Financial integration and international risk spillovers

Dongwon Lee*

Department of Economics, University of California, Riverside, CA 92521, United States

This version: January 1, 2023

Abstract

Using static panel regression and dynamic local projection methods, we find that financial integration magnifies the transmission of global financial shocks to emerging market economies with fixed exchange rates, validating the insulation benefits of floating regimes and market segmentation.

Keywords: Exchange rate regimes; Financial integration; Global financial shocks; Open-economy policy trilemma; Risk spillovers.

JEL classification: F31, F36, F65

* *E-mail address*: dwlee@ucr.edu (D. Lee).

1. Introduction

International financial integration has led to a lower cost of capital and better risk-sharing, but it has also made local financial markets more vulnerable to external and global shocks. Recently, Devereux and Yu (2020) documented related evidence that financial integration increases the likelihood of financial crises but decreases their severity.

This paper studies the transmission of global financial shocks to emerging market economies (EMEs) in the recent period of financial globalization. The focus of the recent empirical literature, such as Rey (2015), Passari and Rey (2015), and Obstfeld et al. (2019), has been primarily on whether a country's choice of exchange rate regime encourages the propagation of global financial conditions.

Unlike the previous approaches, however, our discussion places more emphasis on financial integration as a spillover channel of global risk. Specifically, instead of relying on a de jure capital openness indicator, we estimate the beta exposure of the stock returns to the global equity market portfolio and use this higher-frequency de facto measure as a proxy for integration.[1]

We look at the domestic responses of private credit, house prices, capital inflows, and real output in EMEs with different degrees of equity market integration and exchange rate flexibility. In addition to static panel regressions, we also employ Jordà's (2005) local projection methods to investigate the dynamic responses of the outcome variables.

[1] Studies documenting evidence that global market betas increase with financial integration include Bekaert and Harvey (1997), Baele (2005), Bekaert et al. (2009), Bekaert and Mehl (2019), and Kim and Lee (2020). Alternative equity market integration or segmentation indicators include the adjusted *R*-square from a regression of country equity returns on multiple global factors (Pukthuanthong and Roll, 2009) and the industry-weighted sum of valuation differentials between the local and global markets (Bekaert et al., 2011).

Our findings reveal that while heightened global uncertainty contracts the domestic market conditions in general, deeper integration tends to exacerbate international risk spillovers in countries with fixed exchange rates. For floaters, even though they are typically more integrated than peggers, further integration does not intensify the extent of risk spillovers in local credit, housing, and output markets. These results may reflect limited monetary policy autonomy in integrated EMEs with exchange rate controls, highlighting the insulation benefits of floating regimes and market segmentation against external financial shocks.[2]

2. Data and econometric specifications

Our main regression sample covers an unbalanced panel of 38 EMEs from 1992q1 through 2019q4. To get a time-varying measure of global financial integration, we follow Bekaert et al. (2009) and estimate Eq. (1) on weekly data using rolling regressions with a window size of two quarters:

$$s_{i,t} = \beta_{i,t}^{g} f_t^{g} + \beta_{i,t}^{r} f_t^{r,\backslash i} + c_i + \epsilon_{i,t} \tag{1}$$

where $s_{i,t}$ is the excess return on the stock index of country i in dollars over the U.S. T-bill rate; factors f_t^{g} and $f_t^{r,\backslash i}$ are value-weighted excess returns from the global and regional markets (excluding country i's own returns), respectively; and c_i is a country-specific constant.[3] The estimated quarterly global betas serve as indicators of financial integration.

The global factor is calculated using data from 20 advanced economies, including Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan,

[2] According to the open-economy policy trilemma, either capital controls or floating exchange rates are necessary to ensure independent monetary policies (Mundell, 1963). This idea is broadly supported in the literature (e.g., Frankel et al., 2004; Obstfeld et al., 2005; Klein and Shambaugh, 2015). Conversely, Rey (2015) argued that EMEs face a dilemma in the presence of a global financial cycle in that a trade-off exists between capital mobility and monetary autonomy regardless of the exchange rate regime.

[3] Using weekly returns helps avoid problems related to asynchronous trading in the daily returns data.

the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States. For regional factor calculation, we consider four regions: Africa and the Middle East (Egypt, Israel, Jordan, Morocco, and South Africa), Americas (Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Jamaica, Mexico, Peru, and Venezuela), Asia-Pacific (China, Hong Kong, India, Indonesia, Korea, Malaysia, Pakistan, the Philippines, Singapore, Sri Lanka, and Thailand), and Europe (Bulgaria, Croatia, the Czech Republic, Greece, Hungary, Kazakhstan, Poland, Romania, Russia, Slovakia, Slovenia, and Turkey). The regional returns are orthogonalized with respect to the global returns before entering the regression. The data for stock market indices and U.S. T-bill yields are from Global Financial Data, and the market capitalizations are from the Datastream and CRSP databases.

We acknowledge that the global beta is an imperfect measure of financial integration. First, it represents the extent of equity market integration, ignoring the information from the other asset classes. Second, it is based on the data from equity prices rather than flows. Nevertheless, Bekaert and Mehl (2019) argue that it is informative because equity market integration is likely related to broader financial integration.[4] Furthermore, the cross-border transmission of shocks can occur without having explicit capital flows (Bekaert et al., 2014).

To test the effect of integration as a transmission channel of global financial shocks, we estimate Eq. (2) for each currency regime, namely pegs and floats:

$$\Delta y_{i,t} = \alpha_1 vix_t + \alpha_2 vix_t int_{i,t} + \alpha_3 int_{i,t} + \Delta \boldsymbol{z}_{i,t-1}\gamma + c_i + u_{i,t} \tag{2}$$

where $y_{i,t}$ is a vector of outcome variables such as real private credit, real house prices, equity inflows, and real GDP; vix_t is a proxy for global market volatility; $int_{i,t}$ is our integration indicator; $\boldsymbol{z}_{i,t}$ represents a vector of other control variables, including domestic GDP, CPI, and

[4] Supporting this view, we find a strong correlation coefficient of 0.89 from the data provided by Fernández et al. (2016) for the average index values of equity and bond flow restrictions in our sample countries.

world GDP; and Δ is a first difference operator. All the variables are measured in logarithms, and the vix and int variables are standardized to facilitate their interpretation.[5]

We define real private credit as depository corporations' (excluding central banks') domestic claims on the private sector deflated by local CPI, and equity inflows as liabilities of portfolio equity investment as a ratio to GDP. The information for these series is from the IMF's International Financial Statistics. Real house prices come from the Bank for International Settlements; nominal and real GDP from Global Financial Data and the World Bank's Global Economic Monitor; the VIX, a measure of the implied volatility of S&P 500 index options, from the Chicago Board Options Exchange; and fine exchange rate regime classifications (IRR codes) from Ilzetzki et al. (2019).[6] For the last two variables, we use their quarterly averages.

To study the cumulative effects for horizon h, we adopt the local projection methods specified below:

$$\begin{aligned}\Delta_h y_{i,t-1} = {} & \theta_1^h vix_t D_t^{\text{<int, float}} + \theta_2^h vix_t D_t^{\text{>int, float}} + \theta_3^h vix_t D_t^{\text{<int, peg}} + \theta_4^h vix_t D_t^{\text{>int, peg}} \\ & + \boldsymbol{x}_t \delta^h + \Delta \boldsymbol{z}_{i,t-1} \gamma^h + c_i^h + \varepsilon_{i,t+h}\end{aligned} \tag{3}$$

where $\Delta_h y_{i,t-1} = y_{i,t+h} - y_{i,t-1}$; D_t is a variable indicating each integration-currency regime, with a "<int" (">int") superscript representing a less (more) integrated market and "float" ("peg") denoting a flexible (fixed) exchange rate regime; and $\boldsymbol{x}_t$ is a vector encompassing all four regime indicators.[7] The specification also controls for a linear trend.

---

[5] The sample correlation between vix and int variables is 0.06, supporting that our integration measure is unlikely to suffer from the volatility bias described in Forbes and Rigobon (2002). As a robustness check, we re-estimate Eq. (2) by substituting the int variable with its lag and find very similar results (available upon request).

[6] The IRR code ranges from 1 to 15, with a higher value corresponding to more flexible rates. As in Obstfeld et al. (2019), we exclude categories 14 (freely falling) and 15 (dual market in which parallel market data is missing).

[7] Note that "less segmented" instead of "more integrated" may be a more appropriate description given that most EMEs are relatively segmented from the world market.

Similar to the baseline specification of Han and Wei (2018), the dummy variable $D_t^{\text{<int, peg}}$ takes a value of 1 for a country-quarter observation with an integration indicator smaller than or equal to 0.15, the median value of the sample comprising both EMEs and advanced economies, and an IRR code smaller than or equal to 6 (pre-announced crawling bands ≤ 2%). Likewise, the dummy variable $D_t^{\text{>int, float}}$ takes a value of 1 for a country-quarter observation with an integration indicator greater than 0.15 and an IRR code greater than 6. The other regime indicators are defined accordingly.[8]

The international risk spillover effects of integration can be identified by assessing the estimates of α_2 in Eq. (2) and θ^h's in Eq. (3). We employ Driscoll and Kraay's (1998) standard errors to account for potential serial and cross-sectional correlations along with heteroskedasticity.

3. Empirical results

Table 1 presents the estimation results based on Eq. (2). The significantly negative coefficients on the VIX in all columns indicate that global uncertainty adversely affects local financial and output variables in EMEs, irrespective of their exchange rate regimes. The size of the VIX coefficients (in absolute value) is slightly greater for fixed exchange rates relative to floats across the outcome variables except for private credit, whose reaction magnitude appears larger in floating regimes.

[8] While integration proxies and exchange rate regimes change over time at the country level, Argentina, Poland, and Russia are among the least segmented countries, whereas Costa Rica, Jamaica, and Sri Lanka are among the most segmented ones when averaging the global beta estimates over the sample period. Likewise, Israel, South Africa, and Turkey are among the countries with the most exchange rate flexibility, whereas Bulgaria, Greece, and Hong Kong are the ones with the least exchange rate flexibility. It is worth noting that the excess stock returns of the pegged currency countries do not appear to mechanically comove with the dollar-denominated global factor in our sample.

On the other hand, the insignificant coefficients of the interaction variable reported in columns (1), (2), and (4) suggest that integration plays a negligible role in transmitting a global shock into the domestic economy in countries with flexible exchange rates except for equity inflows. As shown in the last row of the table, floaters are, on average, more integrated with the world market than peggers. Thus, a negative interaction term coefficient in column (3) may reflect active responses by international investors in the liquid equity markets.

By contrast, the significant interaction coefficients in columns (5)–(8) verify that deeper integration is expected to aggravate international risk spillovers in pegged countries. For example, given a one-standard-deviation (S.D.) shock to the VIX, an increase in integration by one S.D. leads to a 0.38-percentage-point further drop in quarterly credit growth in pegs. The same changes result in a 0.51-, 0.63-, and 0.13-percentage-point larger reduction in quarterly house price growth, equity inflow growth, and GDP growth, respectively.[9] As shown in columns (3) and (7), EMEs generally experience sudden stops in the face of global financial shocks, with the decline in equity inflows more dramatic in fixed exchange rate regimes.

A plausible channel through which integration amplifies the extent of the cross-border transmission to domestic credit and house prices in pegged regimes is a more remarkable reduction of nonresident equity flows.[10] Such liability responses may reflect monetary policy constraints under a currency peg commitment and the growing demand for safe-haven assets

[9] When Eq. (2) is estimated using the full sample without currency regime distinctions, we find interaction coefficients significant only in the house price and equity inflow regressions. When accounting for finer gradations of currency regimes, we find the results from the intermediate regime sample (5 ≤ IRR code ≤ 12) similar to those in columns (1)–(4) and the results from the hard peg sample (IRR code ≤ 4) similar to those in columns (5)–(8). The pure float sample (IRR code = 13) shows a significantly negative coefficient on the VIX in the equity inflow regression but an insignificant coefficient on the interaction variable in all regressions. We also confirm that the results remain robust when the specifications with a lagged dependent variable in columns (4) and (8) are estimated by the two-step system GMM.

[10] When looking at the liability flow responses for portfolio debt securities and direct investment, we do not find significant evidence for them as a transmission channel.

when global risk aversion rises. More disruptions in the financial markets are translated into more real output losses.

Though not reported, the core results hold when using the alternative exchange rate regime of Shambaugh (2004) or bootstrap standard errors, and when controlling for institutional quality (average of 12 political risk components from the International Country Risk Guide). Excluding extremely volatile periods, such as the global financial crisis (2008q3–2009q2) and national financial crises (identified by Laeven and Valencia, 2013, 2018), or adding a change in the VIX along with its interaction with integration does not alter the results much either.

To fully exploit the information from a continuous integration measure, we now examine the marginal effects of the VIX on each outcome variable as a function of integration using the estimates documented in Table 1. The resulting fitted values are portrayed in Fig. 1, along with the 90% confidence intervals. Panel A displays the results for floats and Panel B for pegs.

Expectedly, we see the adverse marginal effects of the VIX on private credit growth in countries that float, with the degree of integration having little influence. Conversely, the peg sample exhibits decreasing marginal effects with respect to financial integration. In particular, the negative marginal effects become significantly different from zero when integration exceeds its 25th percentile in that subsample, suggesting that highly segmented peggers may decouple from global financial turbulence.

We find analogous patterns in the other outcome variables; there are more pronounced international risk spillovers as integration progresses, particularly in pegged countries. It is important to note that although the marginal effects on equity inflow growth decline with integration for floaters, the damaging effects of highly integrated peggers are almost one and a half times as large as those of floaters.

Our last exercise estimates the impulse responses of each outcome variable over the eight quarters. Fig. 2 illustrates the local projection coefficients in Eq. (3) with their 90% confidence intervals across four integration-currency regimes.

Comparing the charts in the first row, we discover that a one-S.D. shock to the VIX initially results in about a 0.5% decrease in private credit in countries with floats, regardless of their degree of integration (see Panels A and B). There is no initial credit decline in pegged countries when less integrated (Panel C) but a 1% decrease when more integrated (Panel D). However, the dynamic pattern indicates that the negative effect of the initial global shock keeps building over time but at a different speed across regimes. In both floating subsamples, by quarter 8, there is about a 7% decrease in credit. In the peg subsamples, by quarter 8, credit declines by about 1% when less integrated and 7% when more integrated.

The house price dynamics illustrated in the second row show delayed responses, with little initial change following a one-S.D. shock to the VIX. An exception is the 1% drop in house prices upon impact for more integrated pegs. Moreover, while there is a cumulative decline in house prices by 1.5% and 2.5%, respectively, for more integrated floats and less integrated pegs (i.e., Panels B and C) over two years, the cumulative decline for more integrated pegs is much larger, reaching almost 6%.

Proceeding to the third row, we find that equity inflows exhibit a persistent drop in both peg subsamples, but shrink by 4.5% after two years for more integrated pegs, with a smaller drop of 2% for less integrated pegs. The dynamic responses of equity inflows in floating regimes appear indistinguishably different from zero one year after the initial shock.

The cumulative effects of the global shock on the real economy are summarized in the last row, which looks much like the financial variable reactions. Again, the response paths in more integrated pegs show about a 0.5% initial contraction of GDP and a continuous decline over time, reaching -2.2% by quarter 6. The cumulative paths of GDP in the other regimes seem comparable, with little initial responses and about a 1% drop by quarter 6.

4. Conclusion

Although global financial shocks generally contract EMEs' financial and real economic conditions, the ultimate effects of shocks substantially differ across policy regimes; stronger integration has a more harmful impact on the domestic conditions only for pegged countries. For floaters, further integration is unlikely to magnify the transmission of the global risk. A considerable degree of segmentation from global finance is required for peggers to stay as resilient as floaters against external shocks, pointing to empirical validity for EMEs' policy trilemma in recent decades.

Acknowledgments

I thank an anonymous referee and participants at the 97th WEAI Annual Conference and 2022 LACEA LAMES Conference for their helpful comments. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

Baele, L., 2005. Volatility spillover effects in European equity markets. J. Financ. Quant. Anal. 40, 373–401.

Bekaert, G., Ehrmann, M., Fratzscher, M., Mehl, A., 2014. The global crisis and equity market contagion. J. Financ. 69, 2597–2649.

Bekaert, G., Harvey, C.R., 1997. Emerging equity market volatility. J. Financ. Econ. 43, 29–77.

Bekaert, G., Harvey, C.R., Lundblad, C.T., Siegel, S., 2011. What segments equity markets? Rev. Financ. Stud. 24, 3841–3890.

Bekaert, G., Hodrick, R., Zhang, X., 2009. International stock return comovements. J. Financ. 64, 2591–2626.

Bekaert, G., Mehl, A., 2019. On the global financial market integration "swoosh" and the trilemma. J. Int. Money Financ. 94, 227–245.

Devereux, M.B., Yu, C., 2020. International financial integration and crisis contagion. Rev. Econ. Stud. 87, 1174–1212.

Driscoll, J.C., Kraay, A.C., 1998. Consistent covariance matrix estimation with spatially dependent panel data. Rev. Econ. Stat. 80, 549–560.

Fernández, A., Klein, M.W., Rebucci, A., Schindler, M., Uribe, M., 2016. Capital control measures: a new dataset. IMF Econ. Rev. 64, 548-574.

Forbes, K., Rigobon, R., 2002. No contagion, only interdependence: measuring stock market comovements. J. Financ. 57, 2223–2261.

Frankel, J., Schmukler, S.L., Serven, L., 2004. Global transmission of interest rates: monetary independence and currency regime. J. Int. Money Financ. 23, 701–733.

Han, X., Wei, S-J., 2018. International transmissions of monetary shocks: between a trilemma and a dilemma. J. Int. Econ. 110, 205–219.

Ilzetzki, E., Reinhart, C., Rogoff, K., 2019. Exchange arrangements entering the twenty-first century: which anchor will hold? Q. J. Econ. 134, 599–646.

Jordà, Ò., 2005. Estimation and inference of impulse responses by local projections. Am. Econ. Rev. 95, 161–182.

Kim, K., Lee, D., 2020. Equity market integration and portfolio rebalancing. J. Bank. Financ. 113, 105775.

Klein, M.W., Shambaugh, J.C., 2015. Rounding the corners of the policy trilemma: sources of monetary policy autonomy. Am. Econ. J. Macroecon. 7, 33–66.

Laeven, L., Valencia, F., 2013. Systemic banking crises database. IMF Econ. Rev. 61, 225–270.

Laeven, L., Valencia, F., 2018. Systemic banking crises revisited. IMF Working Paper 18/206.

Mundell, R.A., 1963. Capital mobility and stabilization policy under fixed and flexible exchange rates. Can. J. Econ. Political Sci. 29, 475–485.

Obstfeld, M., Ostry, J.D., Qureshi, M.S., 2019. A tie that binds: revisiting the trilemma in emerging market economies. Rev. Econ. Stat. 101, 279–293.

Obstfeld, M., Shambaugh, J.C., Taylor, A.M., 2005. The trilemma in history: tradeoffs among exchange rates, monetary policies, and capital mobility. Rev. Econ. Stat. 87, 423–438.

Passari, E., Rey, H., 2015. Financial flows and the international monetary system. Econ. J. 125, 675–698.

Pukthuanthong, K., Roll, R., 2009. Global market integration: an alternative measure and its application. J. Financ. Econ. 94, 214–232.

Rey, H., 2015. Dilemma not trilemma: the global financial cycle and monetary policy independence. NBER Working Paper No. 21162.

Shambaugh, J.C., 2004. The effect of fixed exchange rates on monetary policy. Q. J. Econ. 119, 301–352.

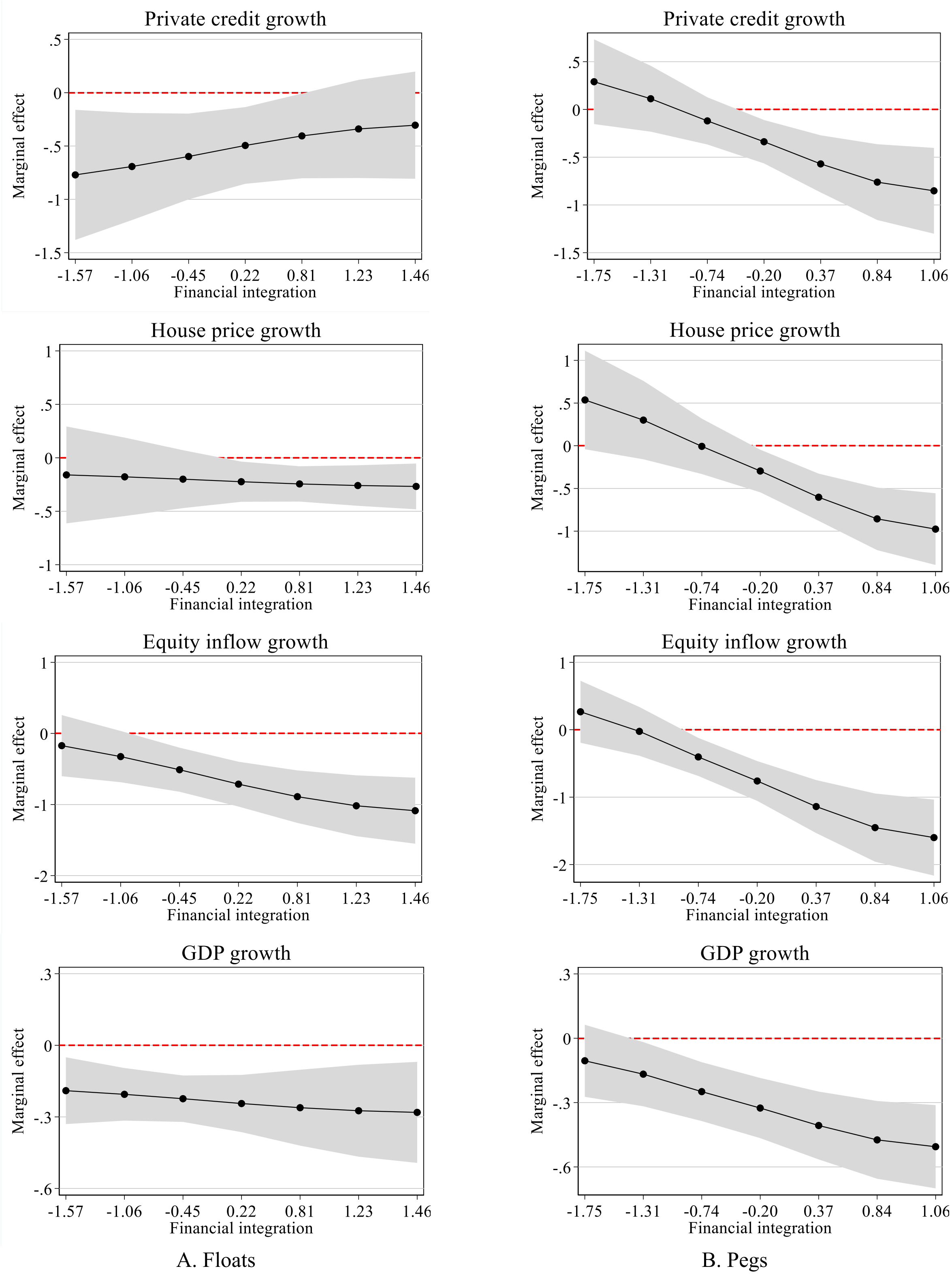

Fig. 1. Marginal effects of the VIX as a function of financial integration. The reported integration values correspond to their subsample distribution at the 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentiles.

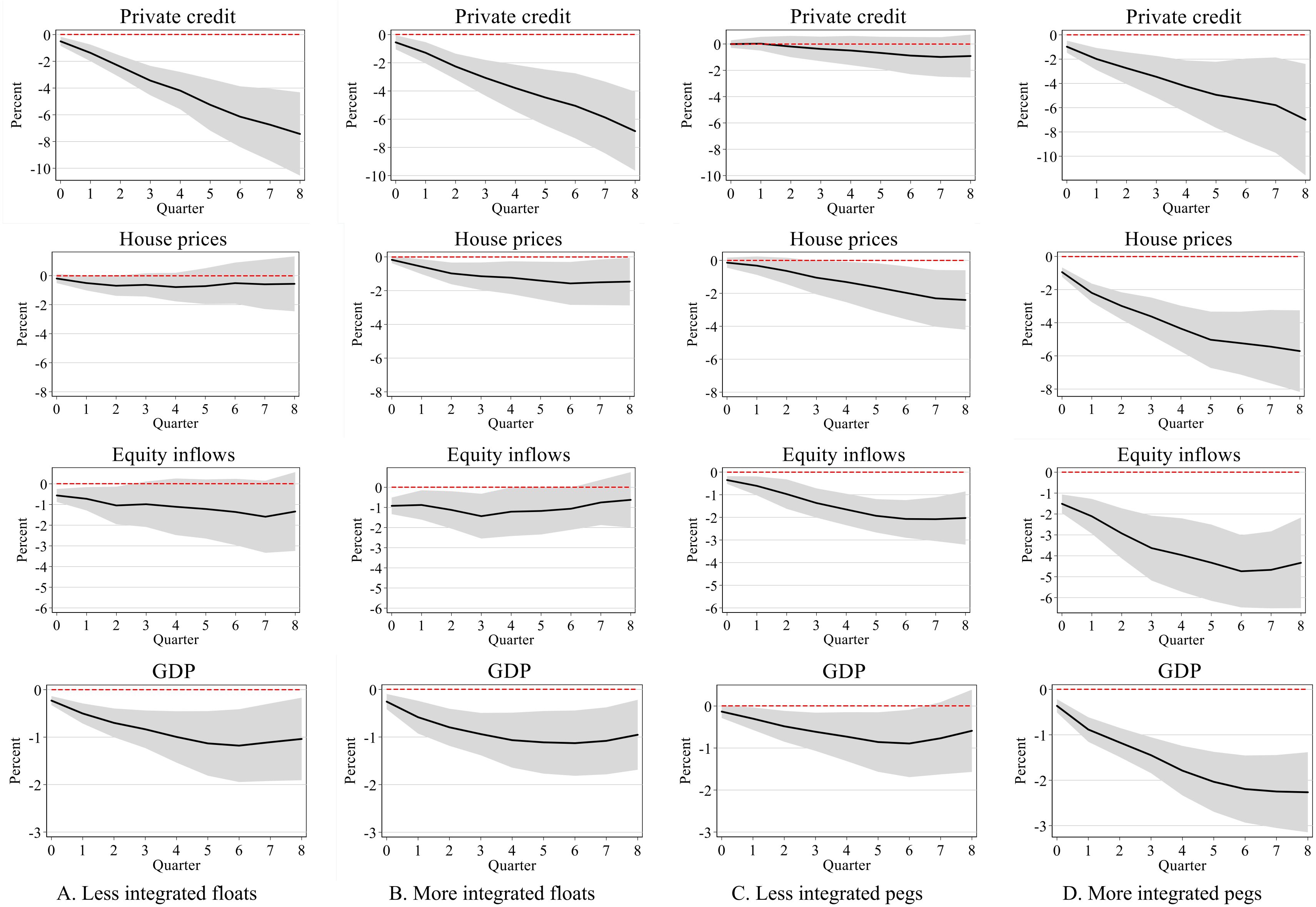

Fig. 2. Cumulative effects of a one-S.D. increase in the VIX.

Table 1

International risk spillovers.

	Floats				Pegs			
Dependent variable is growth of:	Private credit	House prices	Equity inflows	GDP	Private credit	House prices	Equity inflows	GDP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VIX	**-0.529****	**-0.216***	**-0.646*****	**-0.237*****	**-0.421*****	**-0.405*****	**-0.895*****	**-0.354*****
	(0.221)	(0.128)	(0.186)	(0.066)	(0.148)	(0.149)	(0.196)	(0.088)
VIX × INT	**0.154**	**-0.036**	**-0.302****	**-0.030**	**-0.407****	**-0.539*****	**-0.666*****	**-0.143*****
	(0.169)	(0.112)	(0.131)	(0.058)	(0.168)	(0.187)	(0.186)	(0.051)
INT	-0.032	0.002	0.037	-0.102	-0.207	-0.440*	-0.385*	-0.130***
	(0.187)	(0.115)	(0.120)	(0.077)	(0.192)	(0.249)	(0.210)	(0.044)
Inflation (lagged)	-0.164	-0.318***	-0.254**	-0.017	0.073	0.363**	-0.275**	0.011
	(0.115)	(0.097)	(0.101)	(0.016)	(0.125)	(0.149)	(0.106)	(0.026)
GDP growth (lagged)	0.158***	0.180***	-0.009	-0.158***	0.131	0.250*	0.062	-0.013
	(0.057)	(0.057)	(0.065)	(0.038)	(0.080)	(0.142)	(0.124)	(0.053)
World GDP growth (lagged)	0.660*	0.278**	-0.665	0.631***	0.025	0.459	-1.027***	0.340
	(0.336)	(0.114)	(0.410)	(0.151)	(0.299)	(0.289)	(0.304)	(0.213)
Observations	1,573	1,305	1,120	2,429	541	568	451	996
Within R^2	0.037	0.043	0.051	0.067	0.047	0.136	0.139	0.094
Mean of dependent variable	1.900	0.412	0.204	0.941	2.138	0.214	0.032	0.872
S.D. of dependent variable	6.604	3.073	3.418	2.284	4.834	3.153	2.406	1.981
Statistics for INT		Mean = 0.106; S.D. = 1.004				Mean = -0.259; S.D. = 0.942		

Notes: Fixed effect estimator. Driscoll-Kraay standard errors in parentheses. All specifications include a linear trend. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.