KF*: The natural level of capital flows

JOHN BURGER (Loyola University Maryland)

FRANK WARNOCK (University of Virginia—Darden Business School and NBER)

VERONICA CACDAC WARNOCK (University of Virginia—Darden Business School)

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This talk is based on

Burger, J., F. Warnock, and V. Warnock, 2018. Benchmarking Portfolio Flows. *IMF Economic Review* 66(3): 527–563.

Burger, J., F. Warnock, and V. Warnock, 2020. The Natural Level of Capital Flows. NBER Working Paper 26184 (September 15 2020 update).

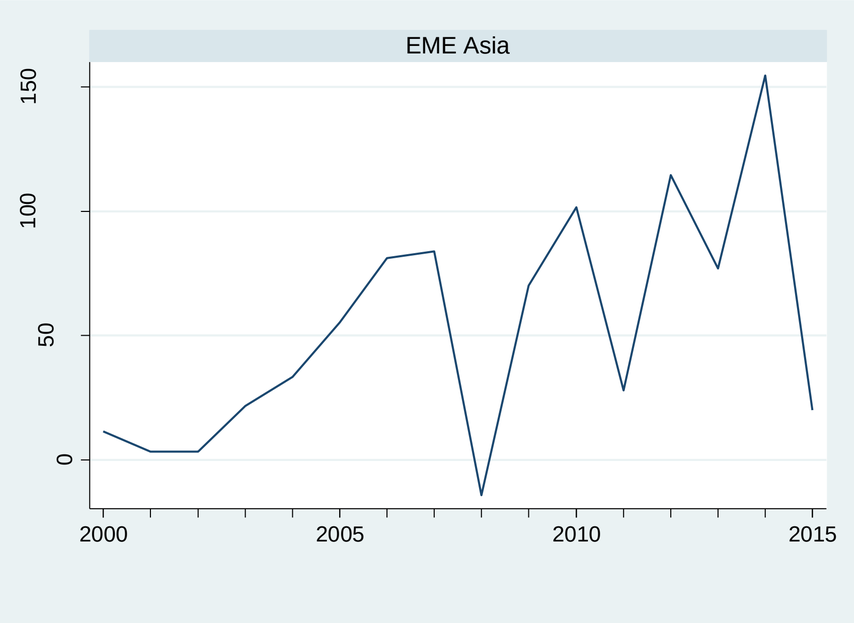
Outline

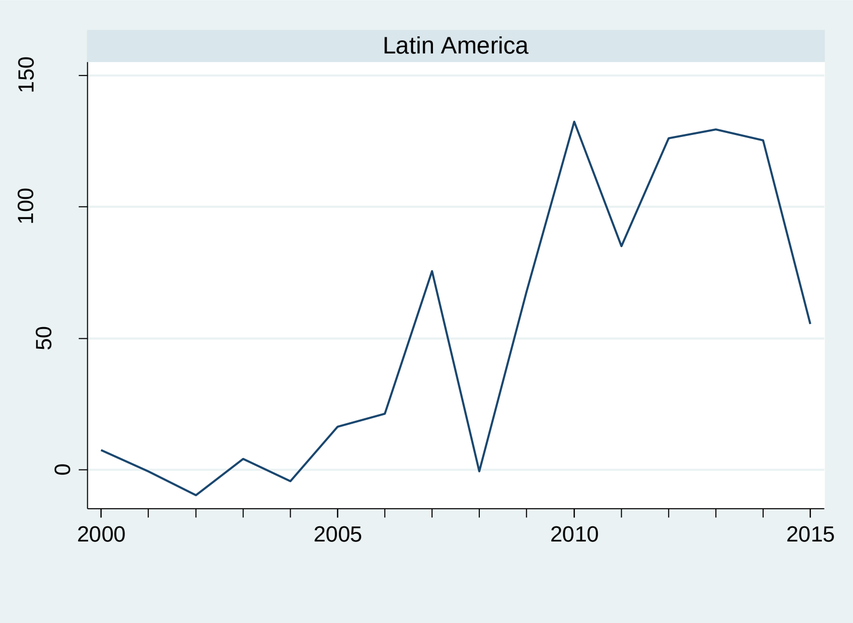
- A Benchmark for Annual Portfolio Inflows (BWW 2018)

- Moving to Notoriously Volatile Quarterly Flows (BWW 2020)
  - Cogley Tests of Predictive Power
  - Predicting 6-quarter-ahead Sudden Stops
  - Predicting annual equity returns
  - Predicting flows during the GFC

Question (posed to us by Maury Obstfeld, IMF's Chief Economist, in late 2016):

Was the 2015/16 sharp decrease in EME portfolio inflows temporary or likely to persist?



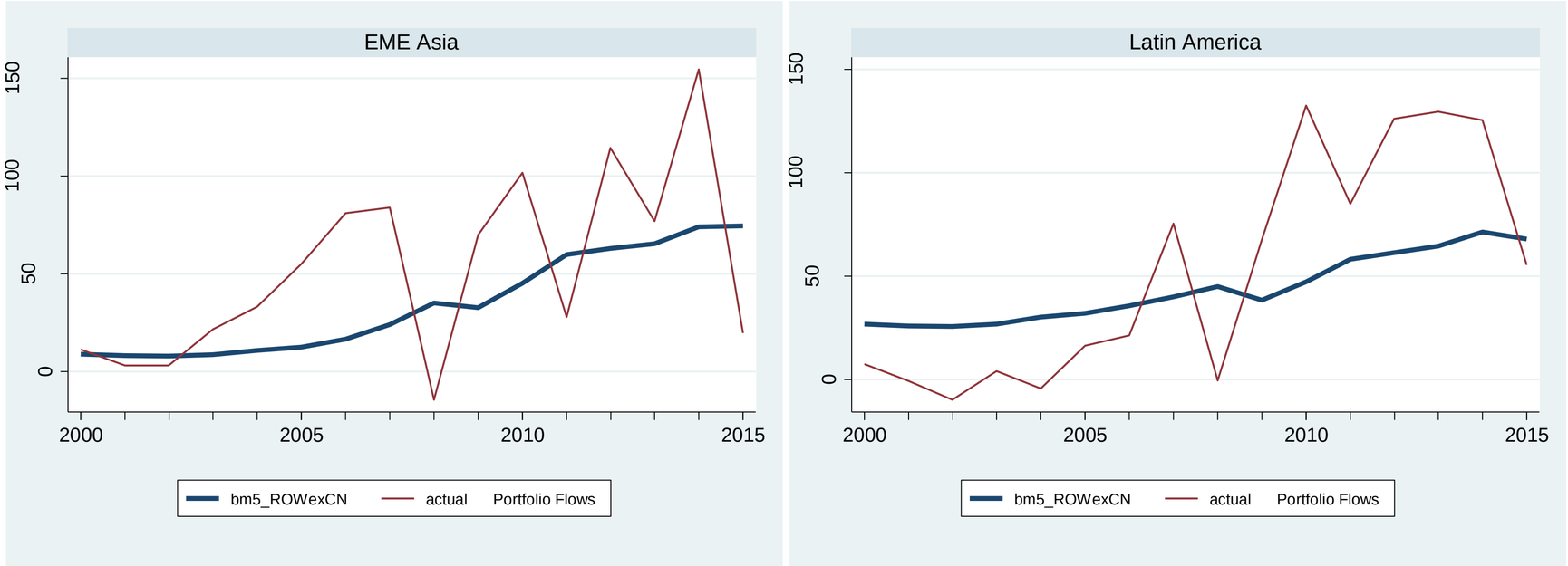


Note: The data in this graph, and in our analysis, are BOP portfolio (ie debt+equity) inflows.

How does one actually go about assessing whether the decrease—or any sharp change in capital flows—was an aberration or the new normal?

Our answer: Develop a benchmark.

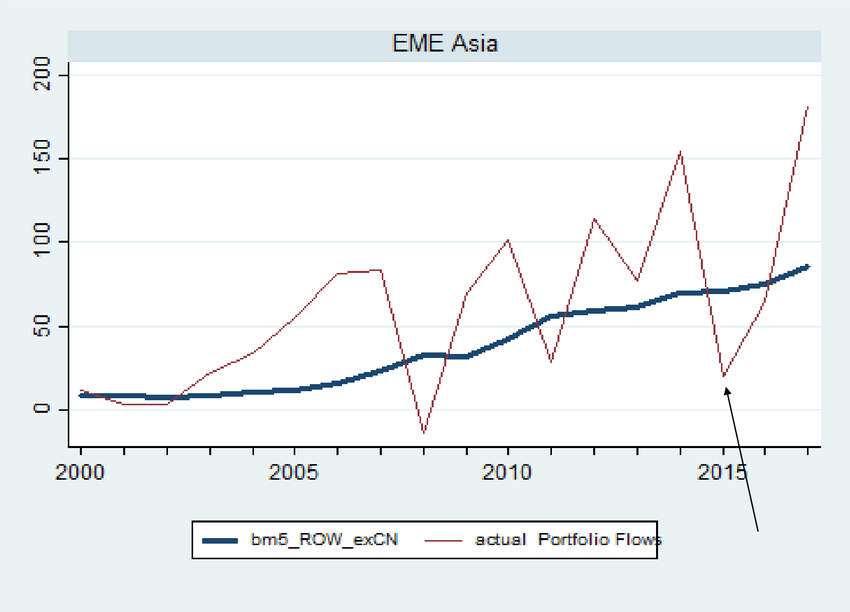
Using the BWW (2018 IMFER) benchmark we were able to differentiate between sharp changes **toward the benchmark** (i.e., back to the normal level) and movements **away from the benchmark** (which should be temporary).



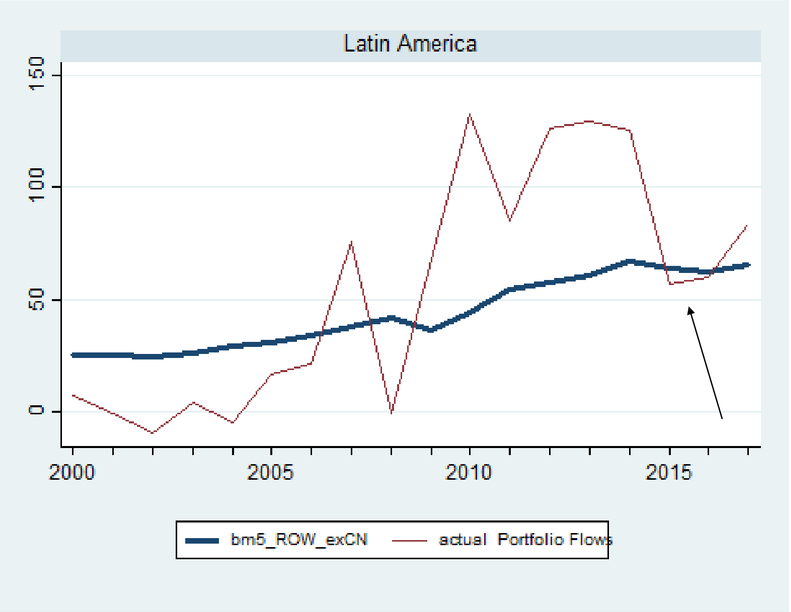
The BWW benchmark suggested that the 2015 decline in EME Asia's inflows overshot and that inflows there should increase thereafter. In contrast, the decline in Latin America's inflows was a return to normal levels.

The benchmark (aka KF*, the natural level of capital flows) suggested that the 2015 slowdown in inflows would be short-lived for EME Asia but was a return to normal for LatAm.

EME Asia: Flows dropped below benchmark in 2015. Expected a rebound (which occurred)



EME Latin America: 2015 drop was reversion to benchmark (back to normal).



Having a benchmark helps distinguish between movements *toward* the benchmark and movements *away from* the benchmark.

What is KF*?

Simply put, KF* is current period ROW private savings ($S_{ROW,t}$) times a lagged portfolio weight (5yr moving average**).

$$KF^*_{d,t} = (\frac{1}{5}\sum_{i=1}^{5} \omega_{ROW,d,t-i})S_{ROW,t}$$

ROW weight on a country's equities and bonds is the stock of that country's portfolio liabilities (that is, ROW holdings of its equities and bonds) divided by ROW wealth.

** In practical terms, this is akin to the CBO's approach to estimating potential GDP. CBO applies a filter to the capital share rather than allowing the volatility in the capital-share series create volatile estimates of potential GDP (Shackleton 2018).

Constructing KF*: Data Requirements

$$KF^*_{d,t} = \omega_{ROW,d,t} S_{ROW,t}$$

Sum of ROW savings in period t

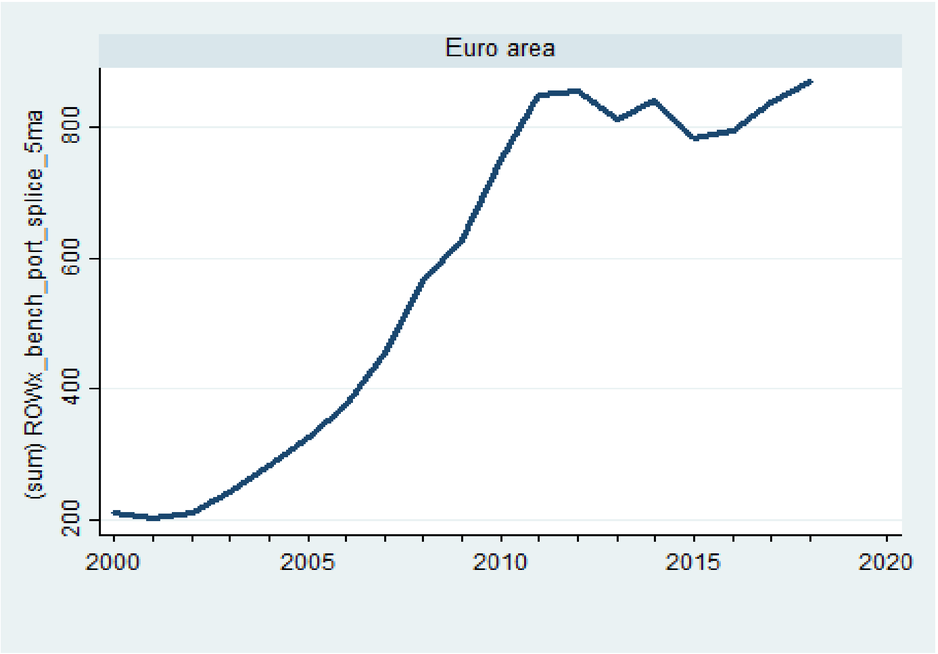
Lagged 5-yr MA portfolio weight (ROW weight on destination portfolio assets), calculated as external liabilities (from LMF) scaled by ROW household wealth

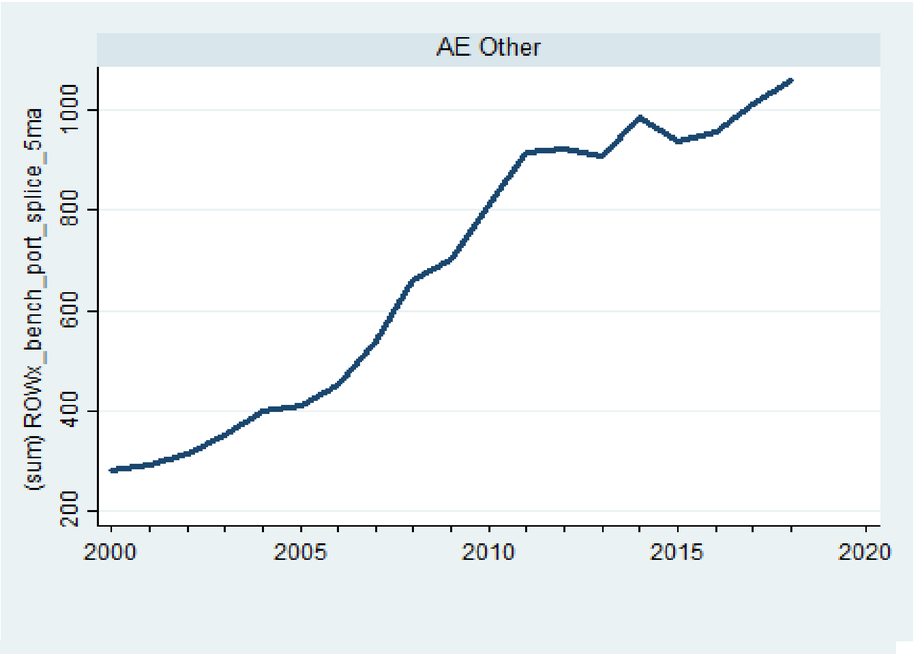
Required data are easily obtained:

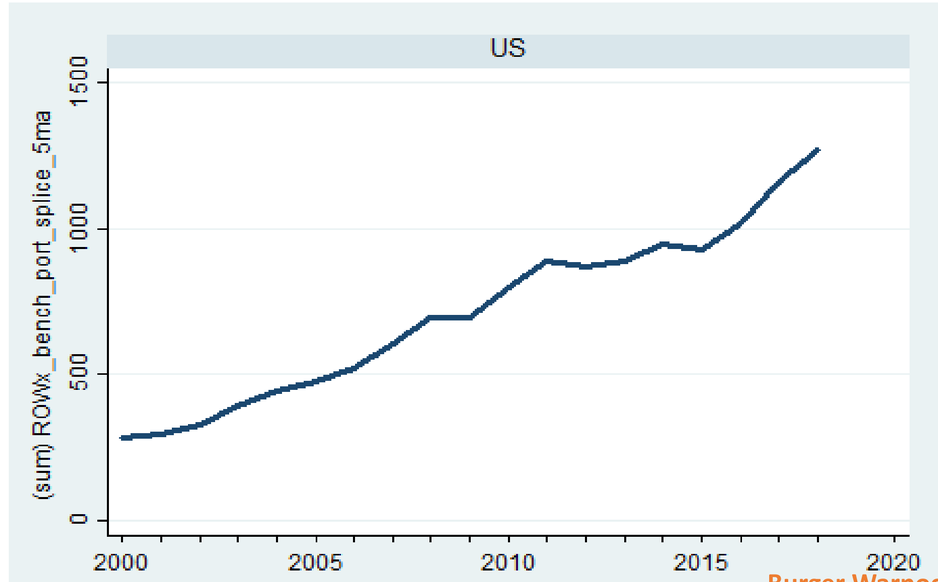
- Flow of private savings is available from the IMF WEO dataset.
  - Constructed as national saving minus government saving
- ROW portfolio holdings are from Lane and Milesi-Ferretti (2018) External Wealth of Nations II dataset.
  - We can create KF* for 180 countries (including some that don't have flow data).
- Scale factors for portfolio weights can be computed from Davies, Lluberas, and Shorrocks Credit Suisse 2018 data on household wealth.
  - Supplemented with McKinsey Global Institute data on total financial assets.
- Portfolio weights are calculated by scaling portfolio equity and portfolio debt liabilities (from LMF) by ROW wealth.

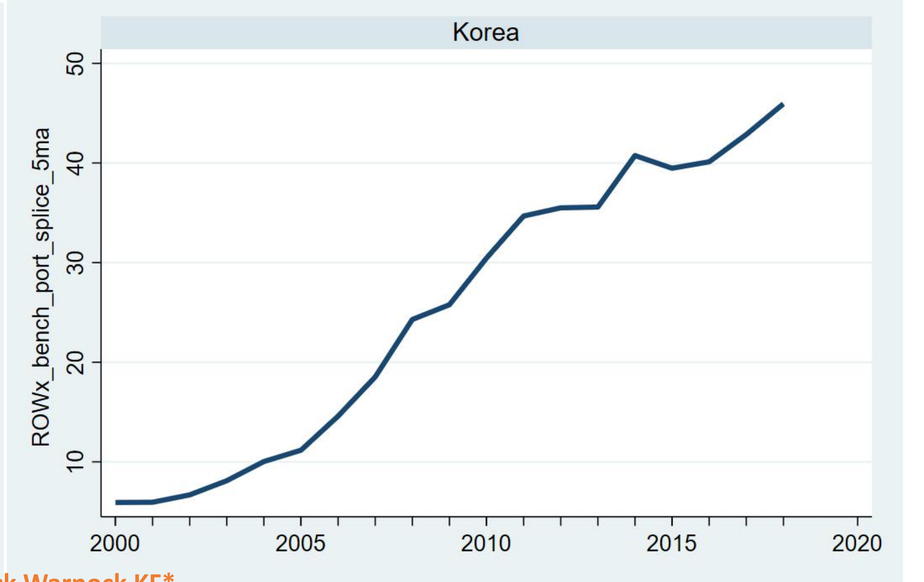
More details, including the underlying theory and decisions that must be made to operationalize are in BWW (2018) and BWW (2020).

KF*, Advanced Economies ($bil, annual)



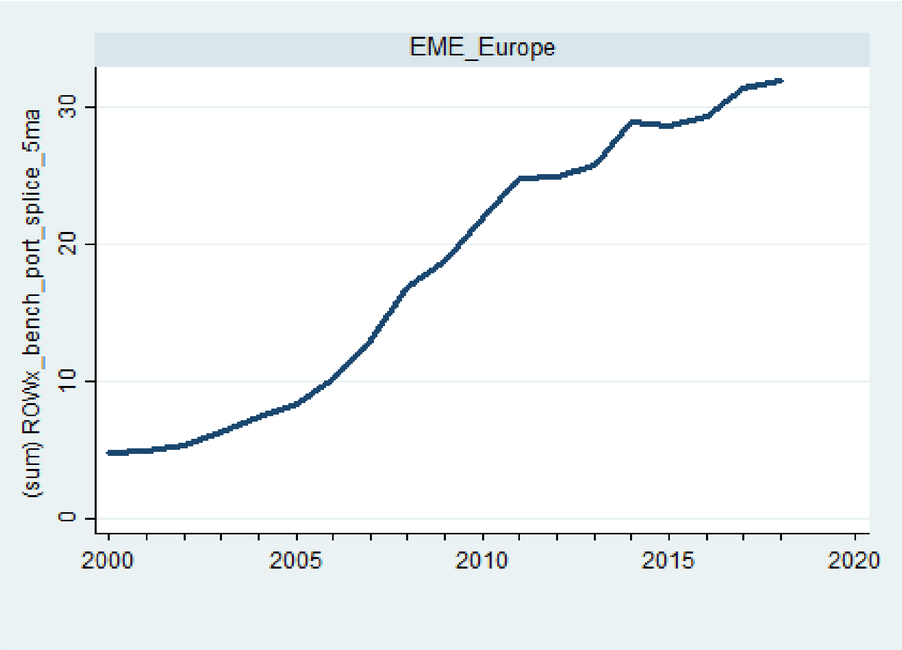


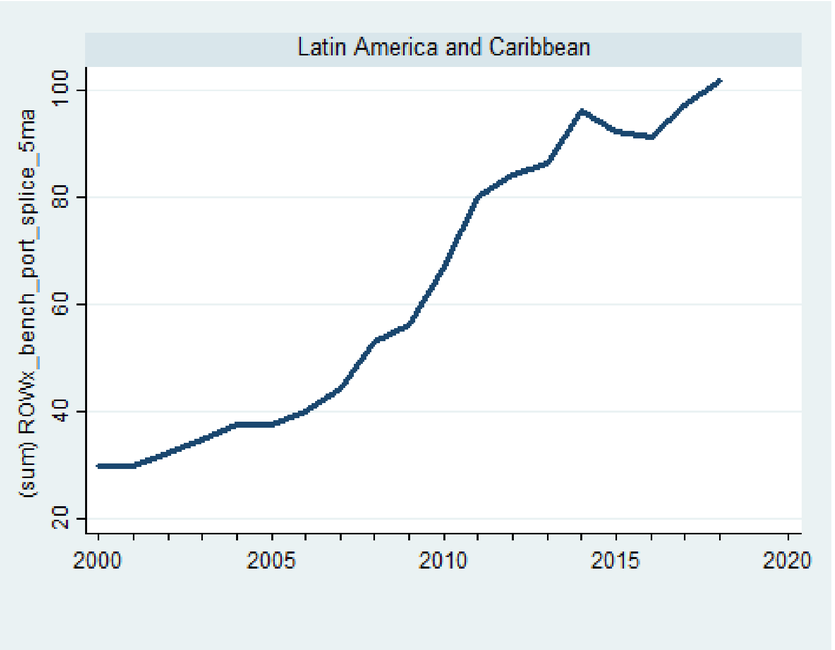


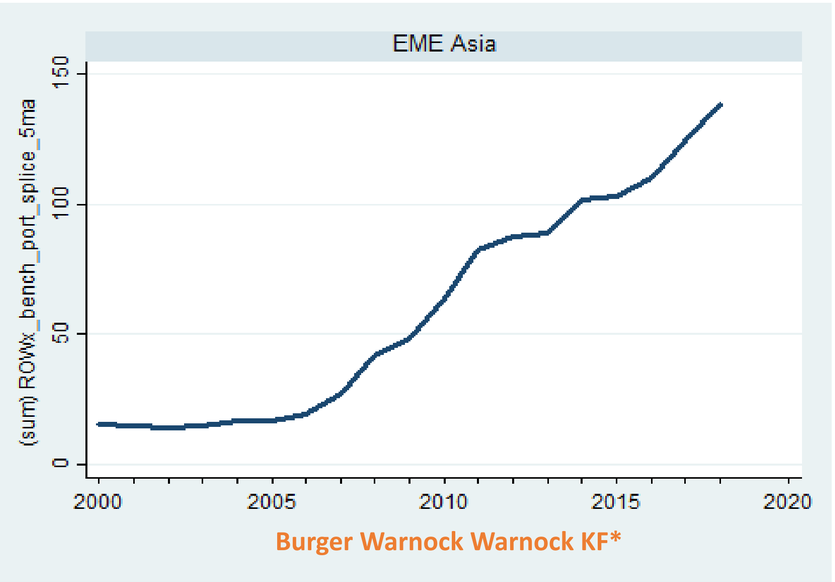


Burger Warnock Warnock KF*

KF*, EMEs (annual, bil US$)

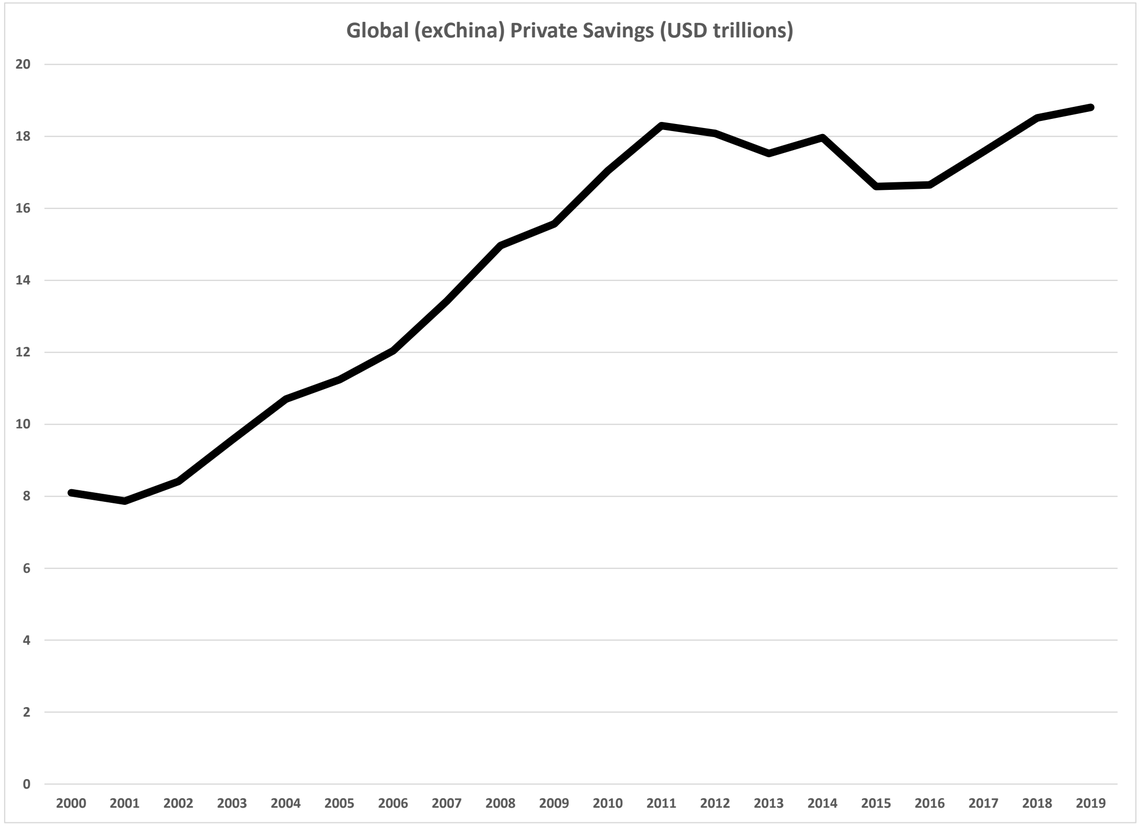






Burger Warnock Warnock KF*

$$KF^*_{d,t} = \omega_{ROW,d,t} S_{ROW,t}$$

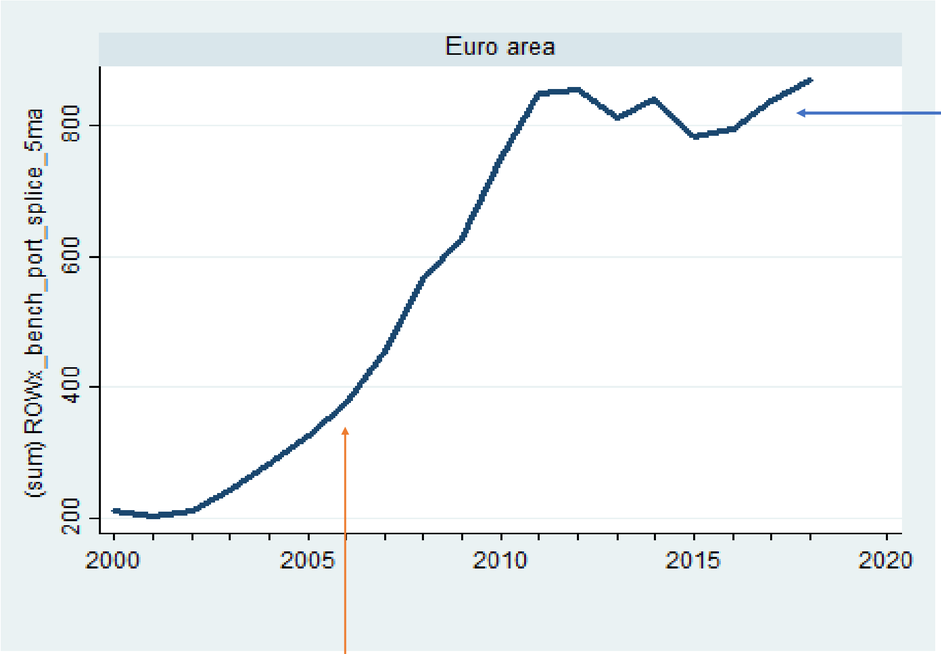


$S_{ROW,t}$, *ROW* global private savings, an important component of KF*, has been flat since 2011 (declined 2012-2016, recouped since).

So, for a country's KF* to increase since 2011 $\omega_{ROW,d,t}$, the ROW portfolio weight, must have increased.

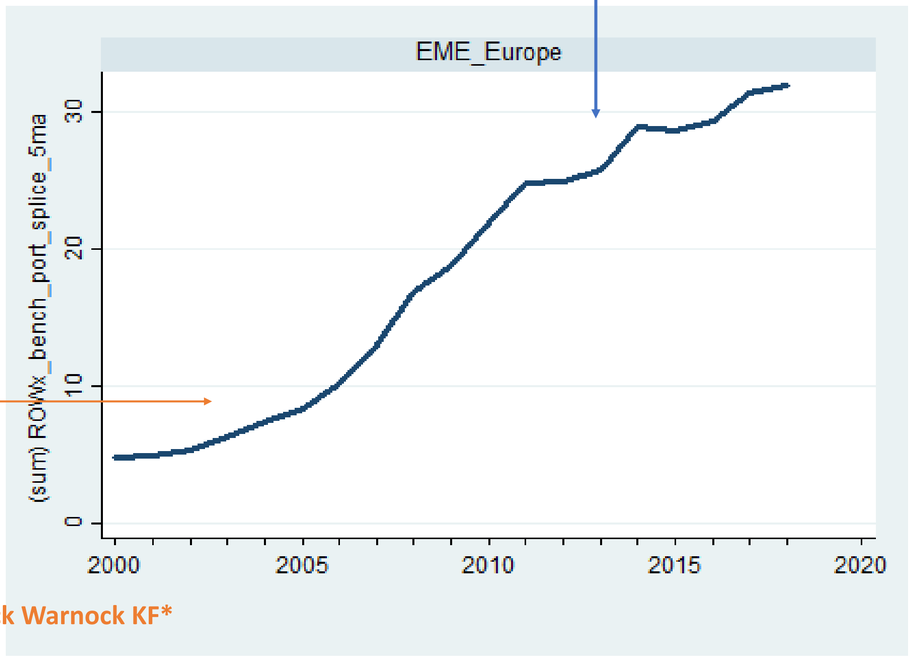
For some it has, for some it hasn't.

Unpacking KF*: Euro area and EME_Europe

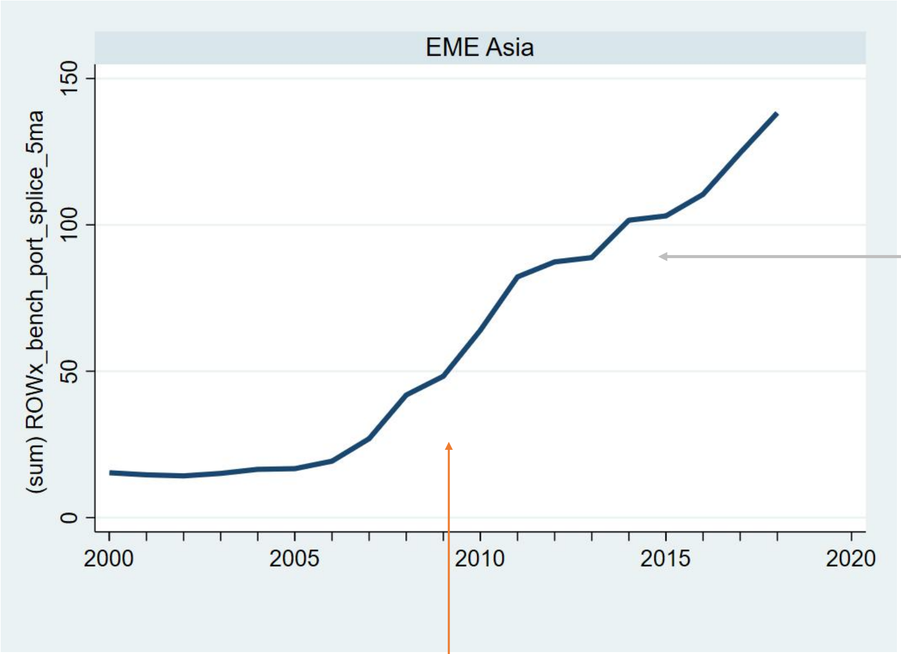


2012-2018 Significant slowing in global economy has led to stagnant ROW savings. Any increases in KF* therefore driven primarily by increased portfolio weights.

2005-2011 Rapid growth in global savings <u>combined</u> with increases in ROW portfolio weights lead to steep increases in KF*



Unpacking KF*: EME Asia and Korea



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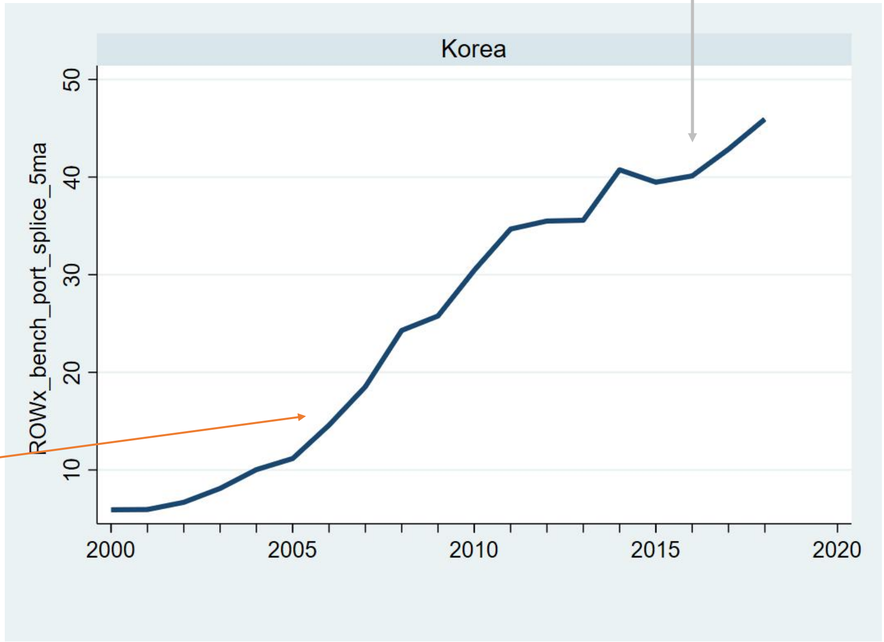


BWW (2020)

- Burger, Warnock and Warnock (2018) created an benchmark for portfolio flows for 47 countries and showed, using annual data, that
  - there is a significant in-sample long-run relationship between actual flows and the benchmark and
  - the benchmark (aka KF*) helps predict the direction of one-period-ahead changes in inflows.

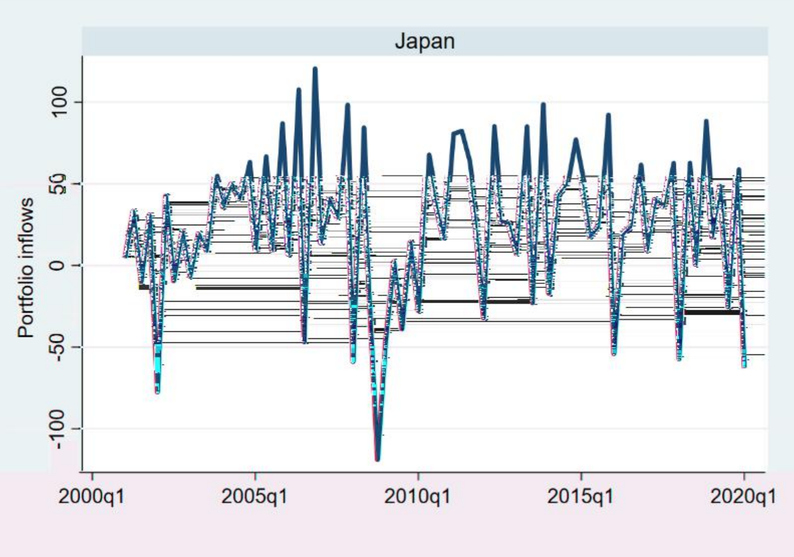
- BWW (2020) pushes this further by applying to notoriously volatile QUARTERLY portfolio flows.

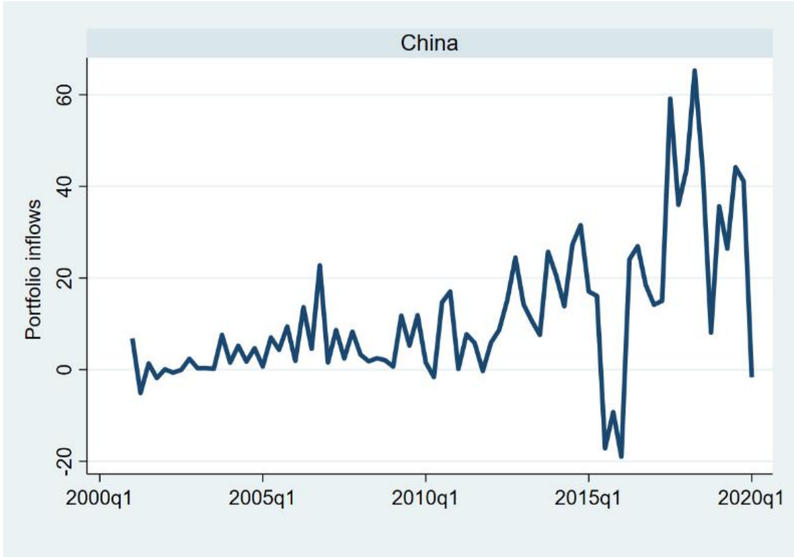
Outline

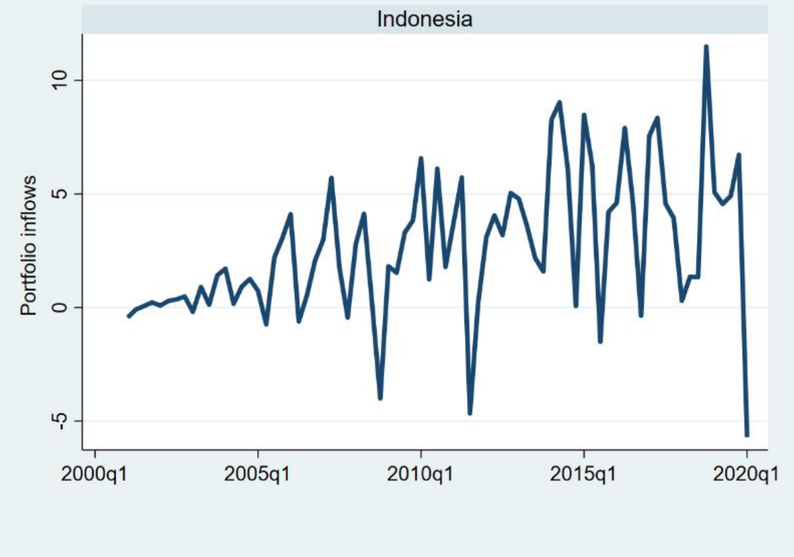
- A Benchmark for Annual Portfolio Inflows (BWW 2018)

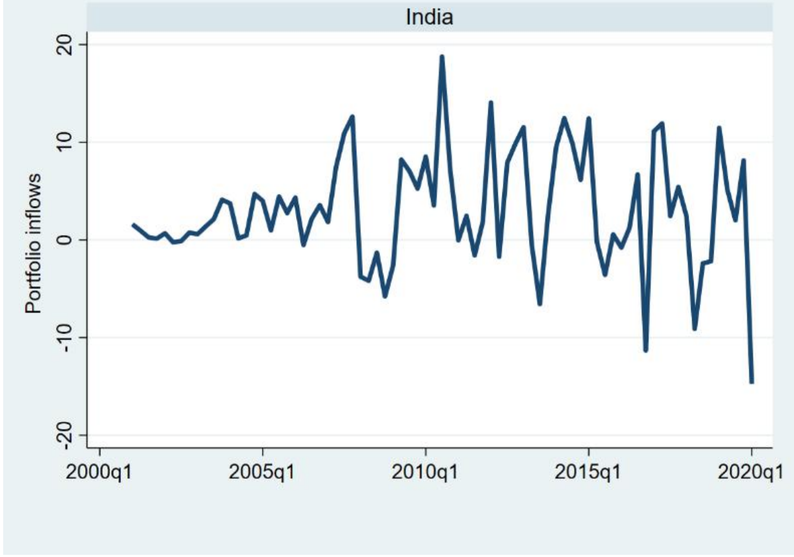
- Moving to Notoriously Volatile Quarterly Flows (BWW 2020)
  - Cogley Tests of Predictive Power
  - Predicting 6-quarter-ahead Sudden Stops
  - Predicting annual equity returns
  - Predicting flows during the GFC

CAN WE PREDICT FUTURE PORTFOLIO INFLOWS?







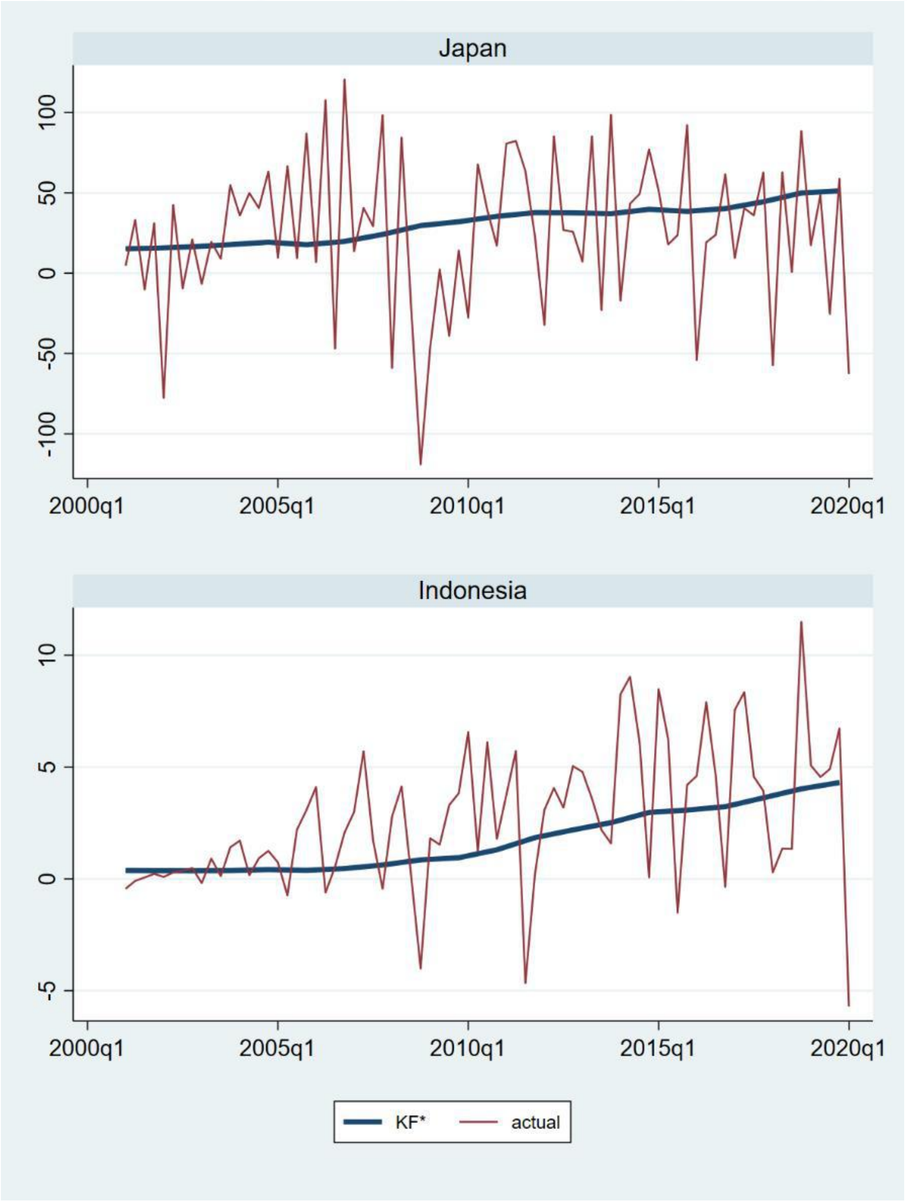


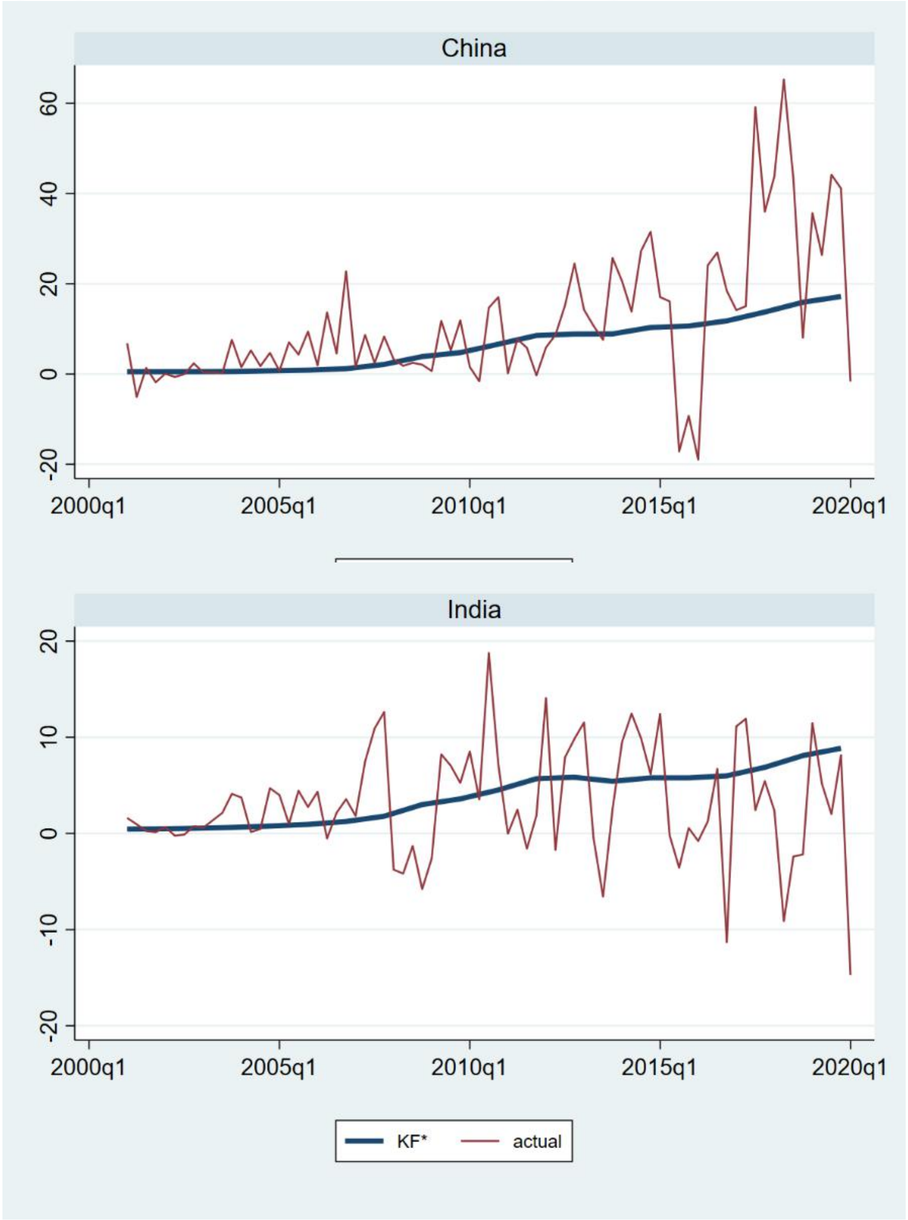
Quarterly, billions of USD

PREVIEW: KF*, THE NATURAL LEVEL OF CAPITAL FLOWS, IS A STRONG PREDICTOR OF FUTURE FLOWS.

- Portfolio inflows oscillate around KF*.
  - Deviations of actual flows from KF* are transitory.
    - Flows revert strongly to KF* over 1-2 year horizon.
    - The explanatory power of KF* is substantially greater than traditional push/pull factors.
- KF* predicts 6-quarters ahead sudden stops, as well as next year's equity returns.
- Application to crises
  - KF*, at the eve of the GFC, predicted flows during the crisis.
  - KF*, at the eve of the pandemic, suggests sharp decreases in portfolio inflows will be short-lived.

PORTFOLIO INFLOWS OSCILLATE AROUND KF*





It's apparent from the graphs, and we show empirically too.

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Cogley Test of Predictive Power of Core Inflation

- Inflation targeting central bank looking for a way to extract the “true” inflation signal from the noise of volatile period-to-period fluctuations.
- Core inflation (π*) should eliminate transient price variation and identify component expected to persist over medium-run.

$$\pi_t^* = E[\pi_{t+h}]$$

- Deviations from core inflation should be inversely related to subsequent changes in inflation:

$$E[\pi_{t+h}] - \pi_t = -(\pi_t - \pi_t^*)$$

- Cogley proceeds to test relationship between deviations of inflation from core and subsequent changes in inflation:

$$\pi_{t+h} - \pi_t = \alpha_h + \beta_h(\pi_t - \pi_t^*) + \varepsilon_t$$

Applying Cogley Test to KF*

- Natural level of capital flows (KF*) should help policymakers identify the component of flows expected to persist over medium-run.

$$KF_t^* = E[flows_{t+h}]$$

- Deviations from KF* should be inversely related to subsequent changes in flows:

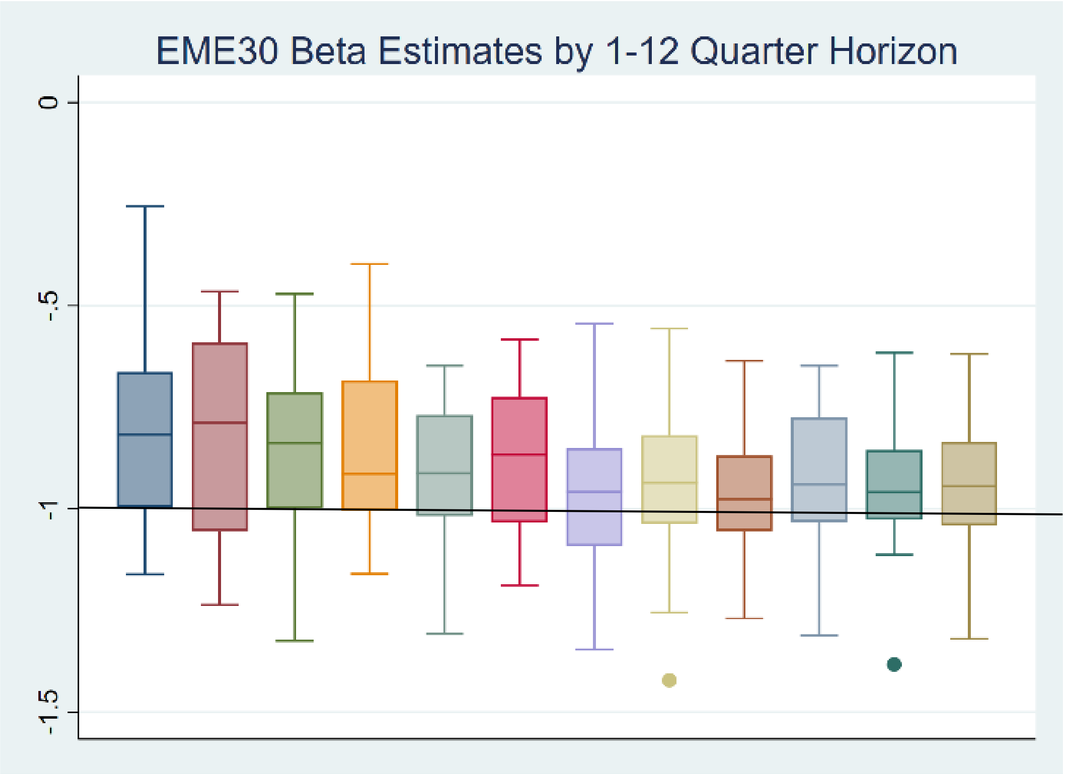
$$E[flows_{t+h}] - flows_t = -(flows_t - KF_t^*)$$

- Estimate following regression for horizons of 1 to 12 quarters for each of 17 AEs and 30 EMEs:

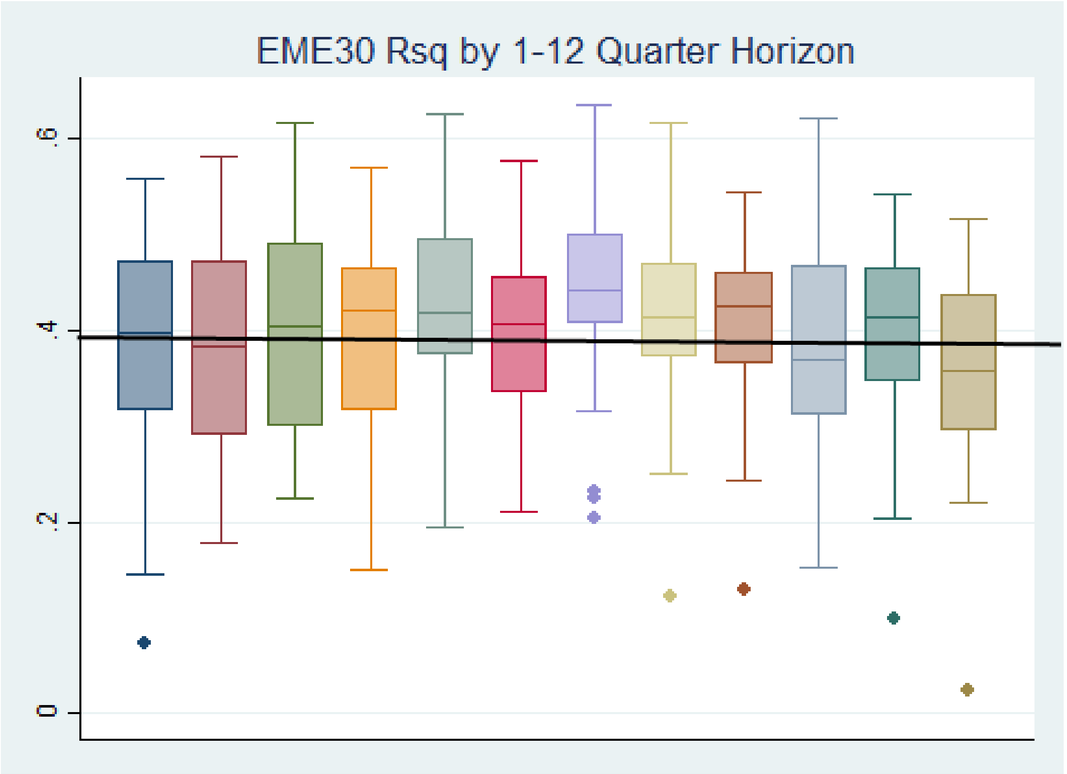
$$flows_{t+h} - flows_t = \alpha_h + \beta_h(flows_t - KF_t^*) + \varepsilon_t$$

- If KF* represents the natural level of flows, we expect to estimate β_h =-1 for medium-run horizons.

FLOWS REVERT STRONGLY TO KF* OVER 1-2 YEAR HORIZON, AND THE EXPLANATORY POWER OF KF* IS SUBSTANTIALLY GREATER THAN TRADITIONAL PUSH/PULL FACTORS.



Beta = -1 means flows fully adjust to KF in h quarters.*



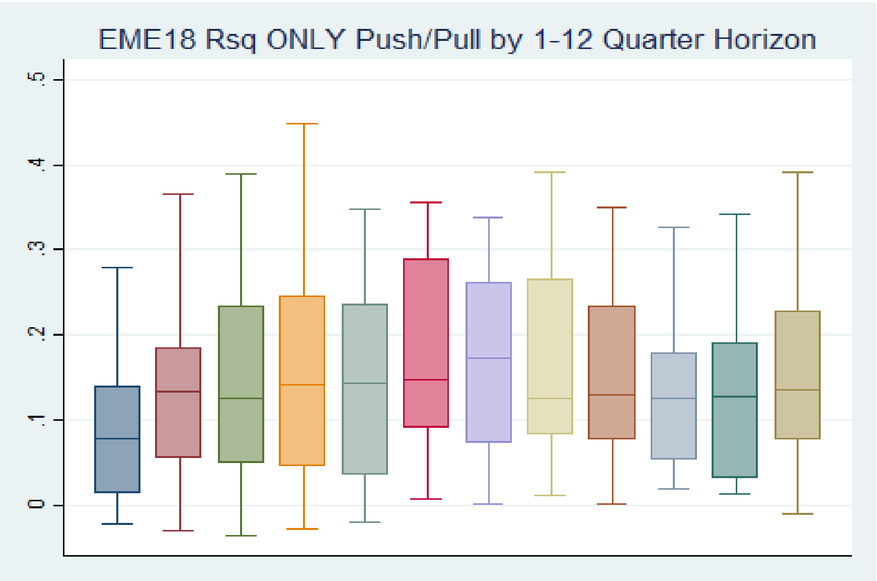
R^2 of 0.15 would be considered good for push/ pull factors.

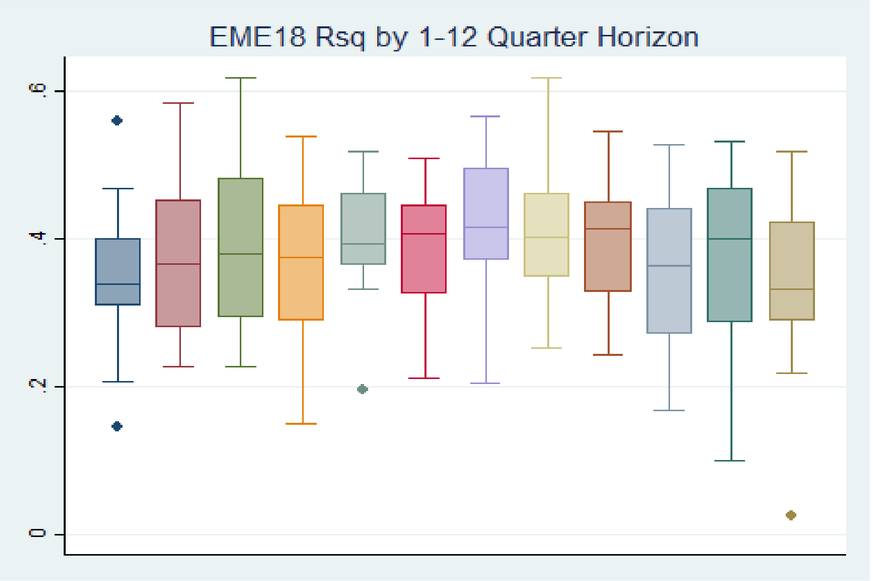
KF* and Push/Pull Factors

- Can prominent push/pull factors explain change in flows over short to medium term horizons?

$$flows_{t+h} - flows_t = \alpha + \beta_{1,h}\left(VIX_{t+h} - VIX_t\right) + \beta_{2,h}\left(i_{t+h} - i_t\right) + \beta_{3,h}\left(\left[\frac{msci_{t+h}}{msci_t}\right]^{1/h} - 1\right) + \varepsilon_t$$

- Note: we measure push/pull factors contemporaneously with flows.
- Compare R^2 for push/pull regressions and Cogley KF* regressions for 18 EMEs that have msci returns.
- Deviations from KF* have far more explanatory power compared to push/pull factors.





7-quarter-ahead forecasting performance vs alternatives

	KF*	MA	HP	Hamilton
		Average Deviation from beta=-1		
EME (30)	0.150	0.161	0.174	0.156
AE (17)	0.198	0.110	0.134	0.115
nonUMP	0.098	0.082	0.129	0.099
UMP	0.341	0.151	0.140	0.138
		Mean Rsq		
EME (30)	0.439	0.376	0.330	0.427
AE (17)	0.394	0.419	0.376	0.457
nonUMP	0.430	0.431	0.382	0.473
UMP	0.342	0.400	0.368	0.435

Sample is of 30 EMEs and 17 AEs for the period 2000Q4-2018Q1, with a forecast horizon of 7 quarters, so the last quarter in the forecast period is 2019Q4.

MA is a 12-quarter moving average; HP is a one-sided HP filter; and Hamilton (2018) is a linear projection.

UMP is defined here as quantitative easing and/or negative policy rates.

For EMEs, KF* performs best, in that it produces beta estimates that have the smallest absolute deviation from negative 1 (0.150, on average) and the highest mean R^2 (average of 0.439).
Along both dimensions, the Hamilton (2018) procedure is second best for EMEs.

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Using KF* to predict sudden stops

We'll use $KF^{*}gap_{i,t}$, the gap between current flows and KF* scaled by GDP, averaged over the last 4 quarters, to predict a sudden stop 6 quarters hence.

Follow Forbes and Warnock (2020) but instead of predicting one-quarter ahead we predict 6 quarters ahead (and everything we say holds for t+4 to t+8).

$STOP_{i,t+h}$ is an indicator variable that takes the value of 1 if country i is experiencing a sudden stop in capital flows at time *t+h*;

Global Growth is year-over-year global GDP growth from the IMF's World Economic Outlook dataset;

Global Risk is the change in VXO.

(We include all variables from Forbes and Warnock (2020), but those are the two that matter most.)

Using KF* to predict sudden stops

Panel A	**Prob(Stop) t+ 6 quarters**	
	Full Sample	2010-2018
KF* gap/GDP	15.74***	17.1***
	(4.59)	(5.07)
Global Growth	0.798***	0.23*
	(0.18)	(0.08)
VXO_ch	0.093***	0.021**
	(0.016)	(0.008)
Observations	2098	1149
Countries	32	32

1. KF*gap helps predict future sudden stops, both in our full smpl and in a post-GFC smpl.

Using KF* to predict sudden stops

Actual flows and KF* combine to be a powerful predictor of sudden stops.

- When global growth is 1stdev above its mean (i.e., is 4.2%), then global savings is increasing strongly and thus KF* is increasing strongly.
- If in that situation actual flows are growing even faster (i.e., KF*gap 1stdev above its mean, or 3.6%), **40.5% chance of sudden stop in 6 quarters**.

Panel B	**Prob (Stop) t+6 quarters**
KF* gap/GDP = 0%	7.7%
KF* gap/GDP = 3.6%	13.1%
KF* gap/GDP = 7.2%	21.9%
KF* gap/GDP = 3.6% & growth = 4.2%	40.5%

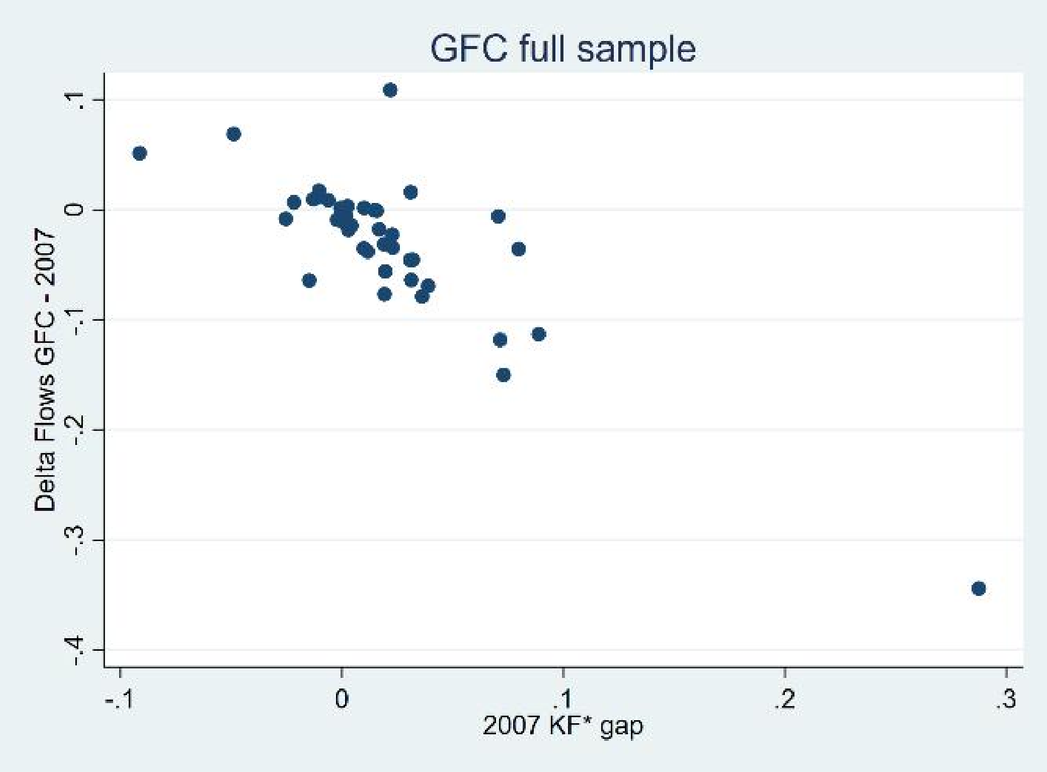
Using KF* to predict next year's equity returns

Actual flows and KF* combine to be a powerful predictor of annual equity returns.

- Even controlling for lagged returns, dividend yield, VIX, the country's growth, when global growth is 1stdev above its mean (and thus global savings is increasing strongly and all else equal so is KF*).
    - If in that situation actual flows are growing even faster (i.e., KF*gap 1stdev above its mean), **the country's MSCI equity returns fall 9.6% in the next year**.

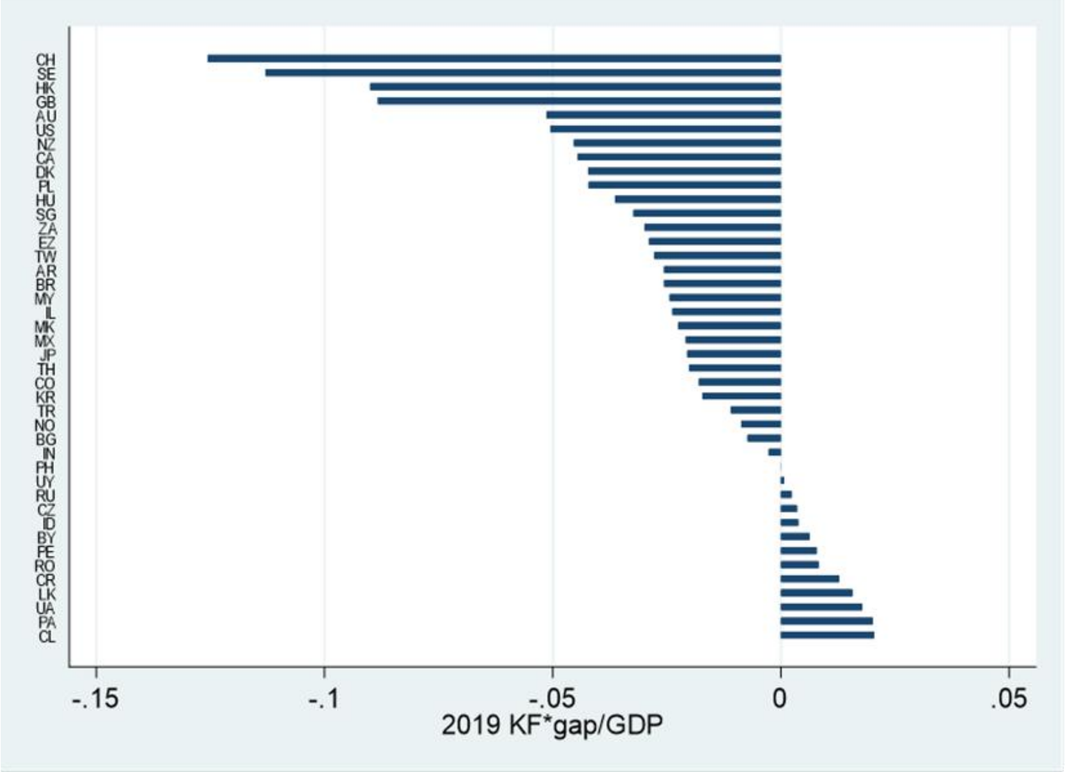
KF* DURING CRISES

Countries with a larger KF*gap/GDP in 2007 had larger declines during the GFC period (2008Q4-2009Q3).



This relationship holds strongly without the one outlier (HK), and in EMEs and nonUMPs.

At the eve of the pandemic, very few countries had positive KF* gaps.



Chile, Panama, Ukraine had the most positive KF* gaps in 2019. In Asia, most positive were Indonesia, China and Philippines (and all were just slightly positive).

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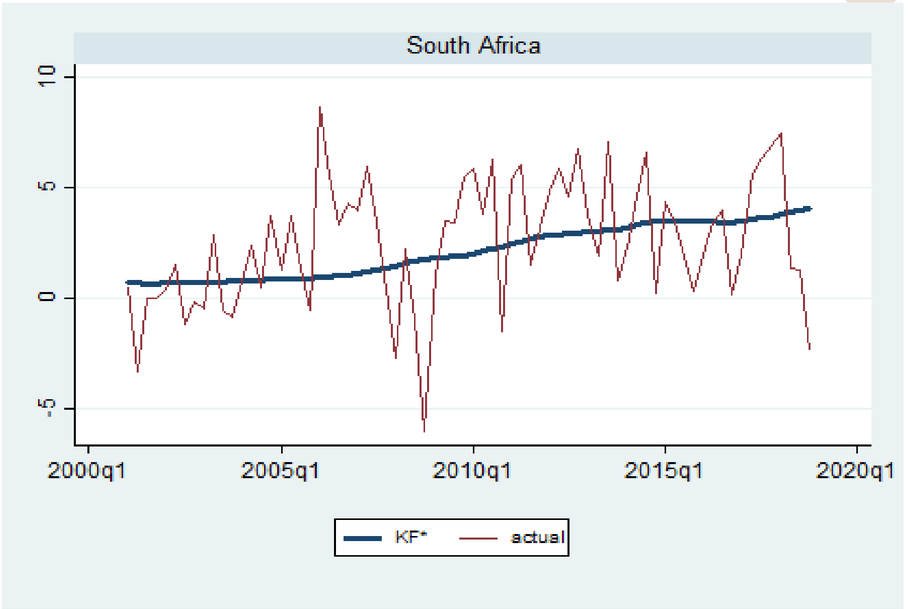
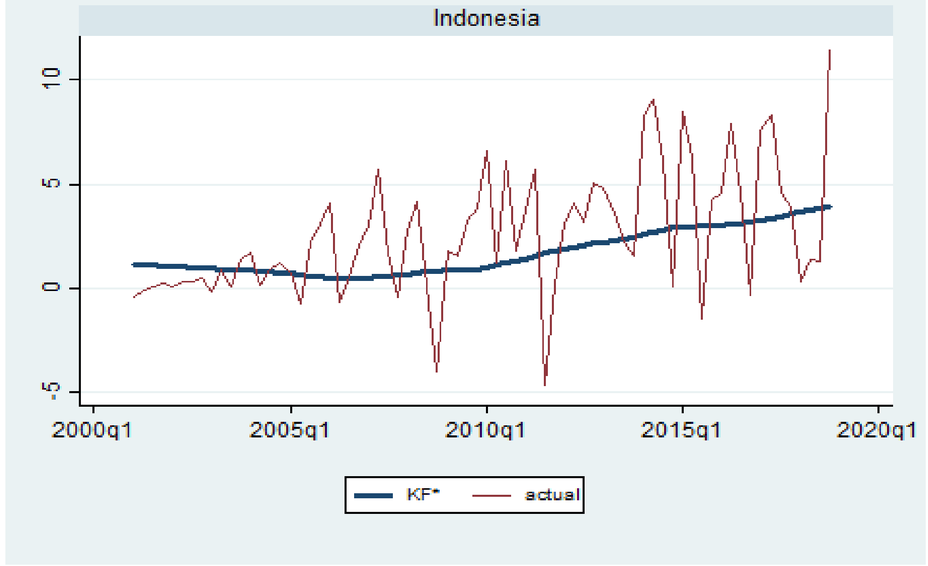
Summary

KF* appears to represent a natural level of flows.

- Quarterly flows are quite volatile – but they oscillate around KF*.
- Cogley tests indicate deviations of actual flows from KF* are transitory: Flows revert strongly to KF* over 1-2 year horizon.
- The tendency of the transitory element in quarterly flows to dissipate over time grants KF* significant explanatory power over medium-run.
- KF* performs well against various filter methods.
- KF* even predicts 6-quarters ahead sudden stops and next year's equity returns, and predicted the country's that had the largest declines in portfolio inflows during the GFC.





THE NATURAL LEVEL OF CAPITAL FLOWS

KF*

Thank you!

JOHN, FRANK, VERONICA