Financial Openness and Macroeconomic Volatility: An Empirical Investigation

Shiu-Sheng Chen* Chien-Chiang Wang†

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Abstract

In this paper, we empirically investigate the impact of financial openness on macroeconomic volatility for a sample of 35 industrial and developing countries over the period 1970–2003. By separating capital flows into inflows and outflows, we find that capital inflows increase GDP growth volatility. This is particularly significant in developing countries. Moreover, capital outflows help to reduce consumption volatility.

Keywords: Financial Openness, Macroeconomic Volatility

JEL Classification: F32, E32

1 Introduction

In the era of globalization, financial openness has become one of the most important factors affecting the macroeconomy. It is argued that financial openness destabilizes the macroeconomy by inducing large capital inflows during economic booms and also makes the economy more vulnerable to speculative attacks such as 'sudden stop' and 'capital flight' problems. (See Glick and Hutchison (1999) and Aghiona et al. (2004).)

*Department of Economics, National Taiwan University, No. 21, Hsu-Chow Road, Taipei, Taiwan. Phone number: (886) 2-2351-9641 ext 481. email: sschen@ntu.edu.tw

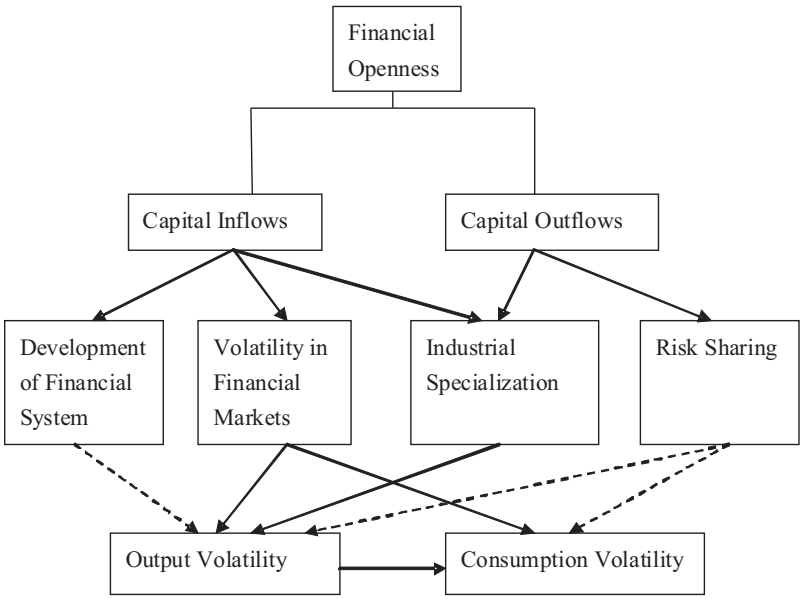
†Corresponding author. email: wangyp@ms18.hinet.net

Moreover, increased financial openness may increase specialization in production and thereby increase output variability. Hence, large capital flows may increase the volatility of output growth. On the other hand, as suggested by Obstfeld (1994) and Kalemli-Ozcan et al. (2003), financial openness may help to insure against such production risks and thereby reduce output volatility. Regarding consumption volatility, Backus et al. (1992), Obstfeld (1994), Baxter and Crucini (1995), Sutherland (1996) and Buch et al. (2005) have shown that financial openness helps to reduce variations in consumption by improving risk-sharing possibilities.

However, there is a lack of empirical evidence on the relationship between financial openness and macroeconomic volatility. By using data from 74 countries over the period 1960–1997, Easterly et al. (2001) finds that financial openness has no significant impact on output volatility. Buch et al. (2005) finds that the link between financial openness and business cycle volatility depends on the nature of the underlying shocks and finds that the link has not been stable over time. During the 1970s and 1980s, financial openness increased output volatility, whereas in the 1990s, openness reduced output volatility. Kose et al. (2003) analyze data from 76 countries and split the sample into three different groups: developed countries; more financially integrated developing countries; and less financially integrated developing countries. They find that financial openness has a nonlinear effect on the ratio of the volatility of consumption growth to the volatility of income growth: once gross capital flows exceed a certain level, financial openness helps to lower this ratio. In a recent study, Bekaert et al. (2006) show that financial liberalization (equity market liberalization and capital account openness) is mainly associated with lower consumption growth volatility.

In this paper, we extend empirical investigation of the impact of financial openness by distinguishing between the effects of capital inflows and capital outflows. Capital inflows and capital outflows may affect macroeconomic volatility differently. Capital inflows may enhance industrial specialization and increase volatility in financial markets. Hence, inflows may raise output growth volatility and thereby increase consumption growth variability. However, capital inflows contribute to developing local financial sectors (see Levine (1996)) and, as shown by Ferreira da Silva (2002) and Easterly et al. (2001), countries with better developed financial systems are more stable. This is because development of the financial system may mitigate the effects of asymmetric information. Capital outflows

Figure 1: The Linkage between Financial Openness and Macroeconomic Volatility (Solid lines indicate positive effects and dashed lines indicate negative effects.)



may reduce macroeconomic volatility by increasing the extent to which production and consumption risks are shared. (See Kalemli-Ozcan et al. (2003) and Baxter and Crucini (1995).) The potential linkages between macroeconomic fluctuations and financial openness (capital inflows and outflows) are summarized in Figure 1.

This paper contributes to the literature in two ways. First, rather than considering only the net effects of capital flows, as do existing studies, we empirically investigate the different impacts on macroeconomic volatility of capital inflows and capital outflows. Second, to study how financial openness affects macroeconomic volatility, in existing studies, variations in output and consumption are measured by using nonoverlapping standard deviations based on annual data, calculated at five- and 10-year intervals. (See, for example, Bekaert et al. (2006), Kose et al. (2003) and Buch et al. (2005).) This may be a limitation because some information contained in the data is lost when calculating this measure. Moreover, computing this measure shortens the sample period. In this paper, to generate a longer sample period and use information in the data more fully, we estimate macroeconomic volatility from the conditional variance obtained by using panel data.

2 Data

There are different approaches to measuring financial openness. It is common to use the index constructed by the International Monetary Fund (IMF). Being a simple dummy variable, the IMF index is zero if the country imposes at least one restriction on payments for capital account transactions. The main drawback of this measure is that it fails to account for the degree of financial openness. Rather than use the binary indicator, Quinn (1997) uses IMF data to measure the intensity of capital controls. In a recent contribution, Chinn and Ito (2007) construct a new measure of financial openness for a relatively large group of countries over a reasonably long time period. However, being *de jure* measures of financial openness, the IMF, Quinn and Chinn–Ito indexes may be uninformative. This is because the private sector often circumvents capital account restrictions. The other way of measuring financial openness is to construct a *de facto* index such as the ratio of net foreign assets to GDP, as proposed by Lane and Milesi-Ferretti (2001) and Lane and Milesi-Ferretti (2006). This type of measure reflects more truly how a country is integrated into world markets, and accounts for all degrees of financial openness.

As discussed by Chinn and Ito (2007), these two types of measures of financial openness each have strengths and weaknesses. However, in order to distinguish between the effects of capital inflows and capital outflows, we further extend the Lane and Milesi-Ferretti (2006)'s net foreign assets ratio into the foreign liability ratio and the foreign assets ratio to measure capital inflow openness and capital outflow openness, respectively. It is worth noting that Prasad et al. (2003) argues that an advantage of using capital stock data over using capital flow data is that stock data are less prone to measurement error.

Our annual data on 35 countries, mostly covering the period 1970–2003, were obtained from the sources detailed in Tables 1 and 2. The growth of GDP per capita and the growth of household final consumption expenditure per capita are from the World Bank's World Development Indicators (WDIs). Data on capital inflows and outflows are from Lane and Milesi-Ferretti (2006). Capital inflows include foreign direct investment liabilities, portfolio equity liabilities, portfolio debt liabilities and other liabilities. Capital outflows include foreign direct investment assets, portfolio equity assets, portfolio debt assets and other assets. We have also considered control variables such as investment, inflation rates, government expenditure, education (proxied by gross enrollment rates) and trade openness

(measured by exports and imports as a percentage of GDP). Descriptive statistics are reported in Tables 3 and 4.

3 Empirical Models and Results

First, consider the following panel volatility model as our benchmark model, Model A:

$$
\begin{aligned}
y_{it} &= \alpha_i + p' x_{it} + \delta' z_{it} + u_{it}, \\
u_{it} &= \sqrt{h_{it}}\ \epsilon_{it},\ \ \epsilon_{it} \sim N(0,1), \\
\log(h_{it}) &= \psi_i + q' \log(z_{it}) + \gamma' \log(z_{it}),
\end{aligned}
$$

where the dependent variable is either output growth or consumption growth, and z_t represents the explanatory variables (capital inflows and capital outflows) that affect the conditional variance, which is our measure of volatility. The other control variables, represented by x_{it}, include investment, inflation rates, government expenditure, education, and trade openness. Note that the left-hand side of the conditional variance equation is the log of the conditional variance. This ensures that the conditional variance is nonnegative. We propose three different model specifications. In Model A1, a fixed effect is incorporated in the conditional mean equation only ($\psi_i = \psi$). Model A2 incorporates a fixed effect in the conditional variance equation ($\alpha_i = \alpha$). In Model A3, we incorporate fixed effects in both equations.

Tables 5 and 6 report the estimation results for consumption growth and output growth, respectively. First, it is worth noting that trade openness significantly raises the volatility of both consumption growth and output growth. This result is consistent with those of Kose et al. (2003), who use the standard deviation of growth rates from successive 10-year periods as their dependent variable. Next, we focus on the effects on volatility of capital inflows and capital outflows. Clearly, capital outflows significantly reduce the volatility of consumption and output. This suggests evidence of risk-sharing effects in consumption and production. By contrast, capital inflows increase the fluctuations in consumption and output growth. The destabilizing effect of capital inflows is consistent with the prediction that capital inflows increase industrial specialization and raise volatility in financial markets. According to our benchmark model, capital outflows

help to stabilize the macroeconomy; these effects are both statistically and economically significant. The estimated effects of capital inflows are statistically insignificant.

Next, we consider potential heterogeneity between industrial countries and developing countries. Consider the following Model B:

$$
\begin{aligned}
y_{it} &= \alpha_i + p' x_{it} + \delta' z_{it} + u_{it}, \\
u_{it} &= \sqrt{h_{it}}\ \epsilon_{it},\ \epsilon_{it} \sim N(0,1), \\
log(h_{it}) &= \begin{cases} \psi_i + q' \log(x_{it}) + \gamma_1' \log(z_{it}) & \text{if } i \in \text{industrial countries}, \\ \psi_i + q' \log(x_{it}) + \gamma_2' \log(z_{it}) & \text{if } i \in \text{developing countries}. \end{cases}
\end{aligned}
$$

Variables are the same as those in Model A. The only difference is that the sample is split into two groups. As for Model A, we consider three different model specifications: a fixed effect in the conditional mean (Model B1); a fixed effect in the conditional variance (Model B2); fixed effects in both (Model B3).

According to the results reported in Tables 7 and 8, the effects of capital inflows and outflows are similar to those in Model A. For both industrial and developing countries, there is evidence that capital outflows lower macroeconomic volatility. However, the impact of capital inflows seems to vary between groups of countries. In industrial countries, while capital inflows appear to reduce volatility, they fail to stabilize consumption and output variations in developing countries. These asymmetric effects suggest that capital inflows increase fluctuations in less developed economies with less diversified industrial structures, less developed financial systems, and macroeconomic policies that are less effective in reducing the variability of growth.

4 Robustness Check

4.1 Panel ARCH Model

To check the robustness of our empirical results, first we incorporate ARCH effects into the empirical model. Although there is no economic theory to justify the inclusion of ARCH effects, it is worth investigating whether inflow and outflow openness continues to significantly affect the conditional variance when a simple autoregressive term is added. Thus, consider Model C:

$$y_{it} = \alpha_i + p' x_{it} + \delta' z_{it} + u_{it},$$

$$u_{it} = \sqrt{h_{it}}\ \epsilon_{it},\ \epsilon_{it} \sim N(0,1),$$

$$\log(h_{it}) = \begin{cases} \psi_i + \lambda\ \dfrac{u_{i,t-1}}{\sqrt{h_{it-1}}} + \beta\ \left|\dfrac{u_{i,t-1}}{\sqrt{h_{it-1}}}\right| + q' \log(x_{it}) + \gamma' \log(z_{it}), & \text{if } i \in \text{industrial countries}, \\ \psi_i + \lambda\ \dfrac{u_{i,t-1}}{\sqrt{h_{it-1}}} + \beta\ \left|\dfrac{u_{i,t-1}}{\sqrt{h_{it-1}}}\right| + q' \log(x_{it}) + \gamma' \log(z_{it}), & \text{if } i \in \text{developing countries}. \end{cases}$$

The β parameter represents the standard ARCH effect and λ allows the ARCH effect to be asymmetric. The results from Model C are shown in Tables 9 and 10. The fact that the results are similar to those obtained in the previous section suggests that our empirical findings are robust to ARCH effects. Note that there are no significant asymmetric effects. We use the bias-adjusted method proposed by Hospido (2007) to reduce potential estimation bias (see Arellano and Hahn (2007)). Model D is the bias-corrected model. The results reported in Tables 11 and 12 indicate that correcting for potential bias does not affect our conclusions about the effects of capital inflows and outflows.

4.2 A Conventional Regression Model

To compare our results with those of previous studies and check the robustness of our empirical findings, we estimate two conventional regression models, Model E:

$$\text{SD}_{it} = \alpha + \eta D + \beta' x_{it} + \gamma' z_{it}$$

and Model F:

$$\text{SD}_{it} = \begin{cases} \alpha + \eta D + \beta' x_{it} + \gamma_1' z_{it} & \text{if } i \in \text{industrial countries}, \\ \alpha + \eta D + \beta' x_{it} + \gamma_2' z_{it} & \text{if } i \in \text{developing countries}. \end{cases}$$

In these models, SD_{it} is the five-year standard deviation of either consumption growth or output growth, D is a dummy variable that is unity if the country is a developing country, x_{it} denotes the five-year average of other control variables, and z_{it} includes the five-year averages of capital inflows and capital outflows. Model F extends Model E to allow the effects of capital inflows and outflows to vary between industrial and developing countries. The results are reported in Tables 13.

The results from our conventional regression models indicate that capital outflows significantly stabilize the macroeconomy, whereas capital inflows significantly increase the

variability in consumption growth and output growth. When effects between groups are allowed to be asymmetric, capital inflows have significantly negative effects on volatility for developing countries. For industrial countries, the effect is negative but insignificant. Capital outflows tend to reduce volatility in both developing and industrial countries. The fact that these results are consistent with those from our benchmark model indicates that our main findings are generally robust.

5 Concluding Remarks

How financial openness affects macroeconomic fluctuations, particularly volatility in consumption growth and output growth, has been widely investigated. However, only the *net* effect of capital flows has been analyzed. Little is known about the *gross* effects of capital inflows and capital outflows. In this paper, we extended previous studies by distinguishing between these two impacts.

This paper has made two contributions. First, we have documented the empirical regularities relating to the effects of capital inflows and capital outflows. Second, instead of using the five-year or 10-year standard deviation of the growth rate of the relevant variable as the dependent variable, we estimated a panel volatility model that uses all the information contained in the data and enables estimation over a longer sample period.

We found that capital outflows help to reduce consumption volatility and output volatility. This economically and statistically significant result suggests evidence of risk-sharing effects in both consumption and production. However, we also found that capital inflows increase fluctuations in consumption growth and output growth. Although this result is consistent with the prediction that capital inflows increase industrial specialization and raise volatility in financial markets, the estimated effects are statistically insignificant.

In addition, we found that capital outflows reduce macroeconomic volatility for both industrial and developing countries. However, the effects of capital inflows vary between different groups of countries. Whereas capital inflows seem to reduce volatility in industrial countries, they do not stabilize consumption growth and output growth in developing countries. This asymmetry is consistent with our expectations because developed economies have more developed financial systems, which may mitigate the effects of asymmetric information.

Table 1: Sample Countries

Industrial Countries		Developing Countries	
Australia	1970–2003	Brazil	1981–2003
Austria	1970–2003	Chile	1970–2003
Belgium	1970–2003	Colombia	1970–2003
Canada	1970–2003	Egypt	1975–2003
Denmark	1970–2003	India	1970–2003
Finland	1970–2003	Indonesia	1970–2003
France	1970–2003	Korea	1970–2003
Greece	1970–2003	Malaysia	1970–2003
Ireland	1970–2003	Mexico	1970–2003
Italy	1970–2003	Morocco	1970–2003
Japan	1970–2003	Pakistan	1970–1996
Norway	1970–2003	Peru	1970–2003
Netherlands	1970–2003	Philippines	1970–2003
New Zealand	1970–2003	South Africa	1970–1996
Portugal	1970–2003	Thailand	1970–1997
Spain	1970–2003		
Sweden	1970–2003		
Switzerland	1970–2003		
USA	1970–2003		
UK	1970–2003		

Table 2: Data Source

GDP per capita growth (annual %)	WDI
Household final consumption expenditure per capita growth (annual %)	WDI
Investment (annual %)	WDI
Inflation, consumer prices (annual %)	WDI
General government final consumption expenditure (%GDP)	WDI
Gross enrollment rate (%), secondary	World Bank Edstats
Capital Outflows: FDI assets + portfolio equity assets + portfolio debt assets + other investment (%GDP)	Lane and Milesi-Ferretti (2006)
Capital Inflows: FDI liabilities + portfolio equity liabilities + portfolio debt liabilities + other investment (%GDP)	Lane and Milesi-Ferretti (2006)
Trade Openness: Exports of goods and services + Imports of goods and services(% GDP)	WDI

[1.] WDI (World Bank's World Development Indicator)

Table 3: Descriptive Statistics: Means and Standard Deviations (Industrial Countries)

	GDP per capita growth	Consumption per capita growth	Investment (%GDP)	Inflation Rates	Government Expenditure	Education	Capital Outflows	Capital Inflows	Trade Openness
Australia	1.716	1.823	25.754	6.906	18.119	96.809	25.570	62.413	34.110
	(1.736)	(1.338)	(1.870)	(3.915)	(1.402)	(32.146)	(20.947)	(35.823)	(5.116)
Austria	2.488	2.405	25.860	3.872	18.203	96.297	64.502	75.715	70.949
	(1.868)	(2.174)	(2.109)	(2.263)	(1.468)	(5.717)	(38.115)	(43.299)	(9.888)
Belgium	2.236	2.278	23.760	4.720	21.459	107.467	159.032	149.375	129.431
	(1.953)	(1.942)	(2.259)	(3.120)	(1.765)	(27.687)	(100.316)	(91.492)	(19.246)
Canada	1.922	1.817	24.809	5.178	21.532	92.911	50.046	79.955	57.180
	(2.136)	(1.923)	(1.512)	(3.387)	(1.312)	(13.837)	(23.778)	(17.449)	(12.628)
Denmark	1.555	1.090	23.855	5.789	25.499	107.960	62.973	91.931	66.480
	(1.896)	(2.253)	(3.006)	(3.756)	(1.698)	(12.056)	(48.250)	(46.087)	(7.632)
Finland	2.593	2.396	30.118	6.089	20.143	107.680	44.808	82.393	58.070
	(2.991)	(2.893)	(6.341)	(4.702)	(2.713)	(11.784)	(41.307)	(67.098)	(8.283)
France	2.046	1.935	24.949	5.874	21.433	91.956	67.193	66.024	43.185
	(1.407)	(1.345)	(2.047)	(4.092)	(2.166)	(13.460)	(50.413)	(49.442)	(5.971)
Greece	2.165	2.692	26.602	13.309	14.188	84.220	28.526	48.909	44.295
	(3.465)	(2.689)	(6.691)	(7.265)	(1.919)	(10.944)	(14.510)	(26.781)	(7.520)
Ireland	4.082	2.633	23.266	7.885	17.615	95.870	187.241	221.515	116.077
	(2.879)	(3.159)	(3.824)	(6.046)	(2.068)	(13.153)	(242.400)	(229.334)	(29.095)
Italy	2.228	2.539	24.967	8.638	18.121	78.189	42.072	47.598	43.598
	(1.841)	(2.028)	(3.335)	(5.854)	(1.303)	(12.281)	(26.380)	(29.254)	(6.057)
Japan	2.722	2.628	33.718	3.791	13.830	95.332	38.250	26.990	21.509
	(2.481)	(2.184)	(2.881)	(4.881)	(1.673)	(5.445)	(22.593)	(14.673)	(3.830)
Norway	1.804	1.551	24.585	4.173	23.825	106.023	137.226	128.201	105.042
	(1.617)	(2.007)	(3.196)	(2.763)	(1.433)	(20.768)	(86.854)	(99.763)	(11.014)
Netherlands	1.256	1.114	22.648	7.835	18.288	92.523	27.355	87.684	57.243
	(2.415)	(2.497)	(2.536)	(5.727)	(1.391)	(14.116)	(20.184)	(49.065)	(5.932)
New Zealand	2.971	2.309	30.710	6.037	19.982	100.165	53.654	62.559	74.006
	(1.815)	(2.430)	(6.048)	(3.454)	(1.705)	(12.951)	(42.622)	(23.253)	(4.141)
Portugal	3.344	2.932	23.048	13.279	15.385	68.819	49.627	79.230	61.236
	(3.973)	(4.415)	(3.271)	(8.362)	(2.739)	(25.905)	(42.724)	(51.855)	(9.245)
Spain	2.393	2.255	25.203	9.088	14.680	92.387	36.873	52.184	38.298
	(2.018)	(2.275)	(2.366)	(5.751)	(2.720)	(21.272)	(31.354)	(40.203)	(10.082)
Sweden	1.739	1.238	22.514	6.233	27.173	104.614	69.973	81.930	63.324
	(1.911)	(2.167)	(2.623)	(3.707)	(2.074)	(27.184)	(66.186)	(65.701)	(10.820)
Switzerland	0.983	1.079	30.099	3.324	10.679	90.972	260.615	167.626	69.006
	(2.229)	(1.475)	(2.912)	(2.509)	(1.003)	(13.303)	(130.354)	(114.152)	(7.282)
USA	2.098	2.595	19.073	7.382	20.175	93.360	170.422	166.506	52.902
	(1.932)	(2.219)	(1.410)	(5.544)	(1.257)	(19.288)	(77.282)	(81.297)	(4.478)
UK	1.956	2.236	21.003	5.001	16.585	91.712	37.019	40.000	19.284
	(2.089)	(1.652)	(1.539)	(2.983)	(1.114)	(5.492)	(19.246)	(27.178)	(3.798)

[1] Standard deviations are reported in parentheses.

Table 4: Descriptive Statistics: Means and Standard Deviations (Developing Countries)

	GDP per capita growth	Consumption per capita growth	Investment (%GDP)	Inflation Rates	Government Expenditure	Education	Capital Outflows	Capital Inflows	Trade Openness
Brazil	0.310	0.771	17.024	554.783	15.339	54.654	17.547	55.182	19.534
	(3.423)	(5.318)	(2.434)	(816.300)	(4.192)	(28.381)	(6.383)	(17.684)	(4.392)
Chile	2.629	2.365	18.161	64.992	12.675	60.286	32.983	81.108	50.509
	(5.409)	(9.560)	(4.180)	(119.992)	(1.865)	(15.160)	(22.205)	(30.543)	(11.871)
Colombia	1.739	1.374	13.319	20.065	12.269	46.305	20.994	41.883	32.259
	(2.264)	(2.851)	(2.480)	(7.354)	(4.727)	(15.456)	(8.653)	(13.027)	(4.717)
Egypt	3.548	2.939	8.420	12.443	14.909	63.270	23.643	74.123	54.520
	(2.976)	(3.589)	(2.810)	(6.078)	(4.267)	(15.833)	(13.377)	(21.314)	(11.930)
India	2.794	2.019	11.619	8.189	10.922	36.913	5.959	23.308	17.033
	(2.957)	(2.576)	(0.701)	(5.570)	(1.038)	(10.030)	(4.744)	(8.102)	(6.142)
Indonesia	4.180	4.571	18.357	13.077	8.785	36.913	14.344	61.539	50.559
	(3.785)	(7.803)	(3.708)	(10.854)	(1.494)	(10.030)	(9.136)	(32.021)	(11.919)
Korea	6.484	5.784	33.511	10.185	11.166	32.632	14.123	38.375	60.790
	(2.748)	(2.193)	(6.414)	(7.601)	(0.854)	(12.423)	(3.771)	(11.706)	(7.623)
Malaysia	4.077	3.364	23.507	3.979	14.342	52.473	46.518	79.902	133.846
	(3.849)	(5.401)	(5.289)	(3.268)	(2.095)	(11.327)	(20.631)	(32.655)	(49.313)
Mexico	1.568	1.394	19.362	31.846	9.916	50.072	13.168	49.633	34.610
	(3.495)	(3.871)	(3.150)	(32.729)	(1.276)	(16.253)	(6.850)	(19.037)	(15.801)
Morocco	1.794	1.343	13.970	6.119	17.017	28.930	20.850	76.215	54.662
	(4.356)	(4.862)	(3.207)	(4.069)	(2.799)	(10.524)	(13.304)	(28.374)	(8.461)
Pakistan	2.621	1.982	13.686	9.839	12.020	17.474	6.186	47.022	33.121
	(2.451)	(6.523)	(1.073)	(5.542)	(1.773)	(4.829)	(1.976)	(7.481)	(4.525)
Peru	0.183	0.031	16.775	398.696	10.504	60.177	17.253	70.654	33.348
	(5.349)	(5.138)	(3.452)	(1381.604)	(1.536)	(17.612)	(7.869)	(15.877)	(5.176)
Philippines	1.007	0.920	15.713	12.251	11.714	64.636	21.239	71.484	61.855
	(3.360)	(3.354)	(3.573)	(9.559)	(9.427)	(11.688)	(8.984)	(23.875)	(21.170)
South Africa	0.037	0.940	10.683	11.882	16.765	58.853	17.944	46.944	50.341
	(2.438)	(2.752)	(2.896)	(3.438)	(2.554)	(8.698)	(4.098)	(9.619)	(6.553)
Thailand	5.390	4.146	33.369	6.413	10.990	31.083	15.934	44.416	58.136
	(3.093)	(3.129)	(4.892)	(5.473)	(1.317)	(11.255)	(6.499)	(21.196)	(18.017)

[1] Standard deviations are reported in parentheses.

Table 5: Panel Volatility Model: Consumption Growth

Dependent Variable: Consumption Growth	Model A1	Model A2	Model A3
Conditional Mean Equation			
Investment (%GDP)	16.188**	11.733*	19.894**
	(0.000)	(0.051)	(0.000)
Inflation	-0.102	-0.203**	-0.179**
	(0.288)	(0.000)	(0.000)
Government Expenditure	-0.296**	-0.120**	-0.280**
	(0.000)	(0.000)	(0.000)
Education	0.003	-0.005	0.001
	(0.660)	(0.352)	(0.212)
Capital Outflows	1.743**	-0.374	0.845
	(0.024)	(0.665)	(0.372)
Capital Inflows	-1.841**	0.322	-0.827
	(0.029)	(0.626)	(0.425)
Trade Openness	0.991	0.726	0.403
	(0.474)	(0.149)	(0.686)
Conditional Variance Equation			
Investment (%GDP)	-1.118**	-0.858**	-0.923
	(0.041)	(0.021)	(0.125)
Trade Openness	0.778**	0.645**	0.851**
	(0.017)	(0.040)	(0.030)
Capital Outflows	-0.990**	-0.338**	-0.374*
	(0.000)	(0.029)	(0.078)
Capital Inflows	0.347	-0.317	-0.473**
	(0.207)	(0.110)	(0.041)
Log Likelihood Value	-2.501	-2.438	-2.352
AIC	-2810	-2740	-2680
BIC	-2925	-2883	-2882

[1] p-values are in parentheses.C

[2] * (**) indicates significance at the 10% (5%) level.

Table 6: Panel Volatility Model: Output Growth

Dependent Variable: Output Growth	Model A1	Model A2	Model A3
Conditional Mean Equation			
Investment (%GDP)	20.522** (0.000)	13.514** (0.000)	20.782** (0.000)
Inflation	-0.140** (0.000)	-0.191** (0.000)	-0.151** (0.000)
Government Expenditure	-0.227** (0.000)	-0.117** (0.000)	-0.230** (0.000)
Education	0.005 (0.500)	-0.012** (0.000)	0.008 (0.275)
Capital Outflows	1.546* (0.073)	-0.217 (0.622)	1.368 (0.112)
Capital Inflows	-1.558* (0.091)	0.237 (0.536)	-1.544* (0.068)
Trade Openness	0.788 (0.675)	1.123** (0.000)	1.765 (0.347)
Conditional Variance Equation			
Investment (%GDP)	-0.631* (0.057)	-1.484** (0.000)	-1.550** (0.007)
Trade Openness	0.450** (0.026)	0.782** (0.011)	0.896* (0.084)
Capital Outflows	-0.563** (0.000)	-0.354** (0.019)	-0.365** (0.039)
Capital Inflows	0.205 (0.360)	-0.216 (0.206)	-0.378** (0.044)
Log Likelihood Value	-2.355 55	-2.342	-2.269
AIC	-2648 8	-2634	-2578
BIC	-2763 3	-2749	-2781

[1] p-values are in parentheses.C

[2] * (**) indicates significance at the 10% (5%) level.

Table 7: Panel Volatility Model: Consumption Growth

Dependent Variable: Consumption Growth	Model B1	Model B2	Model B3
Conditional Mean Equation			
Investment (%GDP)	15.741**	11.464**	19.654**
	(0.000)	(0.000)	(0.040)
Inflation	-0.093	-0.202**	-0.179**
	(0.352)	(0.000)	(0.000)
Government Expenditure	-0.290**	-0.118**	-0.284**
	(0.000)	(0.000)	(0.000)
Education	0.007	-0.006	0.009
	(0.416)	(0.156)	(0.168)
Capital Outflows	1.477*	-0.564	0.838
	(0.093)	(0.464)	(0.346)
Capital Inflows	-1.554	0.485	-0.832
	(0.104)	(0.457)	(0.403)
Trade Openness	0.932	0.829**	0.384
	(0.530)	(0.020)	(0.809)
Conditional Variance Equation			
Investment (%GDP)	-0.776	-0.703**	-0.809
	(0.125)	(0.041)	(0.196)
Trade Openness	0.808**	0.193	0.434**
	(0.011)	(0.570)	(0.360)
Capital Outflows (Industrial Country)	-0.529**	-0.393	-0.556**
	(0.022)	(0.163)	(0.033)
Capital Inflows (Industrial Country)	0.110	-0.290	-0.303
	(0.709)	(0.389)	(0.334)
Capital Outflows (Developing Country)	-1.221**	-0.036	-0.088
	(0.000)	(0.843)	(0.762)
Capital Inflows (Developing Country)	0.696	0.194	-0.077
	(0.211)	(0.509)	(0.883)
Log Likelihood Value	-2.490	-2.433	-2.348
AIC	-2799	-2736	-2678
BIC	-2919	-2857	-2885

[1] p-values are in parentheses.C

[2] * (**) indicates significance at the 10% (5%) level.

Table 8: Panel Volatility Model: Output Growth

Dependent Variable: Output Growth	Model B1	Model B2	Model B3
Conditional Mean Equation			
Investment (%GDP)	18.702**	13.080**	20.264**
	(0.004)	(0.000)	(0.000)
Inflation	-0.135**	-0.191**	-0.152**
	(0.002)	(0.001)	(0.001)
Government Expenditure	-0.218**	-0.111**	-0.219**
	(0.002)	(0.000)	(0.000)
Education	0.005	-0.013**	0.008
	(0.499)	(0.000)	(0.320)
Capital Outflows	1.181	-0.431	1.233
	(0.167)	(0.362)	(0.196)
Capital Inflows	-1.234	0.432	-1.453
	(0.173)	(0.292)	(0.142)
Trade Openness	0.282	1.233**	1.957
	(0.440)	(0.000)	(0.422)
Conditional Variance Equation			
Investment (%GDP)	-0.623**	-1.259**	-1.261**
	(0.022)	(0.00)	(0.021)
Trade Openness	0.510**	0.074	0.075*
	(0.010)	(0.821)	(0.837)
Capital Outflows (Industrial Country)	-0.239	-0.119	-0.426**
	(0.245)	(0.649)	(0.071)
Capital Inflows (Industrial Country)	0.305	-0.499*	-0.347
	(0.266)	(0.080)	(0.205)
Capital Outflows (Developing Country)	-0.812**	-0.123	-0.028
	(0.00.)	(0.513)	(0.902)
Capital Inflows (Developing Country)	0.817**	0.607**	0.410
	(0.001)	(0.019)	(0.213)
Log Likelihood Value	-2.341	-2.331	-2.250
AIC	-2635	-2624	-2569
BIC	-2755	-2744	-2777

[1] p-values are in parentheses.C

[2] * (**) indicates significance at the 10% (5%) level.

Table 9: Panel ARCH Model: Consumption Growth

Dependent Variable: Consumption Growth	Model C1	Model C2	Model C3
Conditional Mean Equation			
Investment (%GDP)	18.929**	10.616**	20.408**
	(0.000)	(0.000)	(0.000)
Inflation	-0.184**	-0.193**	-0.170**
	(0.000)	(0.000)	(0.000)
Government Expenditure	-0.252**	-0.097**	-0.282**
	(0.000)	(0.000)	(0.000)
Education	0.007	-0.006**	0.011**
	(0.430)	(0.003)	(0.003)
Capital Outflows	1.569	-0.905	1.009
	(0.113)	(0.452)	(0.264)
Capital Inflows	-1.611	0.773	-1.067
	(0.153)	(0.457)	(0.287)
Trade Openness	1.274**	0.927	0.971
	(0.085)	(0.113)	(0.512)
Conditional Variance Equation			
λ	-0.085	-0.046	0.033
	(0.277)	(0.541)	(0.609)
β	0.567**	0.328**	0.215
	(0.000)	(0.001)	(0.101)
Investment (%GDP)	-0.880**	-0.920	-0.919
	(0.047)	(0.194)	(0.227)
Trade Openness	0.854**	0.576	0.394
	(0.007)	(0.238)	(0.401)
Capital Outflows (Industrial Country)	-0.624**	-0.489**	-0.653**
	(0.030)	(0.036)	(0.011)
Capital Inflows (Industrial Country)	-0.127	-0.349	-0.274
	(0.724)	(0.310)	(0.402)
Capital Outflows (Developing Country)	-1.295**	-0.065	-0.034
	(0.000)	(0.861)	(0.926)
Capital Inflows (Developing Country)	1.051**	0.021	-0.010
	(0.008)	(0.967)	(0.984)
Log Likelihood Value	-2.451	-2.415	-2.336
AIC	-2764	-2725	-2671
BIC	-2892	-2853	-2883

[1] p-values are in parentheses.C

[2] * (**) indicates significance at the 10% (5%) level.

Table 10: Panel ARCH Model: Output Growth

Dependent Variable: Output Growth	Model C1	Model C2	Model C3
Conditional Mean Equation			
Investment (%GDP)	16.319**	11.834**	17.376**
	(0.000)	(0.000)	(0.000)
Inflation	-0.153**	-0.181**	-0.158**
	(0.000)	(0.000)	(0.000)
Government Expenditure	-0.206**	-0.101**	-0.233**
	(0.000)	(0.004)	(0.001)
Education	-0.001	-0.012**	0.004**
	(0.691)	(0.003)	(0.000)
Capital Outflows	0.173	-0.947	0.636
	(0.856)	(0.269)	(0.603)
Capital Inflows	-0.431	0.922	-0.977
	(0.650)	(0.201)	(0.410)
Trade Openness	3.120**	1.217**	3.112
	(0.055)	(0.009)	(0.157)
Conditional Variance Equation			
λ	-0.094	-0.003	-0.024
	(0.144)	(0.961)	(0.667)
β	0.562**	0.452**	0.355
	(0.000)	(0.000)	(0.139)
Investment (%GDP)	-1.056**	-1.149**	-1.316**
	(0.004)	(0.038)	(0.025)
Trade Openness	0.624**	0.259	0.430
	(0.011)	(0.525)	(0.442)
Capital Outflows (Industrial Country)	-0.160**	-0.371	-0.348
	(0.023)	(0.210)	(0.251)
Capital Inflows (Industrial Country)	-0.584	-0.366	-0.541
	(0.393)	(0.268)	(0.116)
Capital Outflows (Developing Country)	-0.679**	-0.004	0.041
	(0.001)	(0.988)	(0.861)
Capital Inflows (Developing Country)	0.645**	0.654**	0.249
	(0.010)	(0.021)	(0.445)
Log Likelihood Value	-2.311	-2.307	-2.234
AIC	-2609	-2605	-2558
BIC	-2737	-2733	-2771

[1] p-values are in parentheses.C

[2] * (**) indicates significance at the 10% (5%) level.

Table 11: Panel ARCH Model with Bias Correction: Consumption Growth

Dependent Variable: Consumption Growth	Model D1	Model D2	Model D3
Conditional Mean Equation			
Investment (%GDP)	18.928**	10.410**	20.408**
	(0.000)	(0.000)	(0.000)
Inflation	-0.185**	-0.179**	-0.169**
	(0.000)	(0.000)	(0.000)
Government Expenditure	-0.295**	-0.100**	-0.290**
	(0.000)	(0.000)	(0.000)
Education	0.008	-0.006**	0.011**
	(0.670)	(0.004)	(0.000)
Capital Outflows	1.571	-0.890	1.007
	(0.249)	(0.029)	(0.242)
Capital Inflows	-1.613	0.736	-1.068
	(0.303)	(0.105)	(0.274)
Trade Openness	1.272	0.977**	0.975
	(0.564)	(0.002)	(0.512)
Conditional Variance Equation			
λ	-0.104	-0.051	0.036
	(0.220)	(0.152)	(0.586)
β	0.567**	0.271**	0.213
	(0.000)	(0.000)	(0.108)
Investment (%GDP)	-0.859*	-0.823*	-0.921
	(0.097)	(0.072)	(0.228)
Trade Openness	0.854**	0.623*	0.390
	(0.008)	(0.056)	(0.405)
Capital Outflows (Industrial Country)	-0.617**	-0.548**	-0.659**
	(0.036)	(0.000)	(0.009)
Capital Inflows (Industrial Country)	-0.122	-0.291*	-0.274
	(0.726)	(0.090)	(0.384)
Capital Outflows (Developing Country)	-1.298**	-0.084	-0.025
	(0.000)	(0.726)	(0.945)
Capital Inflows (Developing Country)	1.050**	0.015	-0.006
	(0.018)	(0.964)	(0.991)

[1] p-values are in parentheses.C

[2] * (**) indicates significance at the 10% (5%) level.

Table 12: Panel ARCH Model with Bias Correction: Output Growth

Dependent Variable: Output Growth	Model D1	Model D2	Model D3
Conditional Mean Equation			
Investment (%GDP)	16.318**	11.835**	17.379**
	(0.000)	(0.000)	(0.000)
Inflation	-0.149**	-0.183**	-0.156**
	(0.011)	(0.000)	(0.000)
Government Expenditure	-0.221**	-0.100**	-0.228**
	(0.000)	(0.004)	(0.001)
Education	0.002	-0.012**	0.004
	(0.532)	(0.003)	(0.631)
Capital Outflows	0.160	-0.949	0.626
	(0.403)	(0.256)	(0.704)
Capital Inflows	-0.427	0.922	-0.999
	(0.226)	(0.190)	(0.567)
Trade Openness	3.116**	1.216**	3.099
	(0.000)	(0.008)	(0.179)
Conditional Variance Equation			
λ	-0.123*	0.001	-0.021
	(0.055)	(0.988)	(0.723)
β	0.563**	0.448**	0.340
	(0.000)	(0.000)	(0.128)
Investment (%GDP)	-1.043**	-1.149**	-1.327**
	(0.000)	(0.001)	(0.000)
Trade Openness	0.631**	0.259	0.423
	(0.028)	(0.519)	(0.527)
Capital Outflows (Industrial Country)	-0.160	-0.373	-0.356
	(0.709)	(0.203)	(0.471)
Capital Inflows (Industrial Country)	-0.588	-0.365	-0.545
	(0.240)	(0.268)	(0.335)
Capital Outflows (Developing Country)	-0.681**	-0.003	0.035
	(0.000)	(0.990)	(0.927)
Capital Inflows (Developing Country)	0.638*	0.652**	0.258
	(0.087)	(0.020)	(0.514)

[1] p-values are in parentheses.C

[2] * (**) indicates significance at the 10% (5%) level.

Table 13: Conventional Regression Model

Dependent Variables	Consumption Growth Volatility		Output Growth Volatility	
	Model E	Model F	Model E	Model F
(Intercept)	1.726**	1.894**	1.336**	1.520**
	(0.007)	(0.003)	(0.002)	(0.000)
Dummy Variable	0.238	-0.766*	0.070	-0.830**
(Developed Country=1)	(0.436)	(0.075)	(0.735)	(0.004)
Investment (%GDP)	-0.714	-0.534	-0.055	0.094
	(0.605)	(0.689)	(0.953)	(0.916)
Inflation@	0.120**	0.109**	0.119**	0.110**
	(0.006)	(0.010)	(0.000)	(0.000)
Government Expenditure	-0.008	0.009	-0.022	-0.007
	(0.688)	(0.673)	(0.114)	(0.617)
Education	-0.011**	-0.014**	-0.003	-0.006*
	(0.014)	(0.003)	(0.329)	(0.058)
Trade Openness	0.545*	0.290	0.236	-0.025
	(0.097)	(0.423)	(0.287)	(0.917)
Capital Outflows	-0.770**		-0.556**	
	(0.003)		(0.002)	
Capital Inflows	0.831**		0.544**	
	(0.015)		(0.018)	
Capital Outflows		-0.270		-0.139
(Industrial Country)		(0.347)		(0.463)
Capital Inflows		0.273		0.097
(Industrial Country)		(0.463)		(0.693)
Capital Outflows		-1.237		-0.614
(Developing Country)		(0.334)		(0.468)
Capital Inflows		2.514**		1.935**
(Developing Country)		(0.000)		(0.000)
R-squared:	0.308	0.357	0.253	0.338
Adjusted R-squared	0.279	0.324	0.222	0.303

[1] p-values are in parentheses.C

[2] * (**) indicates significance at the 10% (5%) level.

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