Financial Globalisation, Monetary Policy Spillovers and Macro-Modelling: Tales from 1001 Shocks

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Motivation

- Dramatic rise of financial globalisation since 1990s
  - Growing potential for (monetary policy) spillovers
    Kim (2001); Canova (2005); Dedola et al. (2015); Feldkircher and Huber (2015); Georgiadis (forthcoming)
  - Global financial cycle hypothesis
    Bekaert et al. (2013); Bruno and Shin (2015); Passari and Rey (2015); Rey (2015)
- Parallel evolution of structural macro-modelling
  - New Keynesian DSGE models
    Smets and Wouters (2003); Christiano et al. (2005)
  - Global financial crisis spurred work on financial frictions
    Gertler and Karadi (2011); Christiano et al. (2014)
  - Less focus yet on the role of financial spillovers
    Dedola and Lombardo (2012); Kollmann (2013); Banerjee et al. (2015)
- Do standard New Keynesian DSGE models fail to account for strong financial spillover channels?

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What could be the consequences?

- Consider 3-country model for US, EA and Japan
- IS/Phillips curves, Taylor rules
- Cross-country uncorrelated MP shocks
- Financial spillovers

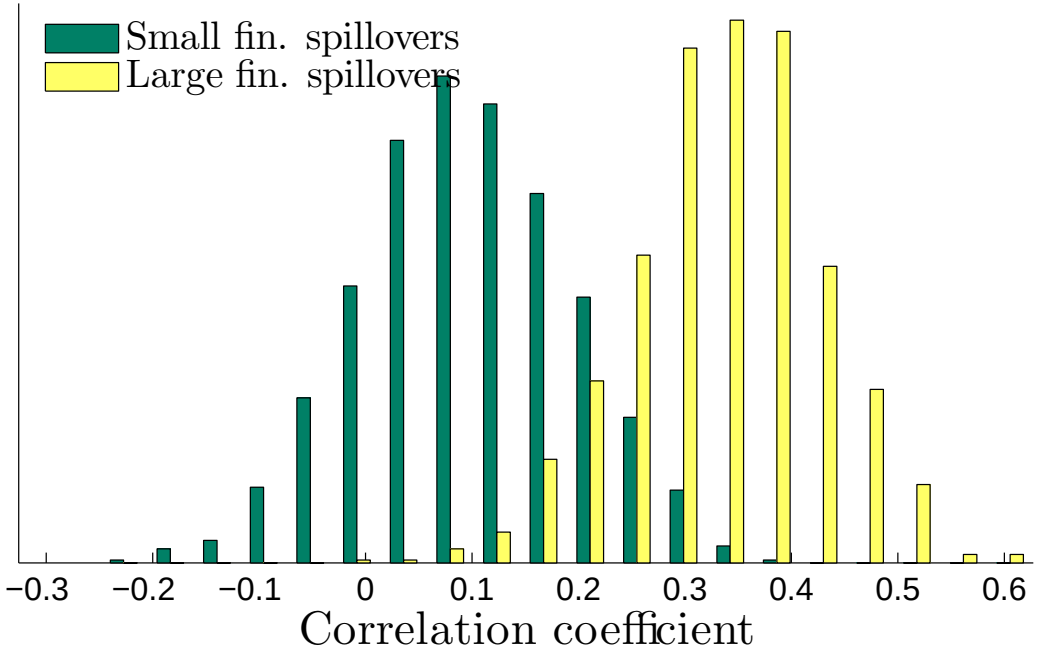
$$i_{it}^{(l)} = (1-\vartheta_i)\cdot\left(\frac{1}{8}\sum_{j=0}^{8} E_t i_{i,t+j}^{(s)}\right) + \vartheta_i \cdot \left(\sum_{j=1, j\neq i}^{N} \omega_{ij}\, i_{jt}^{(l)}\right) \quad (1)$$

  - $i_{it}^{(l)}$: Long-term interest rate (appearing in IS curve)
  - ϑ_i: Degree of international financial integration
  - ω_{ij}: Rel. importance of economy j in economy i's overall integration

The Monte Carlo experiment

1. Simulate data in multi-country model **with** financial spillovers
2. Estimate MP shocks using single-country model **which lacks** financial spillovers on simulated data
3. Compute cross-country correlations of MP shock estimates
4. Repeat steps 1- 3 a large number of times

Distribution of cross-country correlations between MP shock estimates across replications



What is going on?

- In the true DGP US MP shocks transmit to EA through financial spillover channels
- Confronted with these data, a model for the EA without financial spillovers has to label the US MP shocks somehow
- As the menu of shocks available is limited and transmission channels are missing, the model labels US MP shocks as domestic EA ones
- The same happens with a model for Japan
- The EA and Japan MP shock estimates are contaminated by a common US component

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Hypothesis and testable predictions

Our hypothesis

NK DSGE models in the literature fail to adequately account for financial spillover channels in the data

Testable predictions

1. *NK DSGE model MP shock estimates cross-country correlated*
2. *Correlations higher for more financially integrated economies*

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This paper

- Test hypothesis that NK DSGE models in the literature fail to adequately account for financial spillover channels
- Set up a database with MP shock estimates for 28 economies from 250 macro-models
- Evidence consistent with predictions from hypothesis

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Outline

1. A monetary policy shock estimates database
2. Testing the predictions
3. Extensions and robustness
   - Additional testable predictions
   - Alternative explanations
   - Alternative samples
   - Alternative specifications
4. Conclusion

MP shock estimates database

- Database draws on existing/ongoing academic/institutional work
- Multitude of macro-models
  - Structural macro-models (NK DSGEs)
  - VAR models (SVARs, SVECMs, SFAVARs, SDFMs)
  - Other statistical approaches (shadow rates, term-structure models)
  - Narrative approaches
  - Shocks based on financial market expectations
- We consider MP shock estimates over 1993q1-2007q2

Country coverage

	DSGE	FME	NARR	SM	VAR	Total
	.	.	.	.	.	.
AUS	8	0	0	1	4	13
BRA	6	0	0	1	0	7
CAN	6	0	0	1	3	10
CHE	6	0	0	0	1	7
CHL	3	0	0	0	1	4
CHN	4	0	0	0	1	5
COL	5	0	0	0	1	6
CZE	12	0	0	0	2	14
EAR	31	1	0	0	10	42
GBR	9	3	1	0	7	20
HUN	1	0	0	0	0	1
IND	3	0	0	2	1	6
ISL	1	0	0	0	0	1
ISR	3	0	0	0	1	4
JPN	6	0	0	1	1	8
KOR	5	0	0	0	0	5
MEX	3	0	0	0	0	3
NOR	1	0	0	0	2	3
NZL	6	0	0	0	1	7
PER	1	0	0	0	1	2
POL	7	0	0	0	2	9
ROU	1	0	0	0	0	1
RUS	5	0	0	0	0	5
SWE	4	0	0	0	3	7
THA	2	0	0	0	0	2
TUR	2	0	0	0	0	2
USA	25	5	2	3	17	52
ZAF	3	0	0	1	3	7
Total	169	9	3	10	62	253
N	253					

Model type coverage

	Number of shocks	Percent
DSGE	169	66.8
FME	9	3.6
NARR	3	1.2
SM	10	4.0
VAR	62	24.5
Total	253	100.0
N	253	

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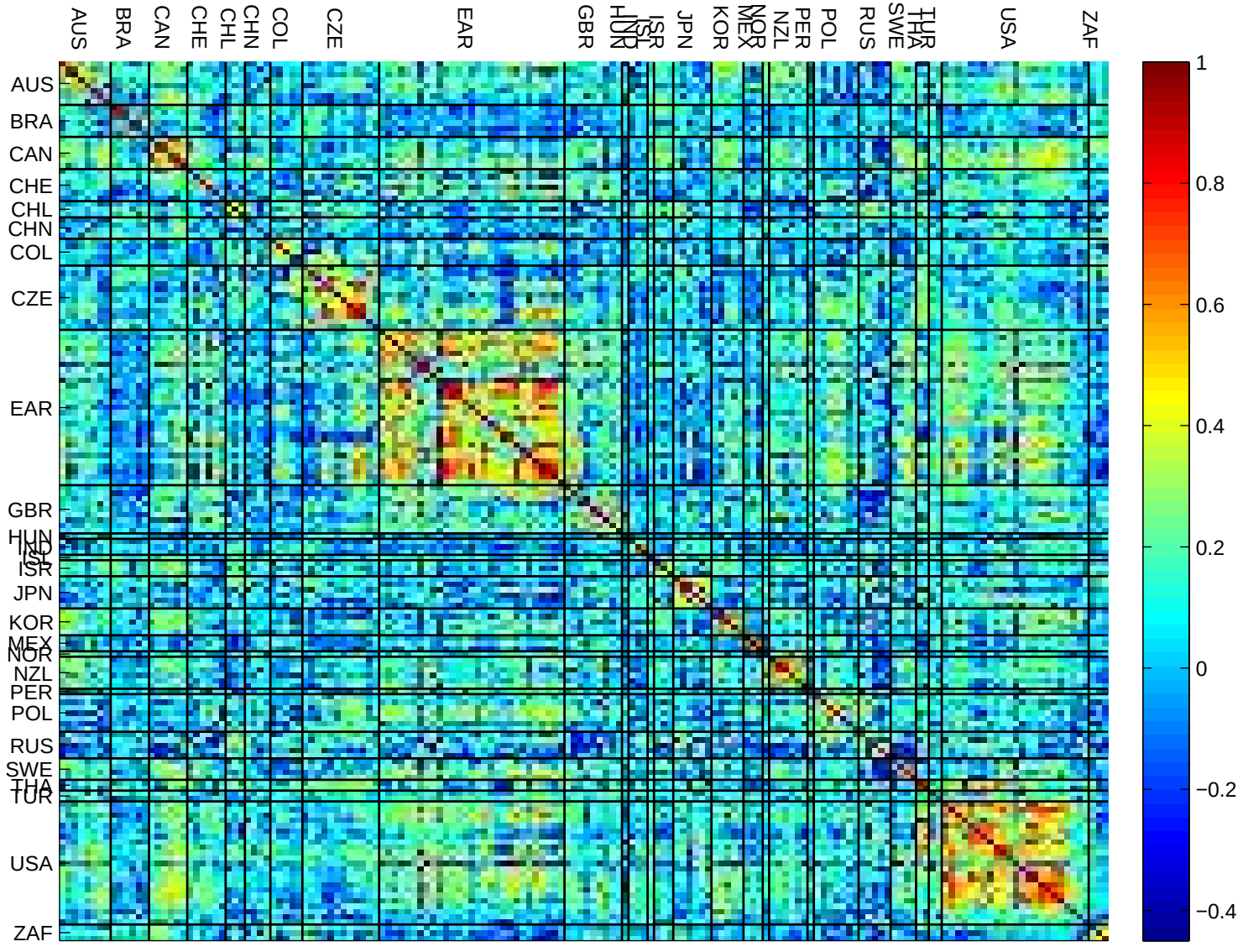
Hypothesis

NK DSGE models in the literature fail to adequately account for financial spillover channels in the data

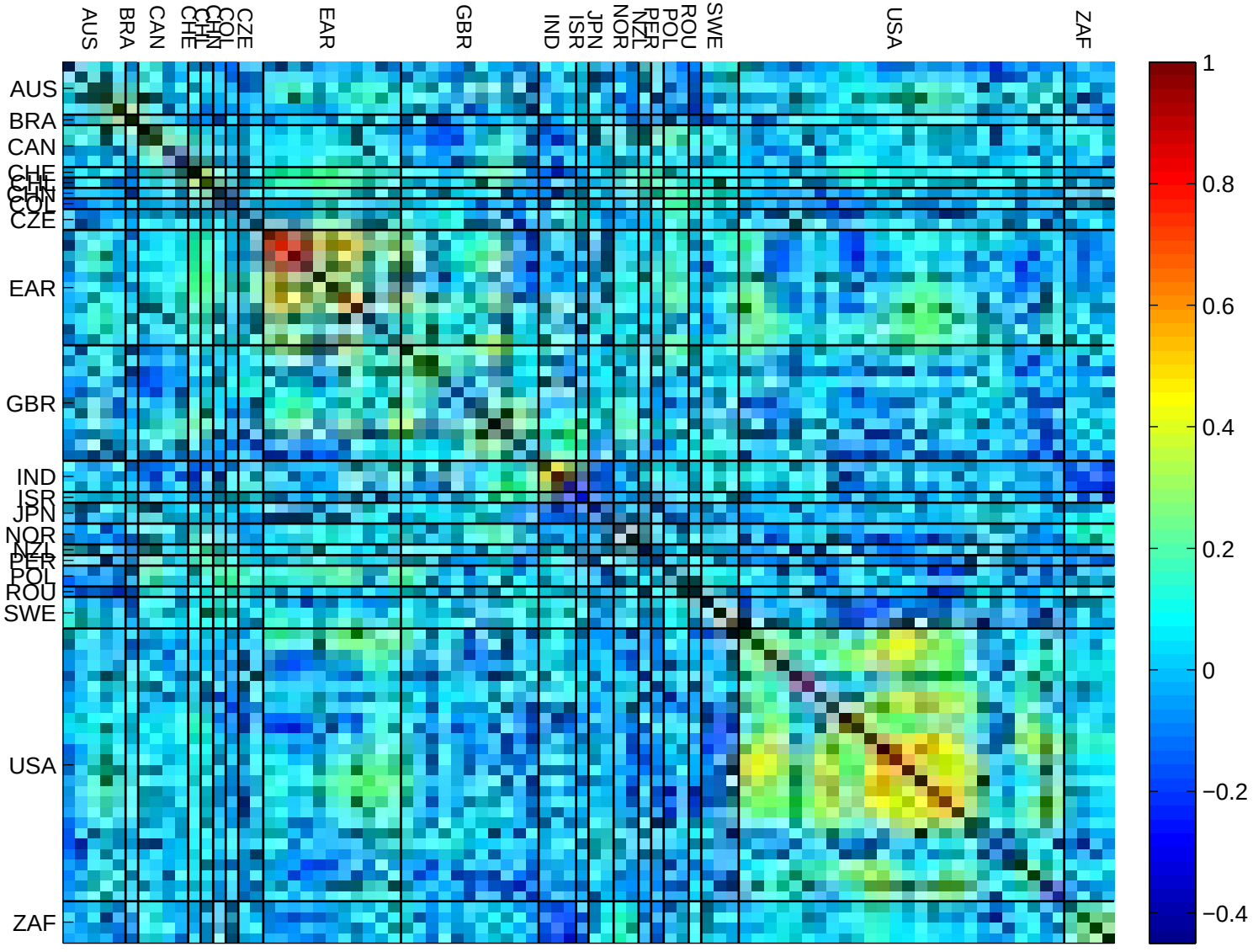
Prediction 1

MP shock estimates from NK DSGE models cross-country correlated

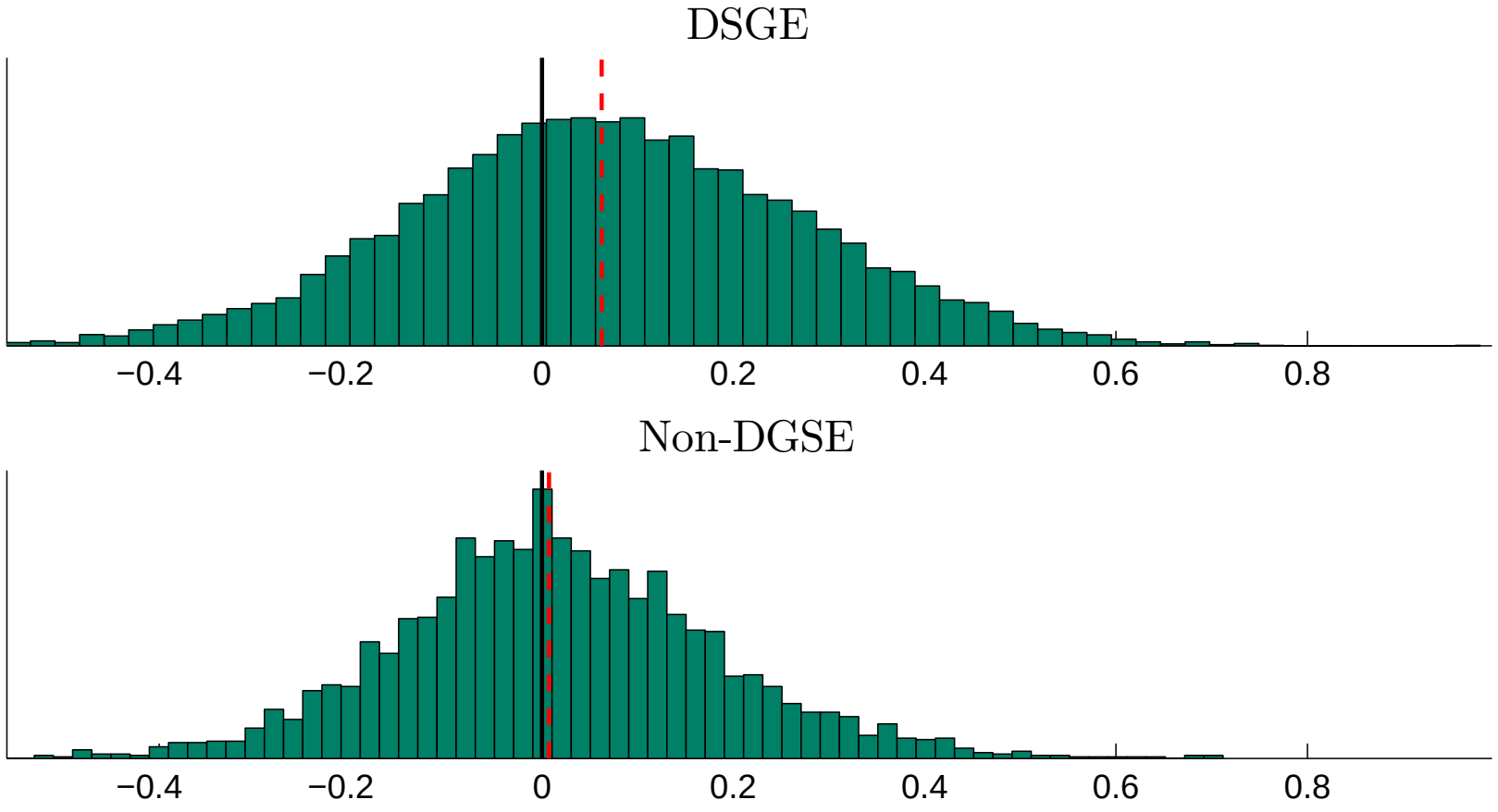
Correlations between NK DSGE model MP shock estimates



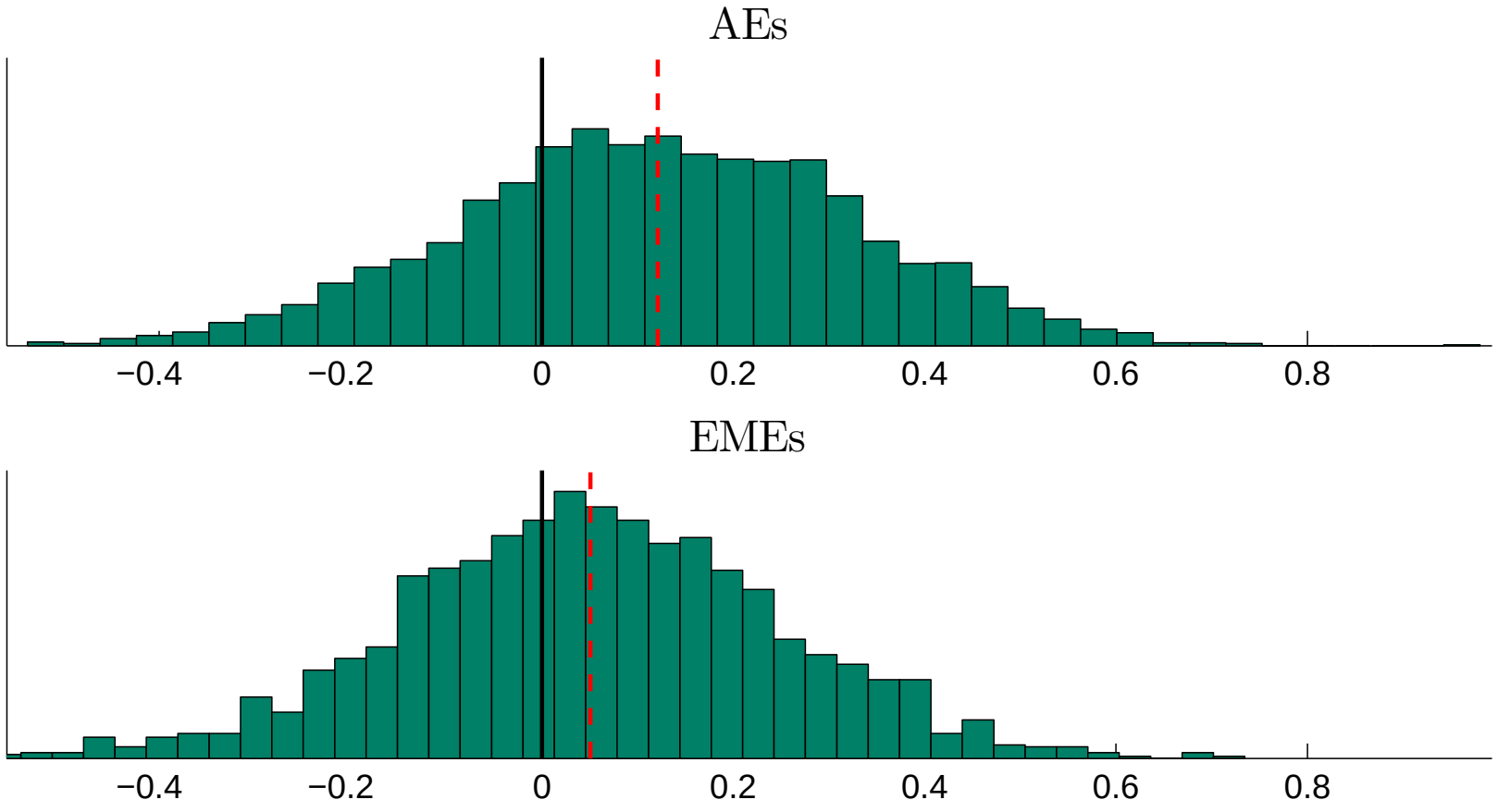
Correlations between non-NK DSGE model MP shock estimates



Distribution of cross-country correlations



Distribution of cross-country correlations: NK DSGEs



Hypothesis

NK DSGE models in the literature fail to adequately account for financial spillover channels in the data

Prediction 2

Cross-country correlation between MP shock estimates higher for financially integrated economies

Testing for the role of financial integration

Consider the regression

$$\rho_{\ell_i,m_j} = \alpha_i + \gamma_j + \boldsymbol{x}_{ij} \cdot \boldsymbol{\beta} + u_{\ell_i,m_j}, \tag{2}$$

$$i,j = 1,2,\ldots,N, \quad i \neq j, \quad i,j \neq us, \quad \ell_i = 1,2,\ldots,L_i, \quad m_j = 1,2,\ldots,M_j,$$

where

- ρ_{ℓ_i,m_j}: Correlation between shock time series estimate ℓ_i of economy i and m_j of economy j
- x_{ij}: Vector of bilateral country characteristics
  - Economy $i \times$ economy j overall financial integration
  - Economy $i \times$ economy j bilateral financial integration with US
- Standard errors clustered at country-pair level

▸ Data

Testing for the role of financial integration

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▸ Data

Testing for the role of financial integration

	(1) DSGE	(2) DSGE	(3) DSGE	(4) Non-DSGE
Overall financial integration	0.08***		0.07***	-0.00
	(0.00)		(0.00)	(0.85)
Share of US in overall financial integration		0.07***	0.06***	0.01
		(0.00)	(0.00)	(0.75)
Country 1 dummies	Yes	Yes	Yes	Yes
Country 2 dummies	Yes	Yes	Yes	Yes
Adj. R-squared	0.13	0.13	0.14	0.03
Observations	8286	7762	7762	1343
Country pairs	190	171	171	136

p-values in parentheses

$^{*}\ p < 0.1,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$

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Additional testable predictions

Consistent with

- the importance of banks in pre-crisis period, correlations higher for economies more integrated through banking interlinkages
- our hypothesis, correlations lower if NK DSGE models feature open-economy elements
- the trilemma, correlations also lower for country pairs which impose capital controls and/or feature flexible FX

Particular role for cross-border banking integration

	(1)	(2)	(3)	(4)
Overall financial integration	0.07***	0.07***	0.02	
	(0.00)	(0.01)	(0.54)	
Share of US in overall financial integration	0.06***	0.05***	0.06***	
	(0.00)	(0.00)	(0.00)	
Share of portfolio assets in GFAL		-0.09		
		(0.32)		
Share of FDI in GFAL		0.04		
		(0.19)		
Share of other investment in GFAL		0.04		
		(0.10)		
Non-resident bank loans/GDP			0.03***	
			(0.00)	
Overall banking financial integration (IR)				0.09**
				(0.02)
Share of US in banking financial integration (IR)				-0.03
				(0.56)
Country 1 dummies	Yes	Yes	Yes	Yes
Country 2 dummies	Yes	Yes	Yes	Yes
Adj. R-squared	0.14	0.14	0.14	0.23
Observations	7762	7762	7762	2045
Country pairs	171	171	171	28

p-values in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Accounting for open-economy features helps

	(1)	(2)	(3)	(4)	(5)
Overall financial integration	0.08***	0.08***	0.08***	0.09***	0.11***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Share of US in overall financial integration	0.08***	0.08***	0.08***	0.08***	0.08***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
At least one multi-country model		-0.01			-0.02
		(0.50)			(0.17)
Over. fin. integr. x at least one multi-country model		-0.02**			-0.02**
		(0.04)			(0.02)
Share of US in over. fin. integr. x at least one multi-country model		-0.01			-0.00
		(0.65)			(0.92)
At least one model with intern. fin. frictions			0.02		0.02
			(0.31)		(0.22)
Over. fin. integr. x at least one model with intern. fin. frictions			-0.03**		-0.03***
			(0.01)		(0.00)
Share of US in over. fin. integr. x at least one model with intern. fin. frictio			-0.04*		-0.04*
			(0.09)		(0.07)
At least one SOE model with i^*				-0.02**	-0.03***
				(0.02)	(0.00)
Over. fin. integr. x at least one SOE model with i^*				-0.02***	-0.03***
				(0.00)	(0.00)
Share of US in over. fin. integr. x at least one SOE model with i^*				0.01	0.01
				(0.30)	(0.27)
Country 1 dummies	Yes	Yes	Yes	Yes	Yes
Country 2 dummies	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.14	0.14	0.14	0.14	0.15
Observations	5575	5575	5575	5575	5575
Country pairs	171	171	171	171	171

p-values in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Flexible FX and capital controls alleviate financial spillovers

	(1)	(2)	(3)
Overall financial integration	0.07***	0.06**	0.06**
	(0.00)	(0.02)	(0.04)
Share of US in overall financial integration	0.06***	0.06***	0.06***
	(0.00)	(0.00)	(0.00)
Capital controls (PC)		0.01	0.04
		(0.28)	(0.18)
FX flexibility		0.00	0.00
		(0.65)	(0.35)
Capital controls x At least one economy is EME			-0.03
			(0.32)
FX flexibility x At least one economy is EME			-0.00
			(0.23)
At least one economy is EME			0.19
			(0.17)
Country 1 dummies	Yes	Yes	Yes
Country 2 dummies	Yes	Yes	Yes
Adj. R-squared	0.14	0.14	0.14
Observations	7762	7762	7762
Country pairs	171	171	171

p-values in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Alternative explanations

- Spillovers through trade rather than financial channels
- Bilateral rather than global MP shock component
- Mis-specification of Taylor rule and fear-of-floating
- Contamination by convolution of several types of global shocks rather than only global MP shocks

Alternative explanations I

	(1)	(2)	(3)	(4)	(5)	(6)
Overall financial integration	0.07***	0.07***	0.05**	0.06**	0.08***	0.05
	(0.00)	(0.00)	(0.04)	(0.01)	(0.01)	(0.23)
Share of US in overall financial integration	0.06***	0.09***	0.06***	0.06***	0.06***	0.09***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Trade integration		0.01				0.01
		(0.68)				(0.65)
Share of US in trade integration		-0.02***				-0.02***
		(0.01)				(0.01)
Bilateral financial integration			0.01*			0.01
			(0.06)			(0.52)
Bilateral trade integration				0.01		0.00
				(0.25)		(0.88)
Net short in foreign currency					-0.02	-0.00
					(0.47)	(0.91)
Country 1 dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country 2 dummies	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.14	0.14	0.14	0.14	0.14	0.14
Observations	7762	7762	7762	7762	7762	7762
Country pairs	171	171	171	171	171	171

p-values in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Alternative explanations II

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Overall financial integration	0.07***	0.06***	0.07***	0.07***	0.05**	0.07***	0.07***	0.07***	0.05*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	(0.05)
Share of US in overall financial integration	0.06***	0.06***	0.06***	0.07***	0.07***	0.07***	0.07***	0.07***	0.08***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Difference in trade integration		-0.01							-0.01
		(0.15)							(0.25)
Difference in centrality			-0.00						-0.00
			(0.82)						(0.59)
Difference in GVC position				0.00					0.01
				(0.54)					(0.39)
Difference in GVC participation					-0.01**				-0.01*
					(0.04)				(0.07)
Heterogeneity in output structure						0.01			0.00
						(0.51)			(0.87)
Heterogeneity in export structure							0.01		0.01
							(0.33)		(0.17)
Heterogeneity in import structure								0.01	0.00
								(0.67)	(0.90)
Country 1 dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country 2 dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Observations	7762	7762	7762	7378	7378	7378	7378	7378	7378
Country pairs	171	171	171	153	153	153	153	153	153

p-values in parentheses

$^{*}\ p < 0.1,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$

Alternative samples

- Only MP shock estimates from central bank and IO models
- Maximum sample
- Without MP shock estimates of Vitek (2015)
- Only MP shock estimates from published studies

Alternative samples I

	(1) Baseline	(2) CBs/IOs	(3) w/o Vitek	(4) Max. sample
Overall financial integration	0.07***	0.17*	0.08***	0.06***
	(0.00)	(0.05)	(0.00)	(0.00)
Share of US in overall financial integration	0.06***	0.15***	0.08***	0.07***
	(0.00)	(0.00)	(0.00)	(0.00)
Country 1 dummies	Yes	Yes	Yes	Yes
Country 2 dummies	Yes	Yes	Yes	Yes
Adj. R-squared	0.14	0.25	0.14	0.14
Observations	7762	214	5575	8847
Country pairs	171	105	171	300

p-values in parentheses

$^{*}\ p < 0.1,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$

Alternative samples II

	(1) Baseline	(2) Published	(3) Keele> 1	(4) Keele> 2
Overall financial integration	0.07***	0.04*	0.06**	0.11
	(0.00)	(0.06)	(0.04)	(0.26)
Share of US in overall financial integration	0.06***	0.11***	0.13**	0.17*
	(0.00)	(0.00)	(0.01)	(0.09)
Country 1 dummies	Yes	Yes	Yes	Yes
Country 2 dummies	Yes	Yes	Yes	Yes
Adj. R-squared	0.14	0.15	0.17	0.24
Observations	7762	1668	621	127
Country pairs	171	105	78	28

p-values in parentheses

$^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Alternative specifications

- Set statistically not significant correlations to zero
- Logit transformation of correlation
- Country-shock fixed effects
- Robust regression
- Minimum of economies' variables rather than interaction
- Observations collapsed within country pairs

Alternative specifications

	(1) Baseline	(2) Insign.=0	(3) Logit	(4) FE	(5) rreg	(6) Min.	(7) Collapsed
Overall financial integration	0.07***	0.05***	0.14***	0.07***	0.07***	0.07***	0.03***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Share of US in overall financial integration	0.06***	0.05***	0.13***	0.06***	0.06***	0.06***	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.51)
Country 1 dummies	Yes	Yes	Yes	No	Yes	Yes	No
Country 2 dummies	Yes	Yes	Yes	No	Yes	Yes	No
Country-shock 1 dummies	No	No	No	Yes	No	No	No
Country-shock 2 dummies	No	No	No	Yes	No	No	No
Adj. R-squared	0.14	0.10	0.14	0.25	0.14	0.14	0.06
Observations	7762	7762	7762	7762	7762	7762	171
Country pairs	171	171	171	171		171	

p-values in parentheses

$^{*}\ p < 0.1,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$

US vs. EA as “core" economy

- EA may be “core” economy alongside the US, especially for European economies

US vs. EA as “core" economy

	(1) Baseline	(2) No EA/US
Overall financial integration	0.07***	0.05**
	(0.00)	(0.02)
Share of US in overall financial integration	0.06***	0.01
	(0.00)	(0.73)
Share of EA in overall financial integration		0.06**
		(0.04)
Country 1 dummies	Yes	Yes
Country 2 dummies	Yes	Yes
Adj. R-squared	0.14	0.10
Observations	7762	4662
Country pairs	171	153

p-values in parentheses

$^{*}\ p < 0.1,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$

1 A monetary policy shock estimates database

2 Testing the predictions

3 Extensions and robustness
- Additional testable predictions
- Alternative explanations
- Alternative samples
- Alternative specifications

4 Conclusion

Conclusion

- NK DSGE models in the literature imply cross-country correlated MP shock estimates
- This can be rationalised by a lack of accounting for financial spillover channels
- Possible/likely consequences
  - Inconsistent likelihood-based estimation of NK DSGE models
  - Mis-leading historical decompositions
- Financial spillovers are important elements in NK DSGE models if these are used for policy advice

Related literature

- Powerful financial spillover channels in NK DSGE models crucial to replicate cross-country business cycle correlations in the data
  Iacoviello and Minetti (2006); Ueda (2012); Yao (2012); Chin et al. (2015)
- Standard open-economy NK DSGE models
  Justiniano and Preston (2010, *JIE*); Alpanda and Aysun (2014, *JIMF*)
  - fail to replicate business cycle co-movements in the data
  - imply only minor role of foreign shocks for domestic variables
  - match cross-country output correlations and spillovers much better if structural shocks are assumed to be cross-country correlated
- Our paper provides indications for the importance of financial spillovers in this class of models from a different perspective

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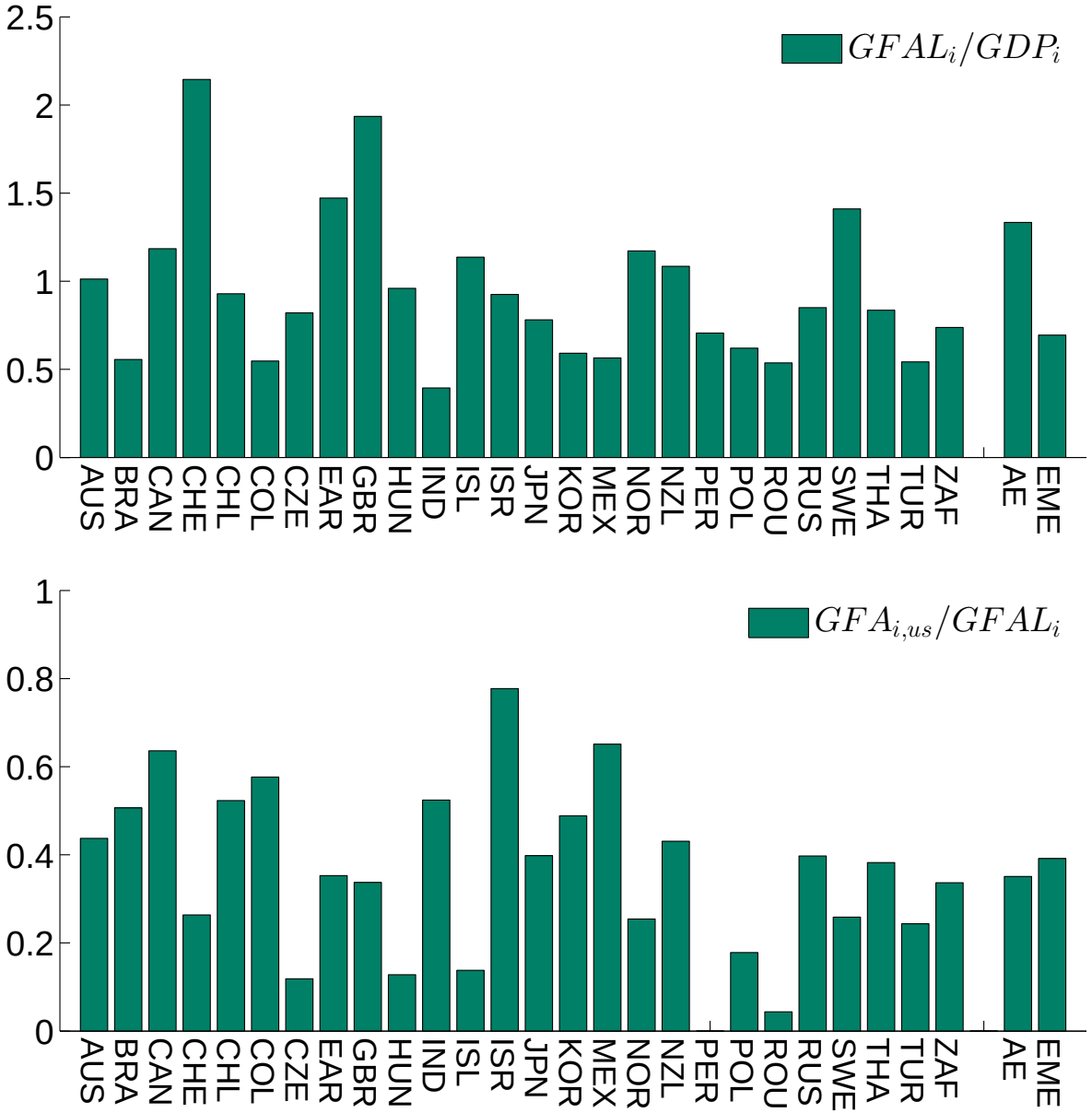
Financial integration: Data



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