**Fordham University
Department of Economics
Discussion Paper Series**

Changes in the Second Moment Properties of Disaggregated Capital Flows

Silvio Contessi
Federal Reserve Bank of St. Louis, Research Division

Pierangelo De Pace
Pomona College, Department of Economics

Johanna Francis
Fordham University, Department of Economics

Department of Economics
Fordham University
441 E Fordham Rd, Dealy Hall
Bronx, NY 10458
(718) 817-4048

Changes in the Second-Moment Properties

of Disaggregated Capital Flows[*]

Silvio Contessi

Federal Reserve Bank

of St. Louis

Pierangelo De Pace

Pomona College

Johanna L. Francis

Fordham University

June 2010

Abstract

Using formal statistical tests, we detect (i) significant volatility increases for various types of capital flows for a period of changes in business cycle comovement among the G7 countries, and (ii) mixed evidence of changes in covariances and correlations with a set of macroeconomic variables.

JEL Classification Numbers: *E32, F21, F32, F36*

Keywords: *Capital Flows, International Business Cycles.*

---

[*]Silvio Contessi (corresponding author): Federal Reserve Bank of St. Louis, Research Division, P.O. Box 442, St. Louis MO 63166-0442, Telephone: 314-444-7410, Fax: 314-444-8731, silvio.contessi@stls.frb.org. Pierangelo De Pace: Pomona College, Department of Economics, Carnegie Building, Room 205, 425 N College Avenue Claremont, CA 91711, Telephone: 909-621-8744, pierangelo.depace@pomona.edu. Johanna Francis: Fordham University, Department of Economics, E-507 Dealy Hall, 441 East Fordham Road, Bronx, NY, 10458, ajofrancis@fordham.edu. The views expressed are those of the authors and do not represent official positions of the Federal Reserve Bank of St. Louis, the Board of Governors, or the Federal Reserve System.

1 Introduction

Gross capital flows among industrialized countries expanded by 722% between 1991 and 2005. This increase exceeded real GDP growth (approximately 29%) and international trade growth (about 151%) in advanced economies. During those years macroeconomic comovement among the G7 economies was lower than in previous decades.[1] Did the cyclical behavior of capital flows change during this period of increased financial globalization and decreased comovement?

Most empirical research on capital flows has focused on aggregate net flows, flows between specific country pairs, and single components of flows. In the present work we revisit an idea originally suggested by Doyle and Faust (2005, DF, henceforth) in the international business cycle (IBC) literature and use formal statistical tests for changes in the volatility of capital flows and in the comovement between flows and macroeconomic variables over business cycle breaks in G7 countries.

We use data on total net and disaggregated gross flows between 1975:Q1 and 2005:Q4 and compute the ratio between each flow and domestic GDP.[2] We take the log of real GDP, the ratio between gross fixed capital formation and GDP (Source: OECD Quarterly National Accounts), and the real interest rate (Source: IFS), and estimate the cyclical components of each transformed macroeconomic and capital flow series using standard filtering techniques. We find that recent changes in international business cycles are not associated with systematic changes in the second-moment properties of disaggregated flows, except for a general volatility increase.[3]

1.1 Related Literature

Numerous studies in applied macroeconometrics and IBC, among them McConnell and Quiros (2000) and Heathcote and Perri (2004), examine changes in domestic volatility and cross-country correlation of macroeconomic aggregates over the past three decades. DF detect falling volatility in macroeconomic variables of G7 countries, but no variation in cross-country comovement. Stock and Watson (2005) suggest

---

[1] Heathcote and Perri (2004) and Stock and Watson (2005).

[2] We analyze 11 flows (International Financial Statistics, IFS, by IMF) for each country: inward FDI (iFDI), inward Foreign Portfolio Investment (iFPI), inward debt (iDebt), total inward flows (iTot); outward FDI (oFDI), outward Portfolio Investment (oFPI), outward debt (oDebt), total outward flows (oTot); net total flows (noTot), defined as outward flows net of inward flows; net FDI (noFDI), net FPI (noFPI), net debt (noDebt), defined analogously. These ratios are conceptually similar to net exports-to-GDP ratios in the IBC literature. See Neumeyer and Perri (2005).

[3] In this work a single capital flow is said to be procyclical (countercyclical) with respect to a reference macroeconomic variable if the correlation of the cyclical component of the ratio between that capital flow and GDP and the cyclical component of the reference macroeconomic variable is positive (negative), and significantly different from zero.

that the widespread drop in volatility was mostly associated with a reduction in the magnitude of common international shocks. De Pace (2010) uses parametric bootstrap techniques to describe comovement changes in IBC within free-trade areas and the European currency union and finds some evidence of positive variations.

Levy-Yeyati, Panizza, and Stein (2007) study north-south FDI and find that outward FDI is counter-cyclical with respect to output and interest rate cycles in the US and Europe (but mildly procyclical in Japan), and that FDI and local investment in the source country are negatively correlated. Kaminsky, Reinhart, and Vegh (2005) show that net capital inflows are procyclical (borrowing increases in boom times and vice versa) in a sample of 104 countries. Levchenko and Mauro (2007) look at 142 countries between 1970 and 2003 and show that FDI is the least volatile capital flow and is remarkably more stable than other types of flows during sudden stops episodes, whereas bank lending flows drop dramatically and take a long time to recover. Smith and Valderrama (2009) consider emerging markets and find that debt and portfolio flows (FPI) are more correlated with investment than with GDP, whereas FDI is more correlated with GDP. Contessi, De Pace, and Francis (2010) look at disaggregated flows in 22 countries and find that, while inward flows are procyclical, outward and net outward flows are countercyclical for most industrial and emerging countries, except the G7. Results for individual flows are ambiguous, except for inward FDI flows, which are procyclical in industrial countries, countercyclical in emerging countries.

2 Breakpoint Analysis

We test for changes in volatility and comovement using the nonparametric bootstrap procedure described in De Pace (2010). We use two exogenous breaks, Br, 1992:Q2, estimated by DF for GDP and 1993:Q1 for investment. These breaks mark the most likely change dates in comovement among G7 countries between the 1980s and the 1990s. We use 1992:Q2 for the real interest rate. To test for second moment shifts in time series pairs (covariances and correlations) or in single time series (variances), we bootstrap nonparametrically the difference of the second moments over two subsequent subsamples. Let θ be the parameter of interest (variance, covariance, or the correlation coefficient), θ_1 its true value over the first sample, θ_2 its true value over the second sample. We test whether the parameter shift, $\Delta\theta = (\theta_2 - \theta_1)$, is statistically significant. Formally, we run the statistical test with size $(1 - \alpha) \in (0, 1)$, $H_0 : \Delta\theta = (\theta_2 - \theta_1) = 0$ against the alternative $H_1 : \Delta\theta = (\theta_2 - \theta_1) \neq 0$. Two-sided, α-level, and equal-tailed

confidence intervals, constructed from the bootstrap distribution of $\widehat{\Delta\theta}$, are used to detect significant shifts and infer the sign of their direction. Bootstrap iteration is applied to estimate confidence intervals with improved accuracy as described in DiCiccio, Martin, and Young (1992).[4] Shifts significant at the 10% level signal parameter instability.

2.1 Constructing the Bootstrap Distribution for $\widehat{\Delta\theta}$

Let $X_{A,t} = \{X_{A,s}\}_{s=1}^{T}$ and $X_{B,t} = \{X_{B,s}\}_{s=1}^{T}$ denote two observed time series for countries A and B. Let $Br \in (1,T)$ be an exogenous breakpoint, which splits $X_{A,t}$ and $X_{B,t}$ into two subsamples, $X_{A,t}^{1} = \{X_{A,s}\}_{s=1}^{Br}$, $X_{B,t}^{1} = \{X_{B,s}\}_{s=1}^{Br}$, $X_{A,t}^{2} = \{X_{A,s}\}_{s=Br+1}^{T}$, and $X_{B,t}^{2} = \{X_{B,s}\}_{s=Br+1}^{T}$. Let θ be either the correlation coefficient or the covariance. In the first subsample, let $w_{A,i,l}$ and $w_{B,i,l}$ respectively denote the blocks $\left\{X_{A,s}^{1}\right\}_{s=i}^{i+l-1}$ and $\left\{X_{B,s}^{1}\right\}_{s=i}^{i+l-1}$ of length l starting at $X_{A,i}^{1}$ and $X_{B,i}^{1}$, with $X_{A,i}^{1} = X_{A,1+\{(i-1)\bmod Br\}}^{1}$, $X_{B,i}^{1} = X_{B,1+\{(i-1)\bmod Br\}}^{1}$, $X_{A,0}^{1} = X_{A,Br}^{1}$, and $X_{B,0}^{1} = X_{B,Br}^{1}$. Finally, let $I_1, I_2, \ldots$ be a stream of random numbers uniform on the integers $1, \ldots, Br$, and let $L_1, L_2, \ldots$ be a stream of random numbers independently drawn from a geometric distribution, $Prob\left(L = l\right) = \lambda\left(1 - \lambda\right)^{l-1}$ with $l = 1, 2, \ldots$. The inverse of λ is the expected block length, $E\left(L\right) = \frac{1}{\lambda}$, to be estimated through an inner procedure based on an automatic rule that minimizes an appropriate objective function. Given $\widehat{\left(\frac{1}{\lambda}\right)}$, the algorithm that generates a couple of stationary bootstrap time series replicates over the first subsample, $X_{A,t}^{1*}$ and $X_{B,t}^{1*}$, runs as follows: (i) set $X_{A,t}^{1*} = w_{A,I_1,L_1}$, $X_{B,t}^{1*} = w_{B,I_1,L_1}$, and $j = 1$; (ii) while $length\left(X_{A,t}^{1*}\right) < Br$, increment j by 1 and redefine $X_{A,t}^{1*}$ and $X_{B,t}^{1*}$ as $X_{A,t}^{1*} := X_{A,t}^{1*} \cup w_{A,I_j,L_j}$ and $X_{B,t}^{1*} := X_{B,t}^{1*} \cup w_{B,I_j,L_j}$; (iii) if $length\left(X_{A,t}^{1*}\right) > Br$, discard the two series of pseudo-data just generated and restart resampling from (i) after drawing new streams of I_j's and L_j's. We apply this scheme to both the first and the second subsamples N_O^B times. At each complete resample of the original data, we estimate and collect $\widehat{\Delta\theta}^{*} = \left\{\widehat{\theta}\left(X_{A,t}^{2*}, X_{B,t}^{2*}\right) - \widehat{\theta}\left(X_{A,t}^{1*}, X_{B,t}^{1*}\right)\right\}$ to compose the bootstrap distribution of $\widehat{\Delta\theta}$. The same logic applies with just one time series, if the statistic of interest is the variance.

---

[4]We resample blocks of random length. Length is sampled from an independent geometric distribution whose expected value equals the expected block size. The original series should be *wrapped* around a circle to fill blocks going past the last observation. Optimal expected length is estimated through an inner (smaller) bootstrap procedure. This resampling scheme is known as stationary bootstrap.

2.2 Estimating Accurate Confidence Intervals for $\Delta\theta$

Let $X_{A,t}$ and $X_{B,t}$ be two variables and $I_0\left(\alpha; X_{A,t}, X_{B,t}; X_{A,t}^*, X_{B,t}^*\right)$ the uncorrected bootstrap percentile confidence interval of nominal coverage probability α for $\Delta\theta$, where θ is either the correlation or the covariance.[5] $X_{A,t}^*$ and $X_{B,t}^*$ are two generic resamples with replacement from $X_{A,t}$ and $X_{B,t}$. I_0 is constructed from sample and resample information. Usually, in empirical applications, the coverage probability of I_0, namely $P\left(\alpha\right) = Prob\left\{\Delta\theta \in I_0\left(\alpha; X_{A,t}, X_{B,t}; X_{A,t}^*, X_{B,t}^*\right)\right\}$, differs from α. There exists a real number, ϱ_α, such that $P\left(\varrho_\alpha\right) = \alpha$.

Let $I_0\left(\alpha; X_{A,t}^*, X_{B,t}^*; X_{A,t}^{**}, X_{B,t}^{**}\right)$ be a version of $I_0\left(\alpha; X_{A,t}, X_{B,t}; X_{A,t}^*, X_{B,t}^*\right)$ computed using information from $X_{A,t}^*$, $X_{B,t}^*$, $X_{A,t}^{**}$, and $X_{B,t}^{**}$; $X_{A,t}^{**}$ and $X_{B,t}^{**}$ are resamples with replacement of $X_{A,t}^*$ and $X_{B,t}^*$. An estimate of $P\left(\alpha\right)$ is $\widehat{P}\left(\alpha\right) = Prob\left\{\widehat{\Delta\theta} \in I_0\left(\alpha; X_{A,t}^*, X_{B,t}^*; X_{A,t}^{**}, X_{B,t}^{**} | X_{A,t}, X_{B,t}\right)\right\}$. Let N_O^B be the number of bootstrap replications at the outer level of resampling, then $\widehat{P}\left(\alpha\right)$ is calculated as $\widehat{P}\left(\alpha\right) = \sum_{n_O^B=1}^{N_O^B} 1\left\{\widehat{\Delta\theta} \in I_{0,n_O^B}\left(\alpha; X_{A,t}^*, X_{B,t}^*; X_{A,t}^{**}, X_{B,t}^{**}\right)\right\} / N_O^B$.

Since distribution information on $X_{A,t}^{**}$ and $X_{B,t}^{**}$ given $X_{A,t}^*$ and $X_{B,t}^*$ is unavailable, an inner level of resamples (say, N_I^B resamples for each outer resample, n_O^B) from $X_{A,t}^*$ and $X_{B,t}^*$ is used to outline the features of that distribution.[6]

The bootstrap estimate for ϱ_α is the solution, $\widehat{\varrho}_\alpha$, to the equation $\widehat{P}\left(\varrho_\alpha\right) = \alpha \therefore \widehat{\varrho}_\alpha = \widehat{P}^{-1}\left(\alpha\right)$. The iterated bootstrap confidence interval for $\Delta\theta$ is then $I_1\left(\widehat{\varrho}_\alpha; X_{A,t}, X_{B,t}; X_{A,t}^*, X_{B,t}^*\right)$.

3 Shifts in Second Moments

Inward and outward FDI and FPI exhibit a positive trend from the mid-90s, with peaks in the late 1990s and early 2000s. Debt flows have high volatility, but no clear pattern, except for an upward trend in the US. Five-year rolling standard deviations (SDs) generally increase and then slightly rebound due to the boom and subsequent slowdown in capital flows in the late 1990s and early 2000s. The SD of inward debt flows is high and rising roughly throughout the sample in Canada, Italy, and the US. The SD of outward debt flows trends upwards in Italy and the US only.

---

[5] The framework is adjusted accordingly when only one time series is used to estimate variance changes.

[6] We use $1,000$ replications for the outer bootstrap; 500 for the inner bootstrap. Bootstrap samples are drawn using the same nonparametric method in the main and nested bootstraps. We choose the smallest value $\widehat{\varrho}_\alpha$ such that $\widehat{P}\left(\widehat{\varrho}_\alpha\right)$ is as close as possible to α, i.e., such that $\left|\widehat{P}\left(\varrho_\alpha\right) - \alpha\right|$ is minimized over a grid of values and additional conditions defining tolerance are satisfied (De Pace, 2010).

Inward and outward flows are dominated by movements in debt and exhibit only a mildly increasing trend. Their volatility increases throughout the sample in most countries. There is little trend in the volatility of net flows, except in France and the US (increasing volatility), and the UK (declining volatility). Net outward flows exhibit a slightly increasing trend except in the US, where they markedly trend downwards. Net flow volatility is lower than both inward and outward flow volatility for most G7 countries.[7] Debt is the most volatile type of capital flow.

In Table 1, we summarize the number and sign of correlations between the cyclical components of disaggregated capital flows and real GDP (g), investment to GDP ratio (ι), and real interest rate (r) over the periods 1975-1992, 1992-2005, and 1975-2005. We test whether each correlation is significant at the 10% level using the nonparametric framework described above. A particular flow is procyclical (countercyclical) with respect to a reference macroeconomic variable if the majority of significant correlations is positive (negative). Its cyclical properties are ambiguous if the number of significantly positive correlations equals the number of significantly negative correlations and non-significantly positive and negative values are equal in number.

AGGREGATE FLOWS. (1A) Inward flows are procyclical with respect to GDP, investment, and the real interest rate. (1B) Outward flows are procyclical with respect to GDP and investment, and to some extent to the real interest rate. (1C) Net outward flows are countercyclical with respect to GDP and investment, and to some extent to the real interest rate.

DISAGGREGATED FLOWS. (2A) Inward and outward FDI tend to be procyclical with all three reference macroeconomic variables. Net outward FDI is procyclical with respect to investment. (2B) Inward FPI and debt tend to be procyclical in most countries. (2C) Outward FPI and net outward FPI are countercyclical with respect to the real interest rate.

In Table 2, we describe the second-moment variations between net, gross, and disaggregated capital flows and the reference macroeconomic variables.

VARIANCE CHANGES: MACROECONOMIC VARIABLES. Almost all sample variance shifts in GDP, investment, and the real interest rate are negative. Many are significant. This decrease in correlation is linked to the Great Moderation and consistent with DF and Stock and Watson (2005).

VARIANCE CHANGES: DISAGGREGATED CAPITAL FLOWS. Sample variances generally increase over

---

[7]Contessi et al. (2010) show that this pattern does not extend to other OECD and emerging-market countries.

the breaks for net, total, and disaggregated flows. The majority of these shifts is statistically significant. This finding suggests the existence of an underlying common factor affecting the volatility properties of total inward and outward flows across countries, whose existence would not clearly emerge if we only considered net flows (as in Kaminsky, Reinhart, and Vegh 2005), for which we observe a few negative point estimates.

Since most of the variances of macroeconomic variables decrease and most of the variances of capital flows increase, the correlation variations depend on the size of the covariance changes between these variables relative to the changes in their standard deviations.

CORRELATION AND COVARIANCE CHANGES. Results are heterogeneous across types of flows and macro aggregates. In general, we cannot identify specific patterns. Pointwise, covariance changes usually have the same sign as correlation changes, with only few exceptions due to the relative idiosyncratic variations in the standard deviations. Furthermore, the proportion of significant shifts is modest.

4   Conclusion

We run formal statistical tests to make inferences on the variations of volatility, covariance, and correlation between capital flows and a set of macroeconomic variables in the G7 countries. Second-moment shifts show mixed signs over recent breaks in international business cycles. We detect a clear statistically significant increase in the variance of all types of flows.

References

Contessi, S., De Pace, P., Francis, J., 2010. The cyclical properties of disaggregated capital flows, federal Reserve Bank of St. Louis Working Paper No. 2008-041.

De Pace, P., 2010. Currency union, free-trade areas, and business cycle synchronization, pomona College, manuscript.

DiCiccio, T. J., Martin, M. A., Young, G. A., 1992. Fast and accurate approximate double bootstrap confidence intervals. Biometrika 79 (2), 285–295.

Doyle, B., Faust, J., 2005. Breaks in the variability and co-movement of g-7 economic growth. Review of Economics and Statistics 87 (4), 721–740.

Heathcote, J., Perri, F., December 2004. Financial globalization and real regionalization. Journal of Economic Theory 119 (1), 207–243.

Kaminsky, G. L., Reinhart, C. M., Vegh, C. A., 2005. When it rains, it pours: Procyclical capital flows and macroeconomic policies. In: Gertler, M., Rogoff, K. (Eds.), NBER Macroeconomics Annual 2004. Vol. 19. MIT Press, Cambridge, MA.

Levchenko, A., Mauro, P., 2007. Do some forms of financial flows help protect from sudden stops? World Bank Economic Review 21 (3), 389–411.

Levy-Yeyati, E., Panizza, U., Stein, E. E., 2007. The cyclical nature of north-south fdi flows. Journal of International Money and Finance 26 (1), 104–130.

McConnell, M., Quiros, G. P., December 2000. Output fluctuations in the united states: What has changed since the early 1980's? American Economic Review 90 (5), 1464–1476.

Neumeyer, P. A., Perri, F., December 2005. Business cycles in emerging economies: the role of interest rates. Journal of Monetary Economics 52 (2), 345–380.

Smith, K., Valderrama, D., July 2009. The composition of capital inflows when emerging market firms face financing constraints. Journal of Development Economics 89 (2), 223–234.

Stock, J., Watson, M., 2005. Understanding changes in international business cycle dynamics. Journal of the European Economic Association 3 (5), 968–1006.

Table 1: Summary of Flows Correlations with Macroeconomic Variables

	iTot	oTot	noTot	iFDI	iFPI	iDebt	oFDI	oFPI	oDebt	noFDI	noFPI	noDebt
g												
1975-2005												
Positive	6 (3)	5 (2)	0	6 (5)	6	6 (1)	6 (4)	5	3	4 (1)	3	0
Negative	1	2	7 (2)	1	1	1	1	2 (1)	4	3	4	7 (2)
Average	0.10	0.04	-0.13	0.11	0.05	0.06	0.13	0.01	0.00	0.06	-0.02	-0.11
	+	+	-	+	?/+	+	+	-	?/-	+	?/-	-
1975-1992												
Positive	6 (2)	5 (1)	1	5 (1)	4	6 (2)	6 (4)	1 (1)	5 (2)	7 (1)	2	1
Negative	1	2	6 (1)	2	3	1	1	6	2	0	5	6 (3)
Average	0.17	0.06	-0.21	0.09	0.05	0.14	0.23	-0.13	0.04	0.17	-0.08	-0.18
	+	+	-	+	?/+	+	+	+	+	+	?/-	-
1992-2005												
Positive	5	4	3	6 (3)	5 (1)	2	6	6 (1)	4	4	5	2 (1)
Negative	2	3	4 (1)	1	2	5	1	1 (1)	3 (1)	3 (1)	2	5
Average	0.07	0.04	-0.06	0.18	0.09	-0.02	0.12	0.08	-0.03	0.01	0.00	-0.02
	?/+	?/+	-	+	+	?/-	?/+	?/+	-	-	?/+	+
ι												
1975-2005												
Positive	6 (2)	5	1	5 (2)	5 (1)	6 (1)	7 (4)	3 (1)	4	4 (2)	1 (1)	1
Negative	1	2	6 (2)	2	2	1	0	4	3	3	6 (1)	6 (1)
Average	0.12	0.05	-0.11	0.07	0.06	0.08	0.15	0.01	0.02	0.10	-0.05	-0.11
	+	?/+	-	+	+	+	+	+	?/+	+	?/-	-
1975-1992												
Positive	7 (2)	5 (1)	1	5	3	7 (3)	7 (5)	1	5 (1)	6 (3)	3 (1)	0
Negative	0	2	6 (3)	2	4 (1)	0	0	6	2	1	4	7 (2)
Average	0.16	0.05	-0.17	0.05	-0.03	0.16	0.24	-0.07	0.04	0.19	-0.01	-0.19
	+	+	-	?/+	-	+	+	?/-	+	+	+	-
1992-2005												
Positive	6	4 (1)	2	6 (3)	5 (2)	5	7 (2)	3 (1)	4 (1)	4 (2)	1 (1)	3 (2)
Negative	1	3	5	1	2	2	0	4	3	3 (1)	6 (1)	4
Average	0.09	0.06	-0.06	0.10	0.11	0.02	0.15	0.03	0.01	0.07	-0.07	-0.01
	?/+	+	?/-	+	+	?/+	+	+	+	+	?/-	+
r												
1975-2005												
Positive	5 (2)	5 (2)	3 (1)	6 (3)	4 (1)	4 (1)	4	2	4 (2)	3	3 (1)	2 (2)
Negative	2 (1)	2 (1)	4 (1)	1	3	3 (1)	3	5 (2)	3 (1)	4 (1)	4 (2)	5
Average	0.04	0.02	-0.03	0.06	0.03	0.01	0.01	-0.05	0.02	-0.02	-0.05	0.02
	+	+	?/-	+	+	?/+	?/+	-	+	-	-	+
1975-1992												
Positive	6 (2)	5 (5)	2 (1)	5 (1)	5 (1)	5 (2)	4 (1)	3 (1)	5 (3)	3 (2)	2 (1)	2 (1)
Negative	1	2 (1)	5 (1)	2	2	2	3	4 (3)	2 (1)	4	5 (2)	5 (2)
Average	0.13	0.08	-0.10	0.06	0.03	0.07	0.05	-0.10	0.05	0.04	-0.06	-0.05
	+	+	?/-	+	+	+	+	-	+	+	-	-
1992-2005												
Positive	4 (1)	3 (1)	4 (2)	6 (2)	3 (1)	3 (1)	4	2	4 (2)	3	3 (1)	6 (3)
Negative	3 (1)	4 (2)	3	1	4 (1)	4 (3)	3 (1)	5 (2)	3 (3)	4 (2)	4 (2)	1
Average	-0.04	-0.04	0.04	0.12	0.02	-0.07	0.00	-0.08	-0.03	-0.05	-0.04	0.11
	?/+	-	+	+	?/-	-	-	-	-	-	-	+

Note. +: flow is procyclical. -: flow is countercyclical. ?: cyclical properties of flow are ambiguous. See Section 3 for definitions of procyclical and countercyclical. Figures in parentheses indicate the number of statistically significant correlations at the 10% level.

Table 2: Changes in Second Moments. Breaks Based on Doyle and Faust (2005)

	iToT, g	oToT, g	nTot, g	iFDI, g	iFPI, g	iDebt, g	oFDI, g	oFPI, g	oDebt, g
Japan	u-u-u-u	u-u-U-u	u-u-u-u	d-d-U-u	D-D-U-u	u-u-u-u	d-d-u-u	u-d-U-u	u-u-U-u
France	u-u-U-d	u-u-U-d	u-u-U-d	u-u-U-d	u-u-U-d	d-d-U-d	u-u-U-d	u-u-U-d	d-d-U-d
Germany	u-u-U-D	u-u-U-D	d-d-U-D	u-u-U-D	u-u-U-D	d-d-U-D	u-u-U-D	U-u-U-D	d-d-U-D
Italy	D-D-u-d	D-D-u-d	u-u-D-d	u-u-u-d	d-u-U-d	D-D-u-d	u-u-U-d	d-u-u-d	D-D-d-d
UK	d-d-U-D	d-d-U-D	U-U-d-D	d-d-U-D	d-d-U-D	d-d-U-D	D-d-U-D	u-u-U-D	d-d-U-D
USA	u-u-U-d	u-u-U-d	u-u-U-d	u-U-U-d	U-U-U-d	d-d-U-d	D-d-U-d	u-u-U-d	u-u-U-d
Canada	d-d-U-D	d-d-U-D	U-U-u-D	u-u-u-D	u-u-U-D	d-d-u-D	d-u-U-D	u-u-U-D	d-d-U-D

	iToT, ι	oToT, ι	nTot, ι	iToT, r	oToT, r	nTot, r
Japan	u-d-u-D	U-U-U-D	U-U-u-D	U-U-u-D	d-d-U-D	u-u-u-D
France	u-u-U-d	u-u-U-d	u-U-U-d	d-u-U-d	d-u-U-d	U-U-U-d
Germany	u-u-U-d	u-u-U-d	d-d-U-d	d-d-U-D	u-u-U-D	u-u-U-D
Italy	d-d-u-u	D-D-u-u	d-d-D-u	d-d-u-d	d-u-u-d	u-U-D-d
UK	d-d-U-d	d-d-U-d	d-d-d-d	u-u-U-D	u-u-U-D	u-d-d-D
USA	u-u-U-d	u-u-U-d	u-u-U-d	u-u-U-d	d-d-U-d	D-D-U-d
Canada	d-d-U-d	d-d-U-d	u-u-u-d	D-D-U-D	d-D-U-D	u-u-u-D

Note. In each cell, second-moment changes refer to correlation, covariance, variance in the cyclical component of capital flow, variance in the macroeconomic variable. U: significantly positive change, u: non-significantly positive change, D: significantly negative change, d: non-significantly negative change.