International Effects of QE Policies

Economic Advisory Panel Meeting

Federal Reserve Bank of New York

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Outline

- Questions addressed:
  - How have QE policies affected financial variables globally?
  - Are advanced economies or emerging economies affected more?
  - Are (international) effects of QE diminishing over time?
  - Whose QE matters most (Fed, ECB, BOJ)?
  - What are implications for exit from QE?

- Brief literature survey
- Event study analysis
- Principal component analysis
- Conclusions

Source: DB Global Markets Research

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Previous empirical findings

- Considered: IMF Spillover Reports (2011, 2012), Fed studies by Neely (2012), Glick and Leduc (2013).
- Found: QE has significant negative effect on bond yields across countries and on currencies (trade-weighted dollar depreciation)
- Not much granularity on AEs vs EMs, but EM's especially sensitive to Fed's QE1, much less so to QE2: impact of QEs declining over time.
- Based primarily on event study analysis, focusing on QE1, QE2, Twist, forward guidance (Pre QE3).

Source: DB Global Markets Research

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Breaking some new ground

- **Event studies of QE3** and forward guidance since QE3, with focus across countries on Advanced Economies and Emerging Economies
  - Consider behavior of key variables around Q3-related communications.

- **Principal components analysis**, with focus across international asset classes and across QEs
  - Assess behavior of co-movement of global financial variables during QE periods

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Event Study: Impact of QE3 Announcement Sept 13 2012

	One day changes		
13-Sep-12	Benchmark govt bond yield declined	Stock market rose	Currency appreciated against dollar
US	*	***	*
UK		***	***
Japan	***	***	
Germany		***	***
Italy		***	***
Brazil	*	***	
China		*	***
Korea		***	***
Mexico	*	*	*

* Denotes change in expected direction but not in top 15% of daily changes during 2005-2012

*** Denotes change in expected direction exceeding 85% of daily changes during 2005-2012

Source: Haver Analytics, DB Global Markets Research

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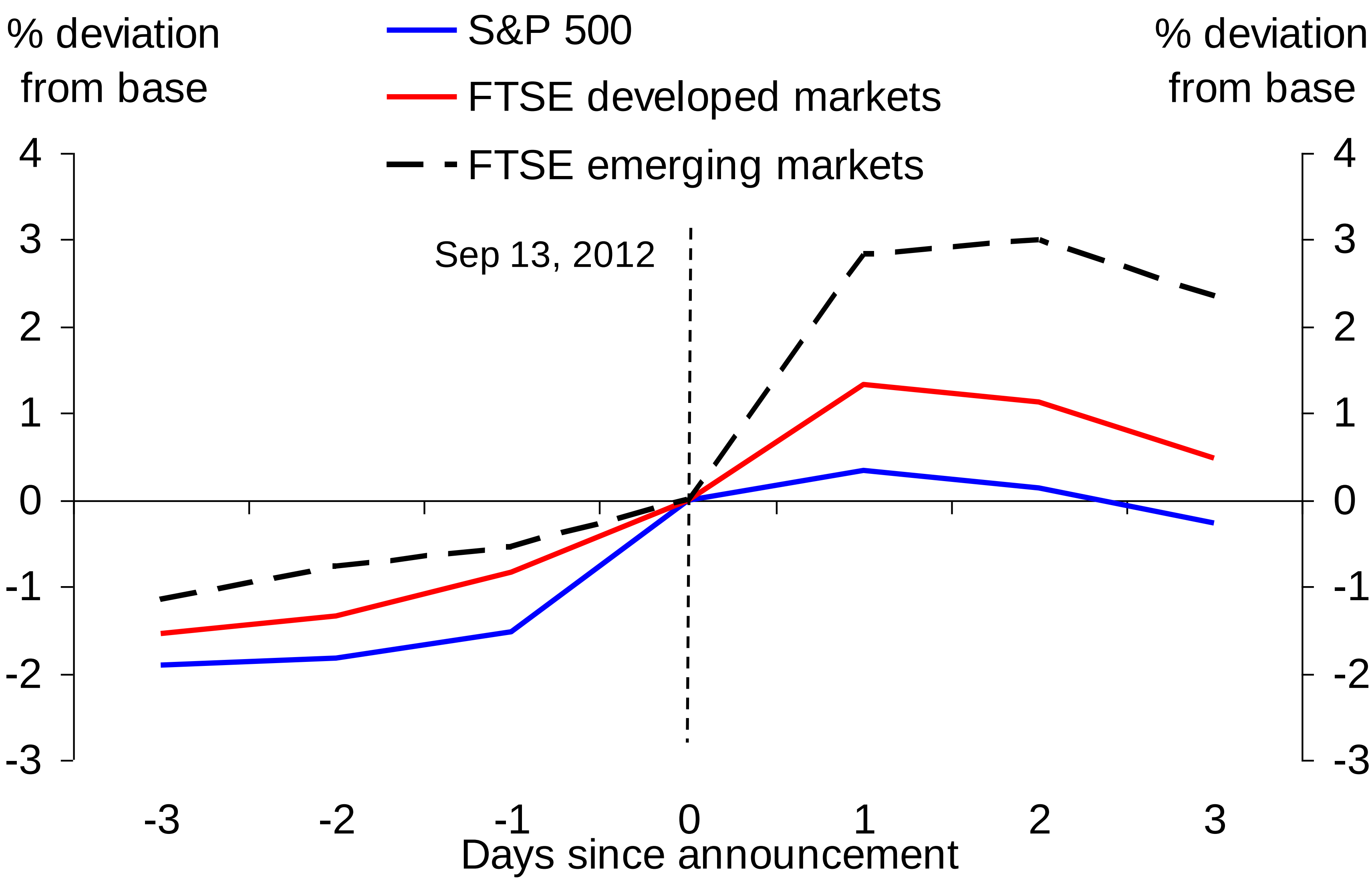
Reaction of stock markets to QE3 announcement



*Base is value at close on September 13; underlying market trend is subtracted from deviation.

Source: Haver Analytics, DB Global Markets Research

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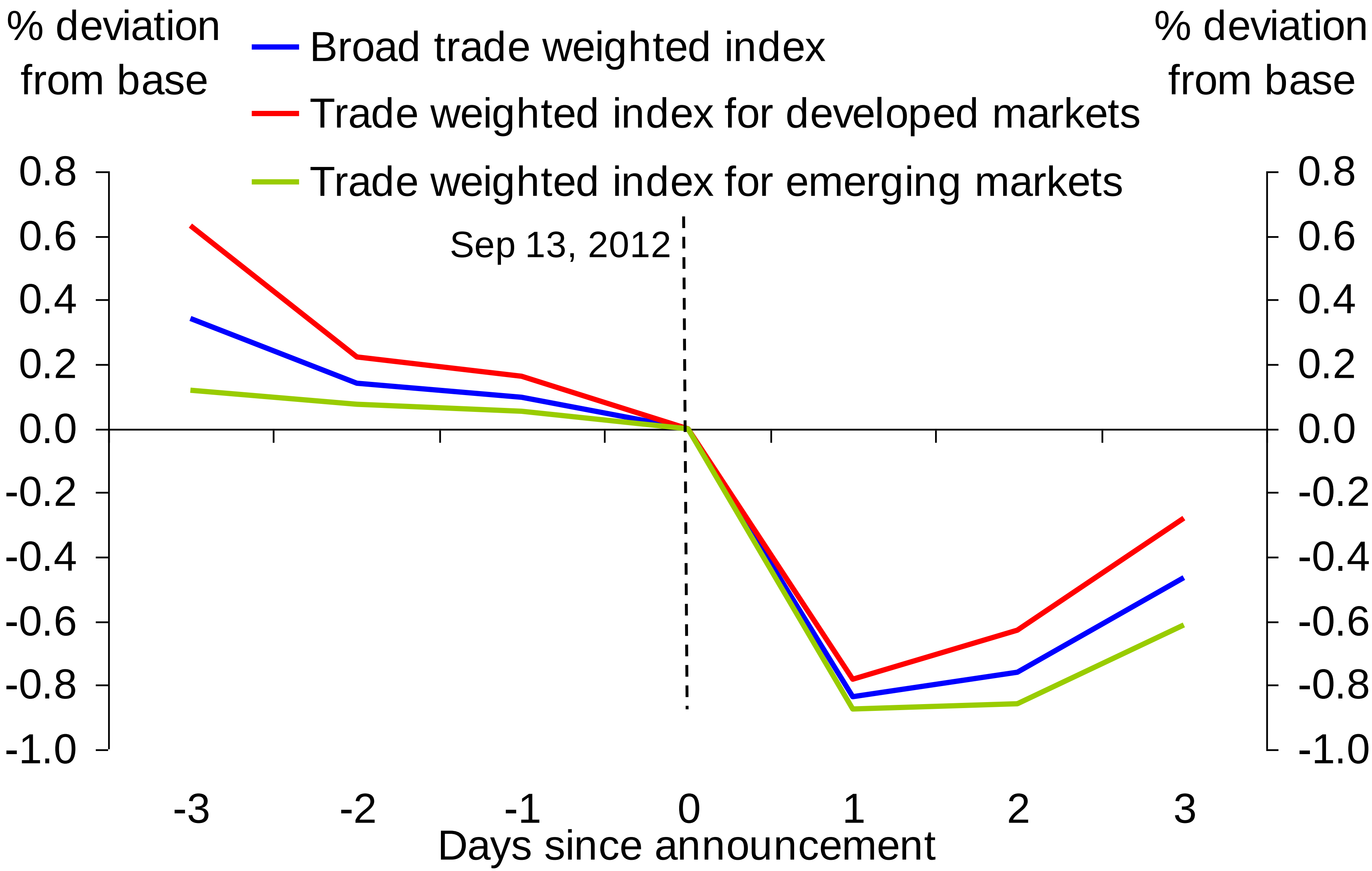
Reaction of exchange rates to QE3 announcement



*Base is noon value on September 13; underlying market trend is subtracted from deviation.

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Event Study: Impact of December FOMC minutes

	One day changes		
03-Jan-13	Benchmark govt bond yield rose	Stock market fell	Currency depreciated against dollar
US	***	*	*
UK	***		***
Japan	***		***
Germany	***		*
Italy	*		*
Brazil	*		
China	*		
Korea		*	
Mexico	*		

* Denotes change in expected direction but not greater than 85% of daily changes during 2005-2012

*** Denotes change in expected direction exceeding 85% of daily changes during 2005-2012

Source: Haver Analytics, DB Global Markets Research

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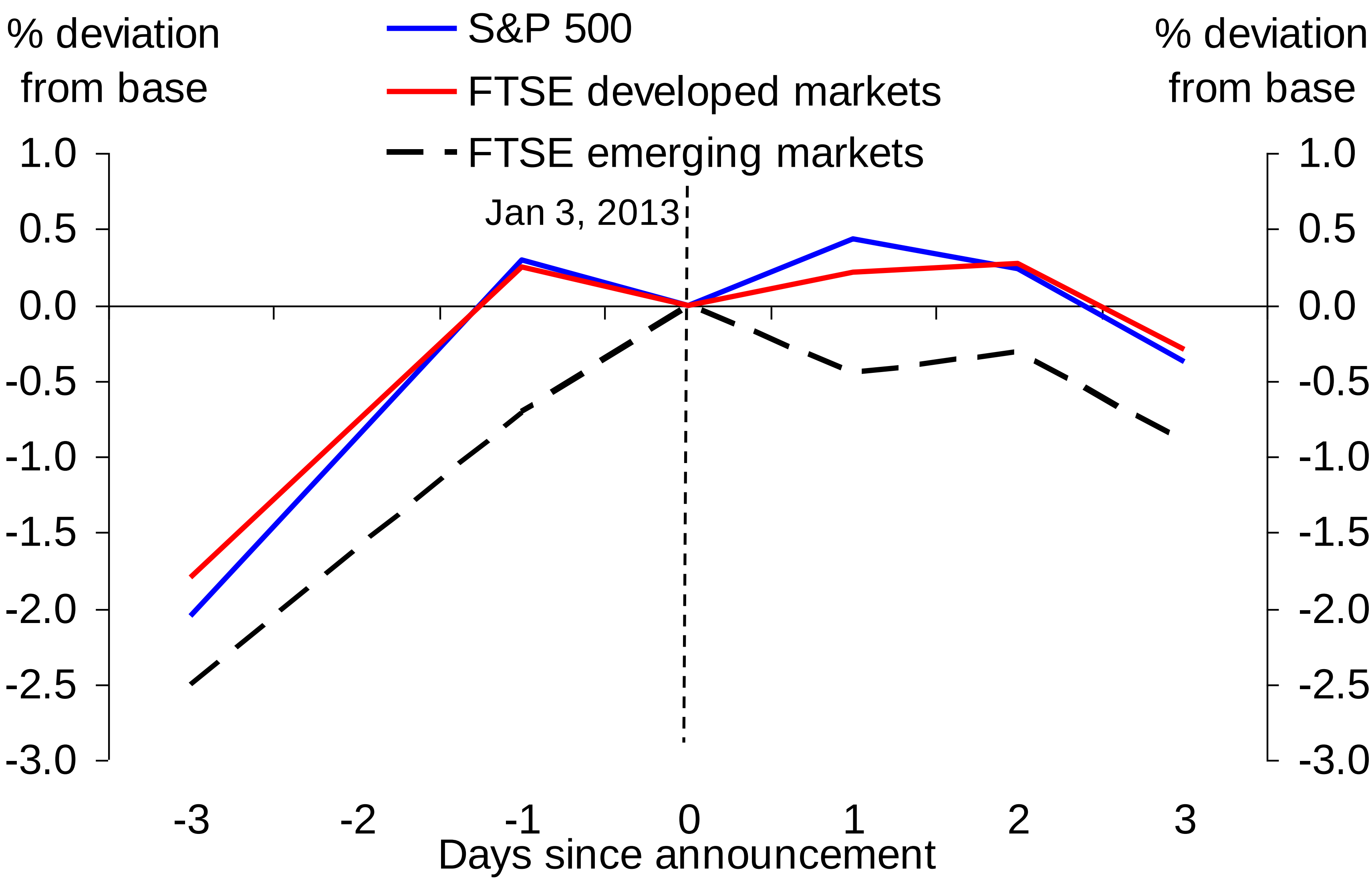
Reaction of stock markets to December minutes



*Base is value at close on September 13; underlying market trend is subtracted from deviation.

Source: Haver Analytics, DB Global Markets Research

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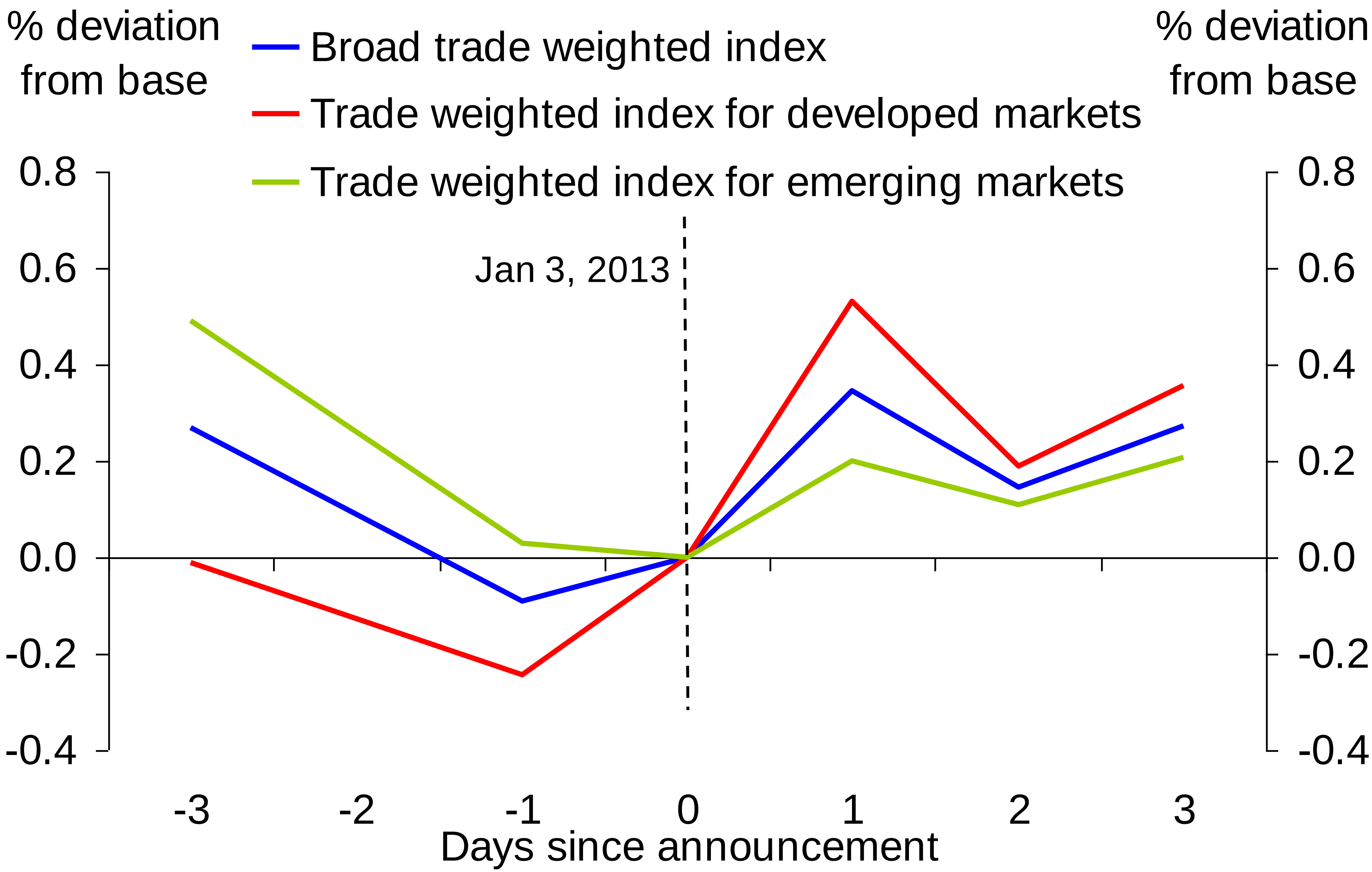
Reaction of exchange rates to December minutes



Base is daily noon value onSeptember 13; underlying market trend is subtracted from deviation.

Source: Haver Analytics, DB Global Markets Research

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Event Study Analysis: Summary of findings

- QE3 announcement effects:
    - Not much effect on foreign bond yields (anticipated earlier?)
    - Significant positive effect on stock markets globally, especially EMs;
    - Negative effect on dollar vs. most currencies
    - Negative spillover to EM via currency appreciation at least partly offset by positive spillover via stocks

- Guidance on costs/limits of QE3 (December minutes):
    - Positive effect on bond yields of AEs
    - Transitory negative impact on stock markets globally
    - Positive effect on dollar vs. most currencies, especially AEs

Source: DB Global Markets Research

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Principal components analysis

Variables included:

1. US 10-yr Treas yld
2. US Hi-yld bond rate
3. S&P 500
4. Trd wtd Dollar index
5. FTSE DM
6. FTSE EM
7. EMBI
8. Crude Oil (Brent)
9. CRB Commodity

Analysis considered average daily variation over three-month windows

Source: Haver Analytics, Bloomberg Financial LP, DB Global Markets Research

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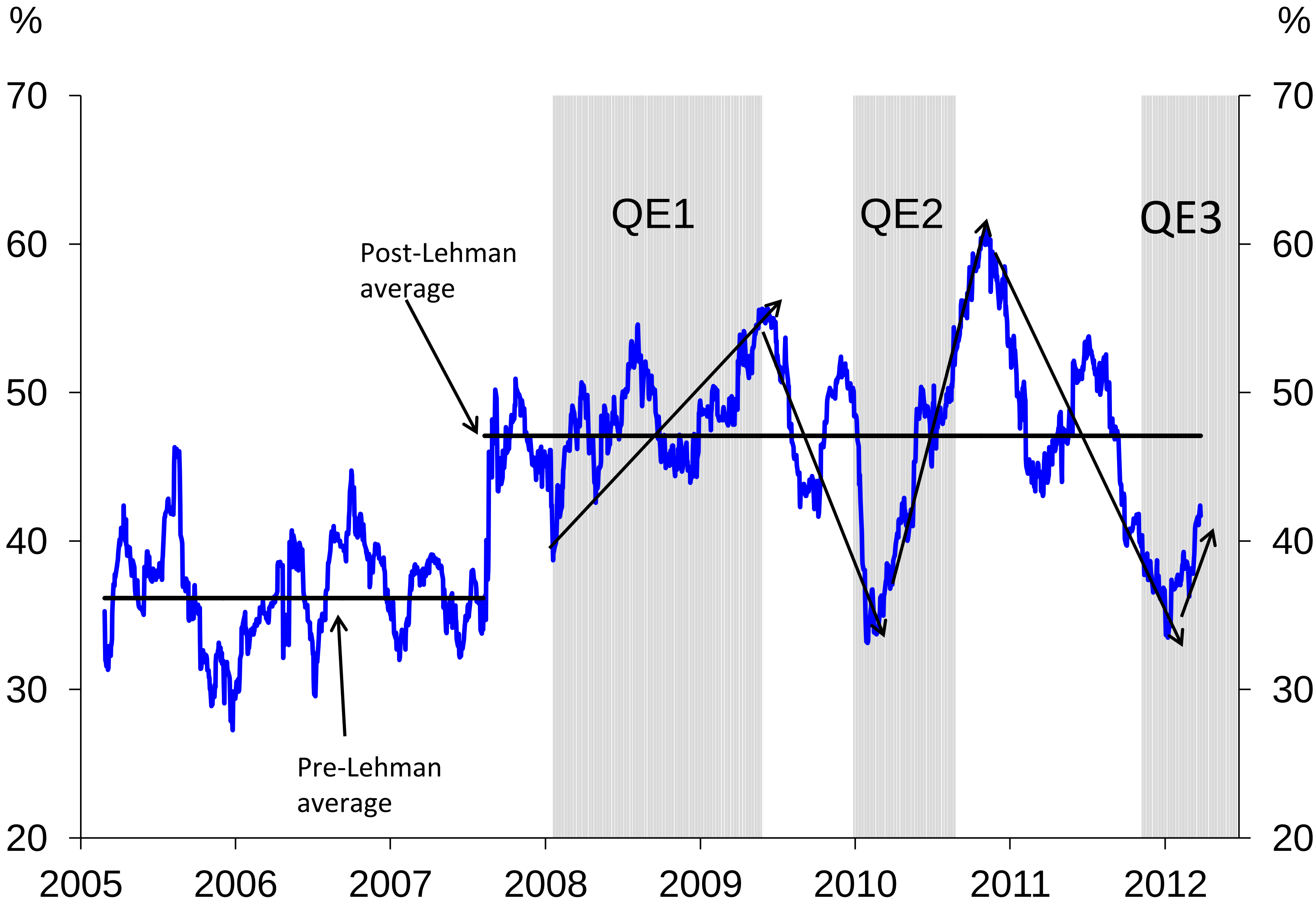
Share of variation in global financial variables explained by first principal component



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Percentage of variation explained by first component declines with subsequent QEs

	% of variation explained by first component
QE1	43%
QE2	40%
QE3	39%

Source: DB Global Markets Research

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Correlation of first principal component with asset returns

	QE1	QE2	QE3
1. US 10-yr Treas yld	-0.37	-0.37	-0.72
2. US Hi-yld bond rate	-0.21	-0.19	-0.41
3. S&P 500	0.76	0.79	0.82
4. Trd wtd Dollar index	-0.51	-0.62	-0.51
5. FTSE DM	0.90	0.89	0.90
6. FTSE EM	0.86	0.83	0.75
7. EMBI	0.58	0.49	0.10
8. Crude Oil	0.71	0.64	0.56
9. CRB Commodity	0.60	0.45	0.27

Source: Haver Analytics, Bloomberg Financial LP, DB Global Markets Research

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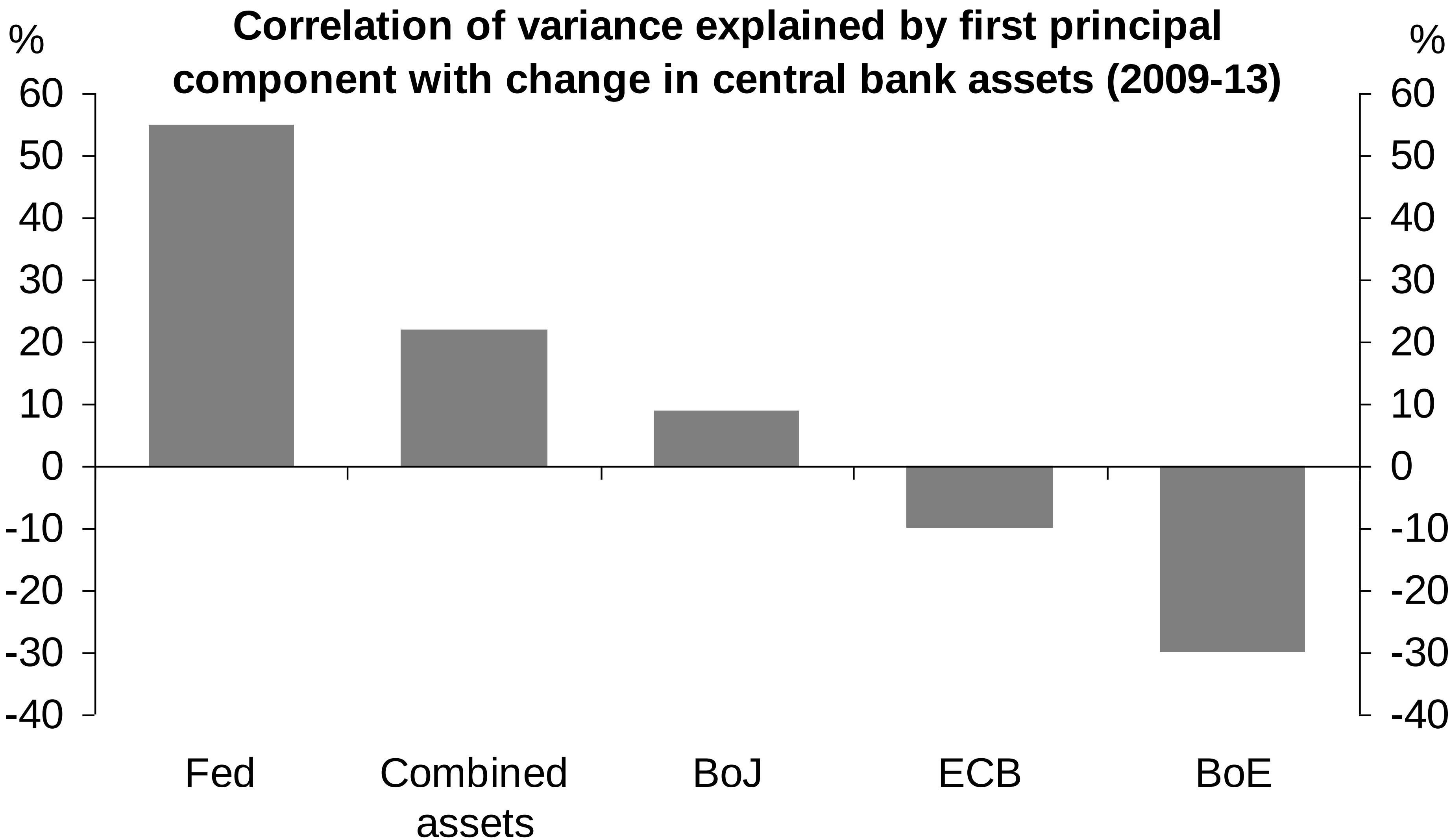
Fed QE has dominated QEs of other central banks in influencing global financial variables



Source: DB Global Markets Research

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Principal components analysis: Summary of findings

- The correlation of returns across asset classes globally has risen during periods of Fed balance sheet expansion, declined during periods of balance sheet stability.
- This rise in risk-on, risk-off co-movements in global financial markets has been on top of a general rise in correlations since the financial crisis.
- These correlations have diminished slightly with successive QEs.
- EM and commodity market correlations with the common factor have diminished more noticeably with successive QEs, confirming and extending earlier findings that EM sensitivity to QE has declined over time.
- Fed's QE has been much more important than those of other major central banks in influencing correlations among global financial variables.

Source: DB Global Markets Research

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Conclusions

What are the effects of QE on financial variables in other countries?

- In order of importance: (1) positive for stock markets globally, (2) dollar depreciation against most currencies, (3) reduces government bond yields, though less so globally than found in earlier studies.

Are advanced economies or emerging economies affected more?

- EMs have been more sensitive than AEs, but may not be so on exit

Are (international) effects of QE diminishing over time?

- Yes for EMs, not so for US and AEs

Whose QE matters most (Fed, ECB, BOJ)?

- Fed's QEs have been dominant

What are implications for exit from QE?

- Ending QE desirable to return markets to more normal functioning--returns driven by asset specific fundamentals, not cross correlations
- But, abrupt or rapid exit, especially in balance sheet contraction, could be costly for ROW, given extent to which returns in EM and other credit markets may have been driven beyond fundamentals.

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- **Peter Hooper** joined Deutsche Bank Securities in 1999 as Chief US Economist. He became Chief Economist and co-head of global economics in 2006. Prior to joining Deutsche Bank, Hooper enjoyed a distinguished 26-year career at the Federal Reserve Board in Washington, D.C. While rising to senior levels of the Fed staff, he held numerous positions, including as an economist on the FOMC. Hooper and his team produce weekly and quarterly publications for Deutsche Bank with a focus on US and global economic developments and Fed policy; he also comments on US and global economic and financial developments in the news media.
- Hooper currently serves as a member of the Economic Advisory Panel of the Federal Reserve Bank of New York, a member and former chairman of the Economic Advisory Committee of the American Bankers Association, a founding member of the US Monetary Policy Forum, a member of the Economic Leadership Council for the University of Michigan, and a member of the Forecasters' Club of New York. Hooper earned a BA in Economics (cum laude) from Princeton University and an MA and Ph.D. in Economics from University of Michigan. He has published numerous books, journal articles, and reviews on economics and policy analysis.

Appendix 1

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