Financial Flows and The International Monetary System

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Sargan Lecture
2014
What do we know about the costs and benefits of financial integration?

- First, I will focus on the standard benefits of international financial flows
- Second, I will discuss some of the potential costs, due in particular to monetary policy spillovers
- Bottom line will be that we still do not have a unified framework to discuss all the relevant aspects and that the welfare benefits of financial flows cannot be taken for granted.
Motivation
Core question in international macroeconomics and finance

- Where do gains from international financial integration come from?
- Conventional view
  - efficient allocation of capital: capital flows to emerging countries
  - risk sharing: reduces volatility of aggregate consumption
- Other possibilities (which I will not discuss here)
  - effect on TFP (via financial markets development, institutional changes, macroeconomic policies...)

Rey Royal Economic Society Sargan Lecture 2014 3 / 52
A simple experiment

Stochastic neoclassical framework with two production economies

- An emerging (risky) country (5% volatility of productivity shocks)
- A relatively safer developed country (2.5% volatility)
- Emerging country starts with 50% of the capital of developed country.

Questions

- What is the growth impact of financial integration?
- What is the dynamics of capital flows?
- How big are the gains from financial integration?
- Who benefits the most?
Two classes of models to quantify welfare gains

- Allocative efficiency of financial integration without aggregate risk

- International risk sharing without production
Empirical evidence on gains from financial integration

- Effect on growth and on consumption volatility
  - Surveys: Eichengreen (2002); Kose et al. (2006); Henry (2007); Obstfeld (2009); Jeanne et al. (2012).

- Mixed results:
  - depends on sample period
  - there is a lot of country heterogeneity.
  - endogeneity issues
  - event studies, though useful, have a short time frame.

- We cannot take the gains for granted.
Modelling jointly the two types of gains in general equilibrium: Coeurdacier, Rey and Winant 2014

- We need an integrated framework
  - Both types of gains are intertwined.
  - Are they substitute or complement?

- Convergence gains depend on distance from steady-state.

- But the steady-state itself is modified by financial integration in the presence of risk.

- We need a general equilibrium model. Emerging markets have integrated in waves.
Two types of gains

- Assess the growth dynamics and the welfare gains from financial integration in a neoclassical growth model
  - with aggregate uncertainty
  - with heterogeneous countries
  - with incomplete (or complete) markets
  - in general equilibrium

- Use a global approximation methods to study the transition path towards the long run world equilibrium

- Emphasize relation between risk, growth and capital accumulation
Findings

- **Growth and capital flows dynamics**
  - Tension between the buildup of precautionary assets by risky (emerging) country and the potential effect of capital scarcity in the short-run.
  - Growth impact of financial integration for risky country depends on these two conflicting forces. Financial integration affects the degree of aggregate risk and hence precautionary savings motives.
  - Terms of the tradeoff between efficiency and risk-sharing depends on the market price of risk.

- **Welfare gains**
  - Remain small for emerging markets. More elusive than we think.
  - Surprisingly, if anything, the safest (developed) countries are the main beneficiaries, particularly so if the price of risk is high.
Baseline model of financial integration

Technology

2 countries $i = D, E$ with a stochastic neoclassical structure. One good perfectly tradable.

Production

- Cobb-Douglas technology:
  \[ y_{i,t} = a_{i,t} k_{i,t}^{\theta} l_{i,t}^{1-\theta} \]

- Productivity shocks:
  \[ \log(a_{i,t}) = (1 - \rho) \log(a_{i,0}) + \rho \log(a_{i,t-1}) + \epsilon_{i,t} \]

- Investment with convex adjustment costs
  \[ k_{i,t+1} = (1 - \delta) k_{i,t} + k_t \varphi \left( \frac{i_{i,t}}{k_{i,t}} \right) \]
Baseline model of financial integration

Preferences

Epstein-Zin preferences

\[ U_{i,t} = \left[ (1 - \beta) c_{i,t}^{1-\psi} + \beta \left( E_t U_{i,t+1}^{1-\gamma} \right)^{\frac{1-\psi}{1-\gamma}} \right]^{\frac{1}{1-\psi}}. \]

- \(1/\psi\) = the elasticity of intertemporal substitution (EIS)
- \(\gamma\) the risk aversion coefficient
- Nests the CRRA case when \(1/\psi = \gamma\)
Baseline model of financial integration
Asset market structure

Autarky

- Budget equation \( c_{i,t} + i_{i,t} = y_{i,t} \)
- Stochastic discount factor

\[
m_{i,t+1} = \beta \left( \frac{c_{i,t+1}}{c_{i,t}} \right)^{-\psi} \left( \frac{U_{i,t+1}^{\psi-\gamma}}{E_t \left( U_{i,t+1}^{1-\gamma} \right)^{\frac{\psi-\gamma}{1-\gamma}}} \right)
\]

- Euler equation for investment

\[
E_t \left[ m_{i,t+1} \left( \frac{\theta y_{1,t+1}}{k_{1,t+1}} \phi'_{i,t} + \frac{\phi'_{i,t}}{\phi'_{i,t+1}} \left( (1 - \delta) + \phi_{i,t+1} - \frac{i_{i,t+1}}{k_{i,t+1}} \phi'_{i,t+1} \right) \right) \right] = 1
\]
Baseline model of financial integration
Asset market structure

Financial Integration (riskfree bond only)

- Budget equation with $p_t = \frac{1}{r_t} = \text{price of the riskfree bond}$

$$c_{i,t} = y_{i,t} - i_{i,t} - b_{i,t} p_t + b_{i,t-1}$$

- Investment Euler equation
- Optimal bond holdings

$$p_t = E_t [m_{i,t+1}]$$
Baseline model of financial integration

Definition of an equilibrium

**Under autarky**

An equilibrium in a given country $i$ is a sequence of consumption and capital stocks $(c_{i,t}; k_{i,t+1})$ such that individual Euler equations for investment decisions are verified and goods market clears at all dates.

**Financial Integration**

An equilibrium is a sequence of consumption, capital stocks and bond holdings in both countries $(c_{i,t}; k_{i,t+1}; b_{i,t})_{i=E,D}$ and a sequence of bond prices $p_t$ such that Euler equations for investment decisions are verified in both countries, Euler equations for bonds are verified in both countries, bonds and goods market clear at all dates.
**Structural parameters**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Discount rate</strong></td>
<td>$\beta$</td>
</tr>
<tr>
<td><strong>Capital share</strong></td>
<td>$\theta$</td>
</tr>
<tr>
<td><strong>Depreciation rate</strong></td>
<td>$\delta$</td>
</tr>
<tr>
<td><strong>Capital adjustment costs</strong></td>
<td>$\xi$</td>
</tr>
<tr>
<td><strong>EIS</strong></td>
<td>$1/\psi$</td>
</tr>
<tr>
<td><strong>Risk aversion</strong></td>
<td>$\gamma$</td>
</tr>
</tbody>
</table>

- Capital adjustment costs such that $\sigma^i = 3\sigma^y$
- Risk aversion $\gamma = 4$, CRRA case.
Volatility

- Volatility matches the group of emerging markets $E$ integrating to developed countries $D$ since 1985.
- Emerging markets roughly twice as volatile.

<table>
<thead>
<tr>
<th></th>
<th>Autocorrelation</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$E$=Risky economy</td>
<td>0.9</td>
<td>5%</td>
</tr>
<tr>
<td>$D$=Safe economy</td>
<td>0.9</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

- Zero correlation of shocks in the baseline calibration (underestimation compared to the data, roughly 0.2)
Capital scarcity

- Roughly the same GDP size as developed countries at opening. → General Equilibrium effects cannot be neglected.
- On average, capital stocks (per efficiency units) of emerging countries $E = 50\%$ of developed countries $D$ at time of integration.
  - Compute capital stocks for emerging countries $E$ integrating to developed countries $D$ since 1985 (perpetual inventory method).
  - Compare with capital stocks of already integrated countries.
Financial integration without aggregate risk

From autarky to a bond only economy: Gourinchas Jeanne (2006) in general equilibrium

- No shocks
- Capital starts 50% below steady-state in the emerging market $E$
- Rest of the world (developed) $D$ starts at its autarky steady state
Figure 1: The riskless case: dynamics along the deterministic path.

Dotted lines (resp. solid lines) refer to autarky levels (resp. levels under integration).
Financial integration without aggregate risk

Efficient reallocation of capital

- No precautionary savings in autarky. Only initial level of capital matters
- Capital goes where returns are higher (from developed to emerging)

But...

- Gains from financial integration are transitory
- Integration speeds up transition towards unchanged steady-state level of capital.
- Interest rate increases in the ROW.
- Welfare gains are small!
Financial integration without aggregate risk

Welfare gains (% increase in permanent consumption)

<table>
<thead>
<tr>
<th>Country</th>
<th>E</th>
<th>Rest of the world</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial</td>
<td>1.03%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>General</td>
<td>0.38%</td>
<td>0.29%</td>
<td></td>
</tr>
</tbody>
</table>

- In partial equilibrium (small open economy), gains are small
  - Transitory nature (Gourinchas and Jeanne (2006)).

- In general equilibrium, welfare gains even SMALLER!
  - Must be shared between the two countries.
  - Adverse General Equilibrium movements of world interest rate.
Integration with *asymmetric* aggregate risk and capital scarcity in the emerging market

- $E$ is twice as volatile as $D$: $\sigma_E = 2\sigma_D = 5\%$.
- Developed country $D$ starts at autarky steady state.
- $E$ starts with 50% of capital stock in $D$. 
Figure 2: Emerging market $E$ volatile and capital scarce

Dotted lines (resp. solid lines) refer to autarky levels (resp. levels under integration).
Capital reallocation for precautionary motives vs efficiency reasons →
Capital flows and growth reversals
  ▶ In the short-run, capital scarcity dominates: capital flows from $D$ to $E$. Capital flows reversal in the medium-run as the precautionary motive dominates.
  ▶ Higher growth on impact in $E$ compared to autarky initially, opposite in $D$. Reversal in the medium-run.

LOW welfare gains despite efficiency & risk-sharing gains.
  ▶ Permanent increase in consumption is $= 0.42\%$ in $D$ and $0.53\%$ in $E$.
  ▶ Gains from faster convergence in $E$ are reduced as financial integration makes $E$ closer to its steady-state. Gains from risk-sharing and from efficiency are substitutes.
Heterogenous dynamics and reversals: global imbalances come naturally

- Capital reallocation for precautionary motives vs efficiency reasons →
- Global imbalances can be generated by the model very naturally
- Happens when the autarky interest rate in E is lower than the autarky interest rate in D (see Gourinchas and Rey (2014) Handbook of International Economics)
- Here this is due to the precautionary savings motive (see also Mendoza et al. and Angeletos and Panousi for the case of idiosyncratic risk)
Figure 3: Volatility of real output growth per capita (in %, 1975-1995).
Figure 4: Capital stock at time of integration of emerging markets (ratio w.r.t developed countries).

Figure 5: Dynamics along the risky path following integration the case of Early South Europe (top panel) and Late Middle-East (bottom panel). South Europe = Greece-Portugal-Spain; Middle-East=Oman-Saudi Arabia.
Southern Europe (early liberalizers) and the Middle East (late liberalizers): small gains

- Early liberalizers (1986): Southern Europe has small gains due to (i) high correlation (0.6); (ii) small initial differences in capital stock (85%).
- Gains 0.08 %.
- Late liberalizers (1999): Middle-East has small gains despite being very capital scarce (35%) due to strong offsetting precautionary demand for safe assets. Volatile countries (8.1%).
- Gains of about 1%.
Robustness and bottom line

- Asset market structure: incomplete vs complete markets
- Stochastic properties of the shocks (correlations)
- Market sizes (small open economy as a limit case)
- Long run risk (gives appropriate risk premia but not risk sharing)
- Empirical work likely to be misspecified (heterogeneity in dynamics and neglects general equilibrium effect)

Conclusion: In the standard, frictionless benchmark model which has guided the intuition of economists and policy makers, gains from international financial integration (efficiency and risk sharing) are SMALL.
The importance of gross capital flows and external balance sheet of countries: a research agenda

- Gourinchas and Rey (2007): Analysis of the US external balance sheet at market value: "From world banker to world venture capitalist". First estimates of the "exorbitant privilege"
- Gourinchas and Rey (JPE 2007): valuation effects are important for the external adjustment dynamics of countries (and they help predict exchange rates!)
- Gourinchas, Rey and Govillot (2010): The US has a very particular balance sheet: it earns excess returns on its net foreign asset position (exorbitant privilege) and provides insurance during global crises (exorbitant duty). Hence it is the world insurer. This is a different interpretation of the role of the centre country compared to the classic models (for example Krugman). Maggiori (2013) builds on our model.
- Gourinchas, Truempler and Rey (JIE 2012) provide estimates of the wealth transfers during the global crisis
FACTS on gross capital flows

- The size of the external balance sheet of countries have increased tremendously since the 1990s (Lane Milesi-Ferretti (2006), Gourinchas Rey (2007, 2014))

- Gross capital flows are positively correlated with one another, across regions and across asset classes and negatively correlated with measures of uncertainty and risk aversion such as the VIX (Rey, Jackson Hole paper 2013, Passari and Rey (2014))

- Gross capital flows follow a global financial cycle like leverage, credit creation and risky asset prices (Rey, Jackson Hole paper 2013, Miranda-Agrippino and Rey (2012))
Figure 6: External balance sheet of the United States, liabilities. Source Gourinchas and Rey (2014)
<table>
<thead>
<tr>
<th>Flows</th>
<th>N. Am LatAm CE.</th>
<th>EU W.</th>
<th>EU Em.As</th>
<th>Asia</th>
<th>N. Am LatAm CE.</th>
<th>EU W.</th>
<th>EU Em.As</th>
<th>Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity N. Am</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Equity LatAm</td>
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<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity W. EU</td>
<td>0.63</td>
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<td>0.50</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Equity Em. As</td>
<td>0.37</td>
<td>0.24</td>
<td>0.28</td>
<td>0.47</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity Asia</td>
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<td>0.31</td>
<td>0.28</td>
<td>0.40</td>
<td>0.31</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity Africa</td>
<td>0.41</td>
<td>0.22</td>
<td>0.26</td>
<td>0.55</td>
<td>0.34</td>
<td>0.26</td>
<td>1.00</td>
<td></td>
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<tr>
<td>FDI N. Am</td>
<td>0.54</td>
<td>0.06</td>
<td>0.07</td>
<td>0.45</td>
<td>0.52</td>
<td>-0.07</td>
<td>0.22</td>
<td>1.00</td>
</tr>
<tr>
<td>FDI LatAm</td>
<td>0.41</td>
<td>0.10</td>
<td>0.08</td>
<td>0.29</td>
<td>0.32</td>
<td>-0.07</td>
<td>0.04</td>
<td>0.68</td>
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<tr>
<td>FDI W. EU</td>
<td>0.46</td>
<td>0.11</td>
<td>0.08</td>
<td>0.18</td>
<td>0.23</td>
<td>-0.12</td>
<td>0.09</td>
<td>0.61</td>
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<tr>
<td>FDI Em. As</td>
<td>0.57</td>
<td>0.21</td>
<td>0.19</td>
<td>0.38</td>
<td>0.35</td>
<td>0.01</td>
<td>0.16</td>
<td>0.61</td>
</tr>
<tr>
<td>FDI Africa</td>
<td>0.47</td>
<td>0.24</td>
<td>0.16</td>
<td>0.34</td>
<td>0.36</td>
<td>-0.04</td>
<td>0.04</td>
<td>0.65</td>
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<tr>
<td>Debt N. Am</td>
<td>0.36</td>
<td>0.16</td>
<td>0.03</td>
<td>0.29</td>
<td>0.30</td>
<td>-0.17</td>
<td>0.05</td>
<td>0.60</td>
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<td>Debt LatAm</td>
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<td>0.17</td>
<td>0.32</td>
<td>0.51</td>
<td>0.29</td>
<td>0.21</td>
<td>0.31</td>
<td>0.40</td>
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<tr>
<td>Debt W. EU</td>
<td>0.20</td>
<td>0.40</td>
<td>0.33</td>
<td>0.16</td>
<td>0.13</td>
<td>0.00</td>
<td>-0.05</td>
<td>0.16</td>
</tr>
<tr>
<td>Debt Em. As</td>
<td>0.37</td>
<td>0.42</td>
<td>0.50</td>
<td>0.43</td>
<td>0.13</td>
<td>0.17</td>
<td>0.19</td>
<td>0.14</td>
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<td>Debt Africa</td>
<td>0.49</td>
<td>0.05</td>
<td>0.33</td>
<td>0.50</td>
<td>0.23</td>
<td>0.27</td>
<td>0.47</td>
<td>0.29</td>
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<tr>
<td>Credit N. Am.</td>
<td>0.16</td>
<td>0.18</td>
<td>0.24</td>
<td>0.22</td>
<td>0.16</td>
<td>-0.04</td>
<td>0.16</td>
<td>0.35</td>
</tr>
<tr>
<td>Credit LatAm</td>
<td>0.26</td>
<td>0.27</td>
<td>0.39</td>
<td>0.18</td>
<td>0.07</td>
<td>0.14</td>
<td>0.09</td>
<td>0.12</td>
</tr>
<tr>
<td>Credit W. EU</td>
<td>0.29</td>
<td>-0.02</td>
<td>0.21</td>
<td>0.38</td>
<td>0.15</td>
<td>-0.01</td>
<td>0.32</td>
<td>0.20</td>
</tr>
<tr>
<td>Credit Em. As</td>
<td>0.41</td>
<td>0.34</td>
<td>0.21</td>
<td>0.26</td>
<td>0.12</td>
<td>0.04</td>
<td>0.22</td>
<td>0.38</td>
</tr>
<tr>
<td>Credit Africa</td>
<td>0.42</td>
<td>0.25</td>
<td>0.27</td>
<td>0.28</td>
<td>0.32</td>
<td>0.15</td>
<td>0.21</td>
<td>0.54</td>
</tr>
</tbody>
</table>

**Figure 7:** Gross inflows, all asset classes (FDI, debt, equity, bank credit), by geographical areas (North America, Western Europe, Latin America, Central and Eastern Europe, Asia, Emerging Asia, Africa). Green colour means positive correlations. Red colour means negative correlations.
**Table 8:** Gross bank credit inflows by countries and exchange rate regimes (countries in light grey are floaters, countries in darker grey are peggers). Green colour means positive correlations. Red colour means negative correlations. Source: Passari and Rey (2014)
fluctuations in capital inflows, except for FDI inflows. The results are similar with outflows, both for the unconditional and for the conditional correlations for the US and Western Europe; they are weaker for the other geographical areas. In contrast, and in agreement with our previous results, the same pattern of correlations does not hold for net flows. I do not report these results due to space constraints.

Table 1(b): Conditional correlations of liability flows with the VIX, quarterly, 1990Q1‐2012Q4.

<table>
<thead>
<tr>
<th>Correlations inflows / VIX</th>
<th>North America</th>
<th>Latin America</th>
<th>Central Eastern Europe</th>
<th>Western Europe</th>
<th>Emerging Asia</th>
<th>Asia</th>
<th>Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity</td>
<td>-0.06</td>
<td>-0.31</td>
<td>-0.32</td>
<td>-0.38</td>
<td>-0.08</td>
<td>-0.34</td>
<td>-0.25</td>
</tr>
<tr>
<td>FDI</td>
<td>0.10</td>
<td>0.35</td>
<td>0.07</td>
<td>0.06</td>
<td>0.08</td>
<td>0.16</td>
<td>0.07</td>
</tr>
<tr>
<td>Debt</td>
<td>-0.30</td>
<td>-0.15</td>
<td>-0.36</td>
<td>-0.23</td>
<td>-0.28</td>
<td>-0.06</td>
<td>-0.22</td>
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<tr>
<td>Credit</td>
<td>-0.29</td>
<td>-0.15</td>
<td>-0.16</td>
<td>-0.24</td>
<td>-0.26</td>
<td>0.09</td>
<td>-0.14</td>
</tr>
</tbody>
</table>

Figure 9: Conditional correlations of liability flows with the VIX (conditioning variables are the world short term real rate and the world growth rate)
Figure 10:  Conditional correlations of domestic credit growth, leverage and leverage growth with the VIX (conditioning variables are the world short term real rate and the world growth rate)
We estimate global, regional and asset-specific factors from a collection of world risky asset prices.

\[
\text{price series (} i, t \text{)} = \text{common component (} t \text{)} + \text{idiosyncratic (} i, t \text{)}
\]

Using a set of restrictions on the coefficient matrices of the Dynamic Factor Model we further decompose the common component in two:

\[
\text{common component (} t \text{)} = \text{global factor (} t \text{)} + \text{regional factors (} t \text{)}
\]

Each price series is then the sum of three components

- a global factor that is a common to all price series in the set
- a region (or market) specific component that captures aggregate shocks that affect all assets traded on the same market or belonging to the same category (i.e. commodities)
- an idiosyncratic asset-specific component

Formally:

\[
\chi_{i, t} = \mu_i + \lambda_{i, G} f_t^G + \lambda_{i, M} f_t^M + \xi_{i, t}
\]

(1)
Dynamic Factor Model for asset prices: Data

- the global set that we consider is a collection of monthly asset prices (logs) [N=428] spanning the twenty-years-period from 1990 to 2010 that combines information from

  ▶ US market [S&P 500, n=165]

  ▶ European market: Euro Area + United Kingdom [S&P Euro + FTSE100, n=144]

  ▶ Asian market: Japan + Singapore + Hong Kong + South Korea + Taiwan [Topix Core 30 + S&P Asia, n=48]

  ▶ Commodities and Corporate bonds markets [n=71]
data are taken at monthly frequency (EOM value) to reduce the noise in daily figures while preserving long term characteristics of the series.

The global set is split into six subsamples or *blocks* each of which will load a specific factor together with the global one. The blocks are:

1. US
2. Europe, further decomposed into Euro area and UK
3. Asia
4. Commodities
5. Corporate
the DFM is cast in state space form and estimated on the stationary return series using Maximum Likelihood (Doz, Giannone, Reichlin (2006), Watson, Reis (2007))

Factors for the price series are then obtained via cumulation (Bai, Ng (2004))

The number of factors [1 global & 1 per each block] and lag length of factors VAR [1] are selected using standard criteria and tests)
To sum up, we have now established in flow data (across most types of flows and regions, but with some exceptions) and in price data (across a sectorally and geographically wide cross-section of risky asset prices) the existence of a global financial cycle. Interestingly, the VIX is a powerful index of the global financial cycle, whether for flows or for returns. Our analysis so far emphasizes striking correlations and patterns, but cannot address causality issues. Low value of the VIX, in particular for long periods of time, are associated with a build up of the global financial cycle: more capital inflows and outflows, more credit creation, more leverage and higher asset price inflation.

### III) Capital flows and market sensitivities to the global financial cycle

In this part I attempt to gauge further the importance of the global financial cycle for different asset markets (stock prices, house prices) as well as for the leverage of financial intermediaries. Having reported the importance of the global cycle for the fluctuations of these variables in the time series dimension, I study in more details the factors affecting the cross sectional sensitivities of these variables to the global financial cycles. More precisely, I focus here on the possibility that larger

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**Figure 3:** Global factor and VIX. Source: Miranda-Agrippino and Rey (2012).

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**Figure 11:** Global factor in risky asset prices and VIX. Source: Rey (2013).
Figure 12: Decomposition of the global factor in a volatility component and a risk aversion component
Facts: The Global Financial Cycle (Rey, Jackson hole (2013))

- Strong commonality in gross capital inflows and outflows around the world
- Negative co-movements of these gross flows with the VIX, index of market risk aversion and uncertainty.
- Credit flows are especially pro-cyclical
- An important part of the variance of a large cross section of 858 risky asset prices (stocks, corporate bonds, commodities) distributed on five continents is explained by one single global factor. This global factor is closely related to the VIX (negatively)
- Credit growth and, for most areas, leverage and leverage growth co-move negatively with the VIX
Figure 13: G-sifi bank leverage. Quarterly growth of total assets over quarterly growth of leverage ratio, all available history.
Figure 14: Capital market banks leverage. Quarterly growth of total assets over quarterly growth of leverage ratio, all available history.
Figure 15: Commercial banks leverage. Quarterly growth of total assets over quarterly growth of leverage ratio, all available history.
Global banks raising funds in particular in the US (dollar is the main currency of global banking).

Surges in credit flows associated with increases in leverage worldwide.

Procyclicality: Credit creation when measured risks are low, asset prices pushed up further, spreads compressed, healthy looking balance sheets etc, measured risks lower etc...

The global financial cycle is not aligned with countries specific macroeconomic conditions.

Symptoms can go from benign to large asset price bubbles and excess credit creation, which are among the best predictors of financial crises.
A VAR analysis suggests monetary policy in the centre country is an important determinant of the global financial cycle (Miranda Agrippino and Rey (2012))

When the Federal Funds rate goes down, the VIX falls, banks leverage rises, as do gross credit flows.

A fall in the VIX leads to an increase in global domestic credit.

Estimates suggest that between 9 and 30 percent of the variance of the VIX is explained by shocks to fed funds rate (1990-2007)
Figure 16: VAR Analysis
Trilemma: with free capital mobility, independent monetary policies are feasible if and only if exchange rates are floating (dominant paradigm in international finance).

Instead, whenever capital is freely mobile, cross-border flows and leverage of global financial institutions transmit monetary conditions globally, even under floating exchange-rate regimes.

Gross credit and debt flows are key for the international transmission of monetary spillovers.

The global financial cycle transforms the trilemma into a dilemma or an irreconcilable duo: independent monetary policies are possible if and only if the capital account is managed, directly or indirectly.
Conclusions

- A very rich research agenda in international macroeconomics and finance as important questions are still unanswered.
- A lot more details at http://www.helenerey.eu/
- Thank you!