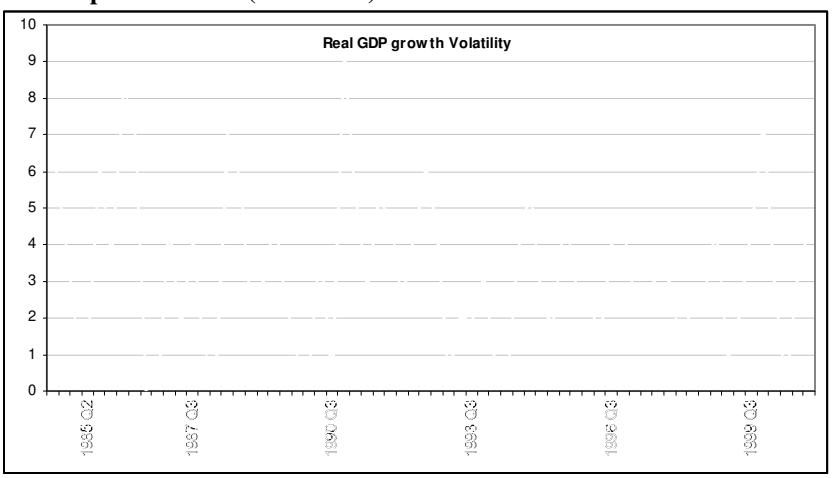
Source: Bank of Greece

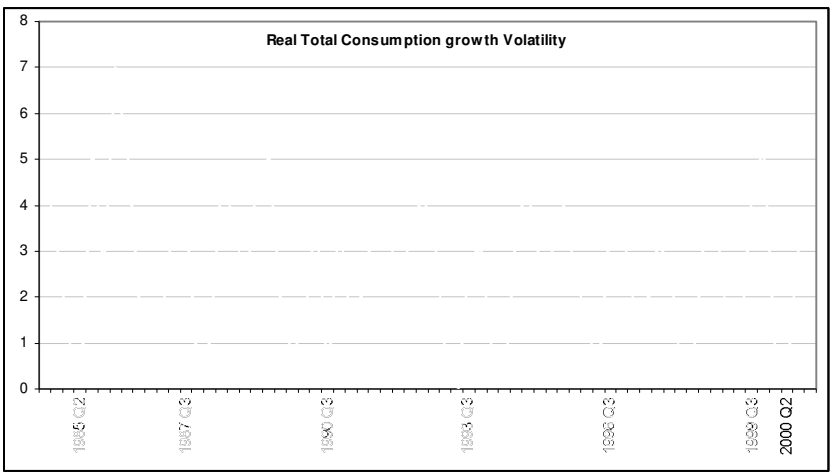
Figure 5: Real Growth of Macroeconomic Indicators (1984-2000, quarterly figures)



Source: Bank of Greece

Figure 6: Three-month Rolling Standard Deviation of GDP Growth and Total Consumption Growth (1984-2000)





Source: Author's Calculation

5. Empirical Results

The results of the Granger causality test are presented in Table 2. There is no strong evidence that the aforementioned variables are interdependent. The only variable which plays some considerable role in macroeconomic volatility is the standard deviation of the rate of change of total capital flows. While the rest of the variables, which approximate the capital account openness in a substantial amount of research, are insignificant in predicting the volatility change of real GDP growth and real total consumption growth. More specifically, the volatility of total capital flows is linked only to the total consumption growth volatility. That causal relationship disappears when a second lag is considered, that is, after six months. On the other hand, both real GDP and real total consumption growth volatility create total capital flows volatility but only for a short-term period (three months).

Besides the Granger causality test, the multivariate tests presented in Table 3 confirms the irrelevance of capital flows variables compared to gross domestic product volatility. Moreover, the regressions confirm also that capital flows have not a significant effect to total consumption volatility (Table 4) besides the fact that the variable which approximates their volatility is significant but quite loose as the coefficient of -0.0003 indicates. Contrary to conventional thought, total capital flows as a percentage to GDP and as a percentage of foreign reserves proved totally insignificant to explain the fluctuations of the Greek gross domestic product and Greek total consumption growth volatility.

As far as the group of policy variables is concerned, the exchange rate policy volatility approximated by the three-month rolling standard deviation of the exchange rate of ECU compared to that of the Greek drachma proved highly and persistently significant, even if more variables were being included in the model. According to the results, the exchange rate volatility explains a substantial fraction of macroeconomic volatility throughout the period of 1984 to 1998 for the Greek economy. As far as other policy variables are concerned, only the T-bill rate volatility, which proxies the monetary policy volatility, seems to reduce consumption volatility, though the results are only weakly significant. The other policy variable (fiscal policy volatility) fails to be linked either with GDP volatility or consumption volatility.

An interesting result is the significant effect on Greek macroeconomic volatility of the currency crisis that occurred in 1992 and hit most European countries participating in the exchange rate mechanism, including Greece. The fact that the dummy variable, used as a proxy of the crisis, is significant demonstrates that capital flows is often a factor which causes instability in small economies through contagion effects.

6. Conclusions

In this paper a simple proposition has been tested: did financial integration decrease macroeconomic variability and specifically real GDP growth volatility and real total consumption growth volatility in the Greek economy during the last two decades of

20th century. The analysis concludes that strong links between macroeconomic volatility and capital account openness are not observed. Thus a conventional argument in favour of full financial liberalization seems not to hold in our case. On the other hand, macroeconomic volatility in Greece did appear to depend on the fluctuations of the Greek drachma against the European Currency Unit (ECU). In other words, Greek external balance, especially that with the rest of the countries of the European Community seems to play a significant negative role by increasing macroeconomic volatility in Greece. Therefore the anticipation for the adoption of the euro by Greece and the increased European integration may explain the reduction of macroeconomic volatility in Greece after the year 1994. The fact that in 1994 full capital account openness was allowed by the Greek authorities seems to be a pure coincidence which is not associated to the fall of Greek macroeconomic volatility. This result is further supported by the significant link between 1992 ERM currency crisis and Greek macroeconomic volatility. During that year the fluctuations of European currencies were highly volatile affecting Greek macroeconomic volatility.

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APPENDIX I: VARIABLES

GDP: Gross Domestic Product real growth volatility,
TC: Total Consumption real growth volatility,
FISCAL: Fiscal Balance rate of change volatility,
TB6: Six-month Treasury Bill Rate volatility,
EURO: Exchange Rate of Greek Drachma vis a vis European Currency Unit, rate of change volatility,
CAPRES: Total Capital Flows, as a percentage of total foreign reserves,
CAPGDP: Total Capital Flows, as a percentage of real GDP,
CAPSTD: Total Capital Flows, rate of change volatility,
ERM: Dummy variable captures the effect of European Exchange Rate Mechanism Crisis of 1992,
MEX: Dummy variable captures the effect of Mexico-Tequila Crisis of 1994-95,
ASIA: Dummy variable captures the effect of S.E.Asian crisis of 1997