Private Investment: *What's the Holdup?*

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Motivation

- Debate over why businesses are not investing more.
  - Is low investment mainly symptom of weak economic environment? (E.g., Chinn, 2011; Krugman, 2011.)
  - Are special impediments to blame, such as policy uncertainty or financial sector weaknesses? (E.g., European Investment Bank, 2013; Buti and Mohl 2014.)
- Diagnosing the cause is critical for devising policies to remedy the fall in investment.

Central questions of the chapter

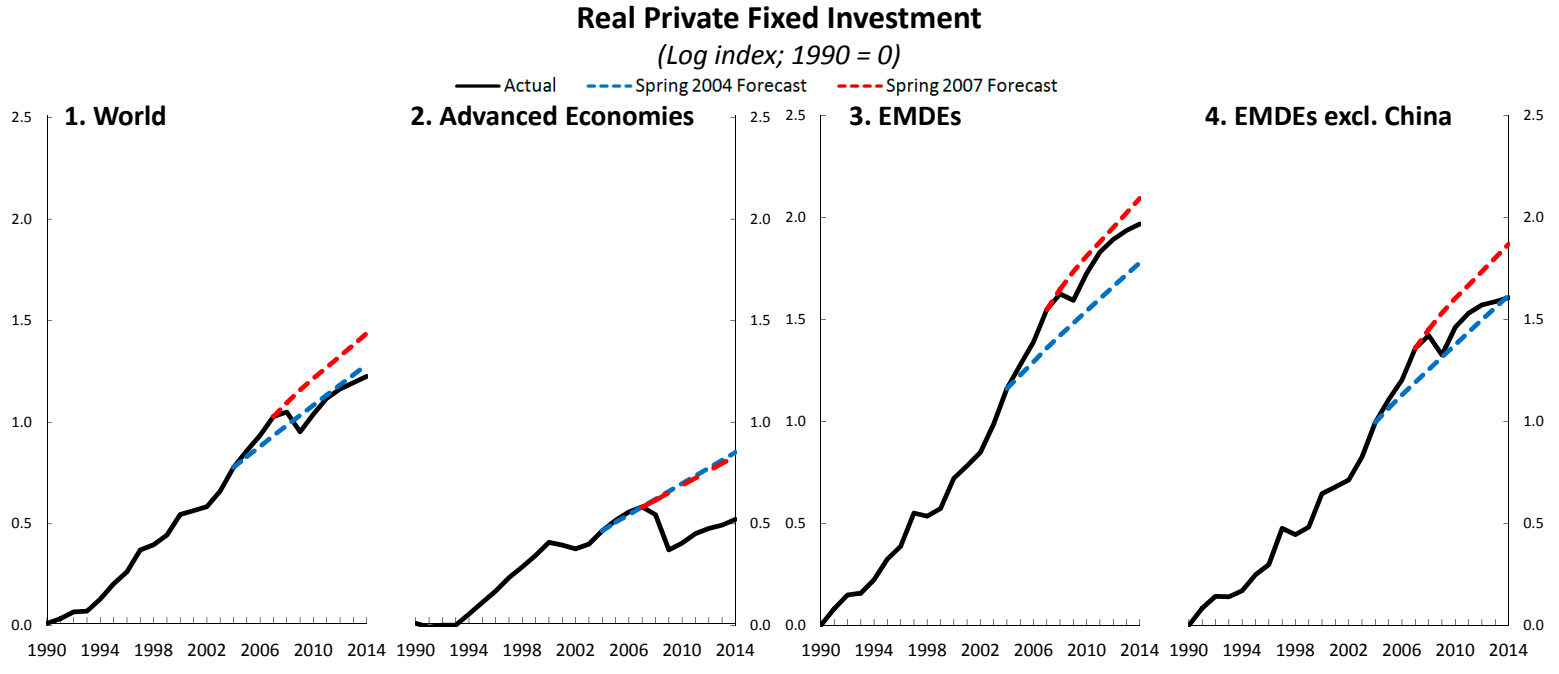
1. Is there a global slump in private investment?

2. Is the slump in private investment due to housing or is it broader?

3. How much of this slump reflects the weakness of demand?

4. Which businesses have cut back more on investment and why?

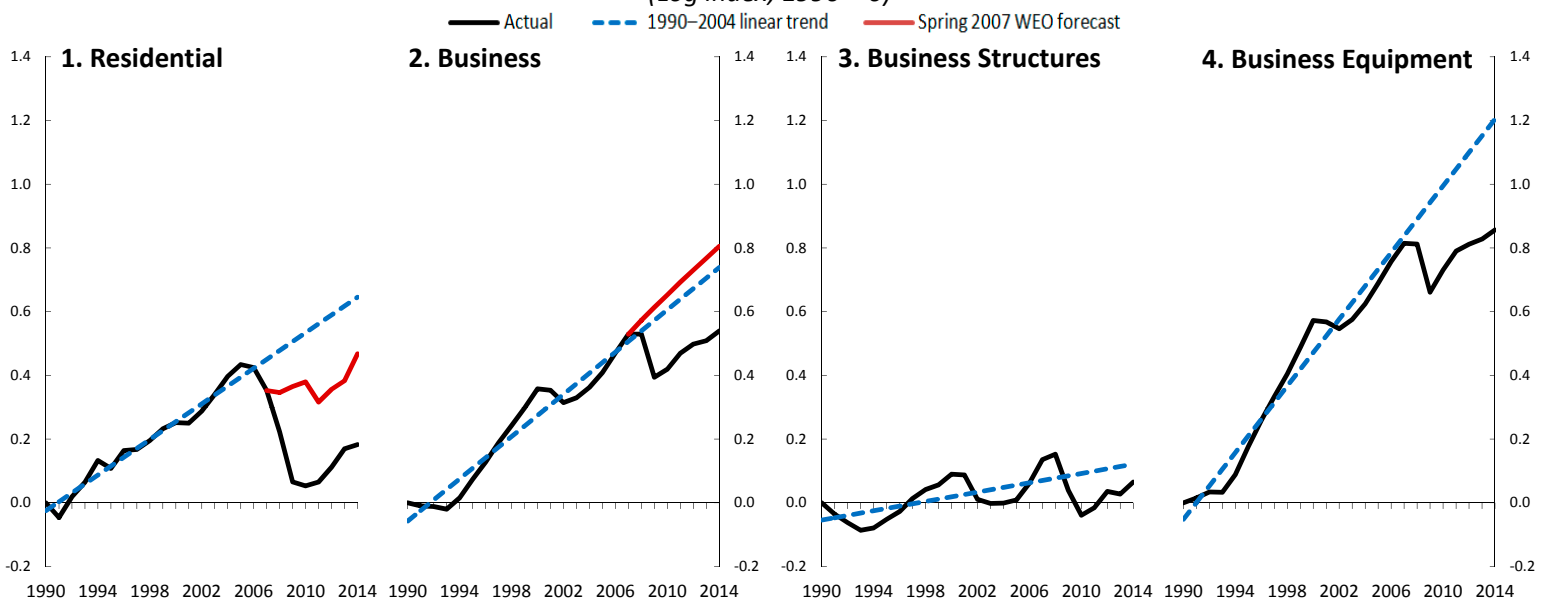
1. Is there a global slump in private investment? AEs.



2. AEs: Just housing or broader? Broader.

Categories of Real Fixed Investment

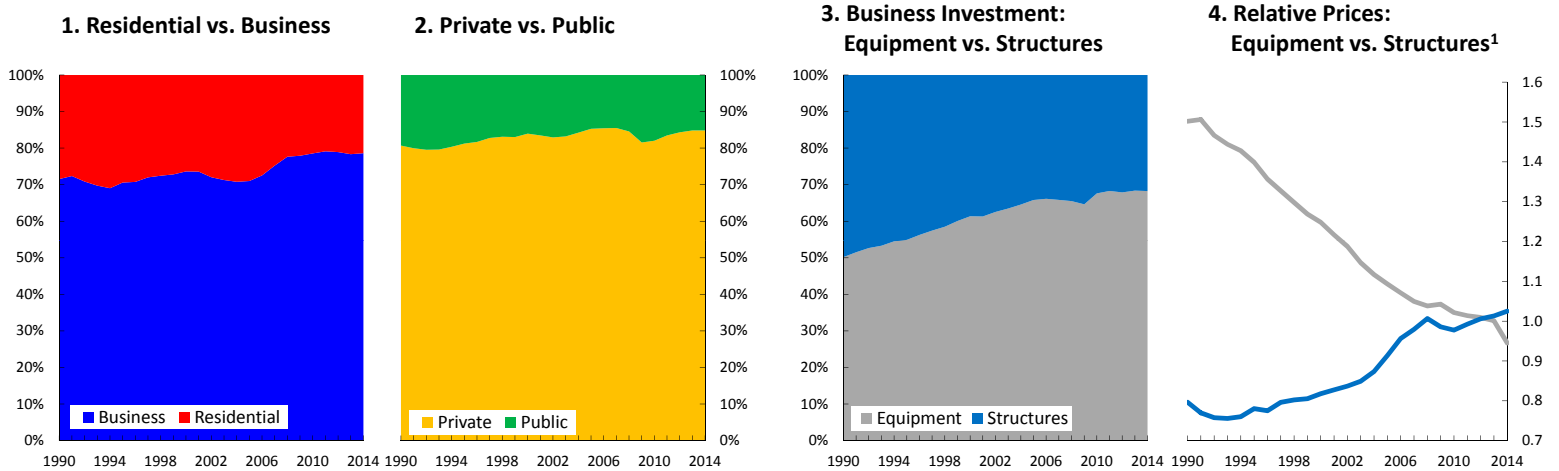
(Log index; 1990 = 0)



Housing: A small share of total investment.

Shares and Relative Prices of Investment Categories

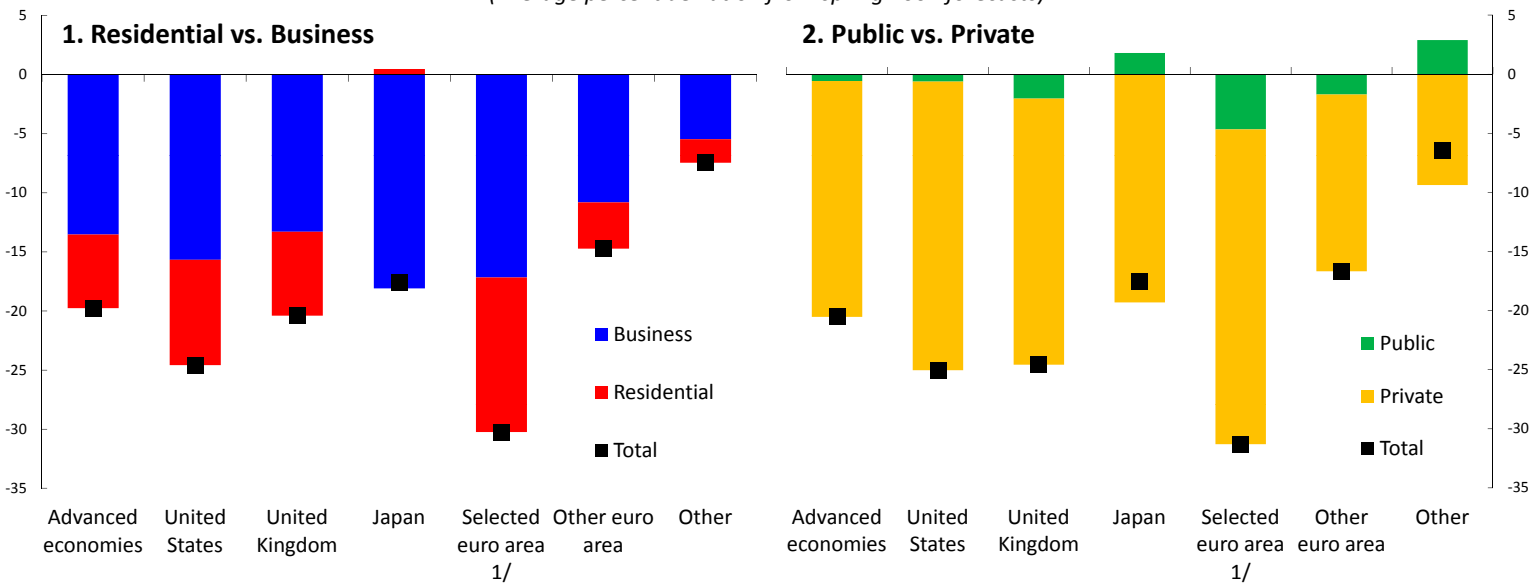
(Percent of total fixed investment, unless noted otherwise)



Decomposing the slump: Not mainly housing.

Decomposition of the Investment Slump, 2008–14

(Average percent deviation from spring 2007 forecasts)



1/ Euro area economies (Greece, Ireland, Italy, Portugal, Spain) with high borrowing spreads during the 2010-11 sovereign debt crisis.

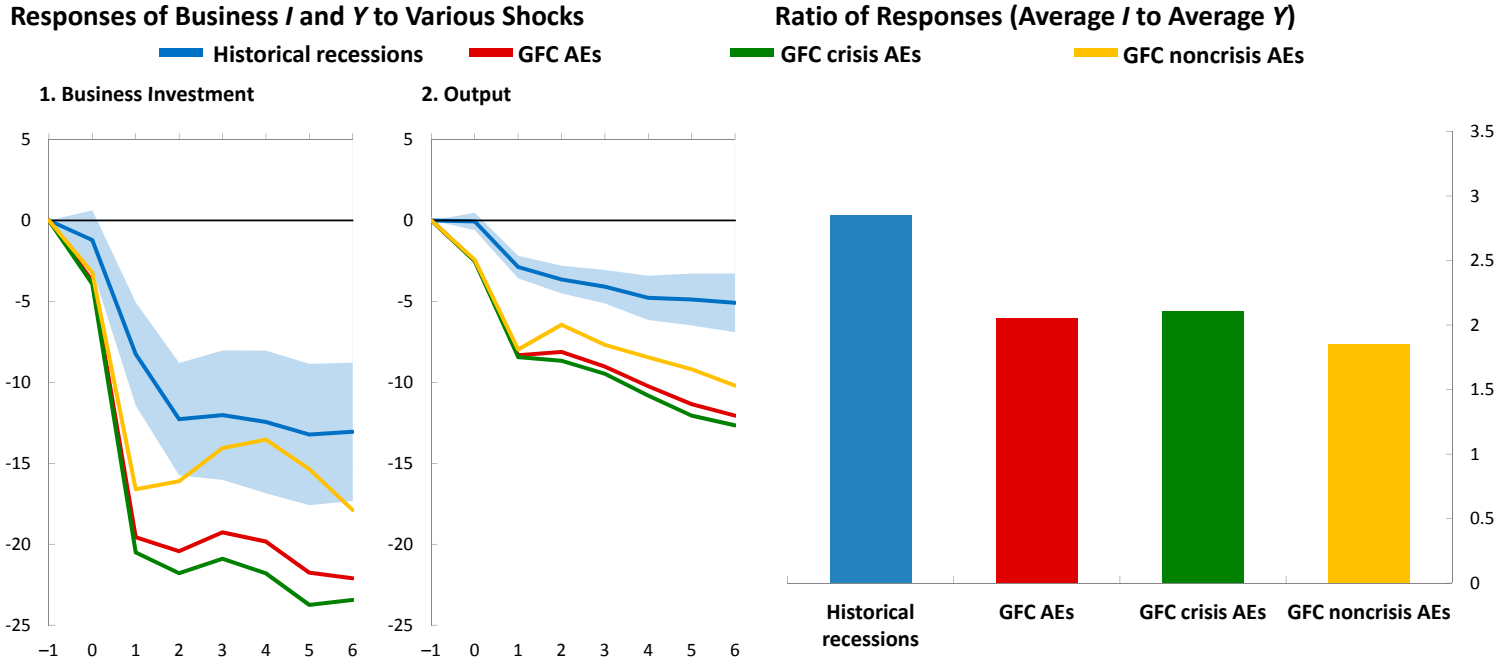
3. How much reflects output?

- As mentioned, important to diagnose correctly → implications for policy.

A. Has the comovement of investment and output been unusual?
   - Is this time different from historical recessions?

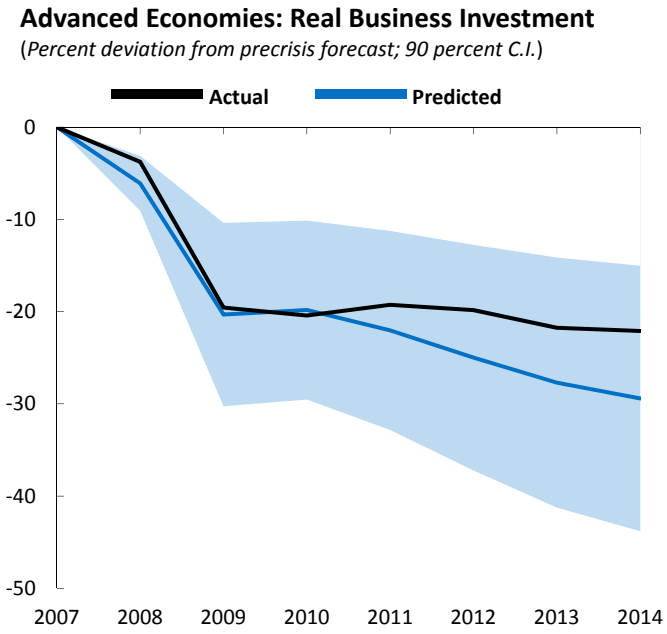
B. How much has weak economic activity driven the weakness in investment
   - Address reverse causality issues using instrumental variables.

A. Unusual comovement of investment and output?



B. How much reflects weak output? The bulk.

- First pass: Is this time different relative to historical recessions?
- Next: Identify *effect* of output on business investment. (Challenge: Reverse causality.)
- Approach: Focus on shocks *not* triggered by business investment. (Fiscal, housing.)



B. How much reflects weak economic activity?

Investment-Output Relation: Instrumental Variables Estimation

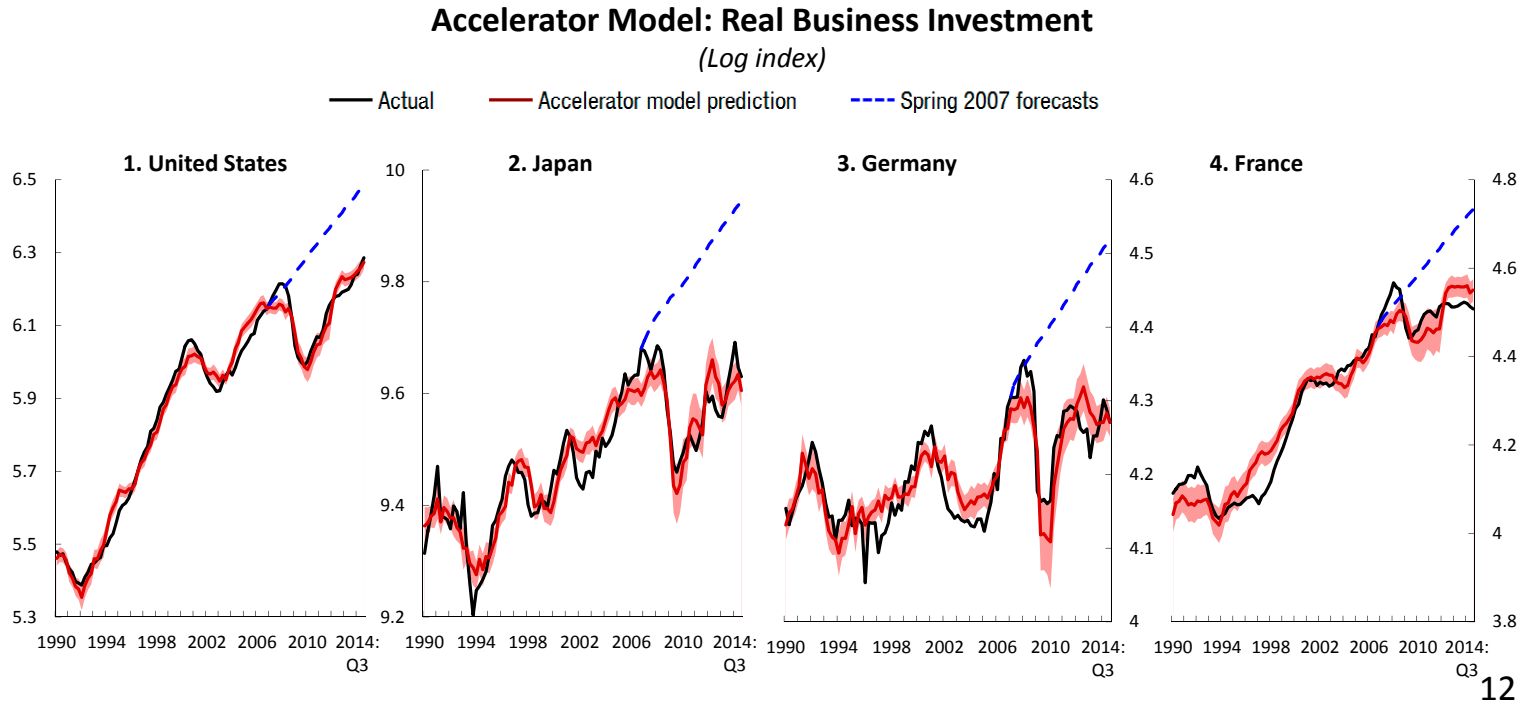
Business Investment Growth$_t$ ($\Delta \ln I_{it}$) = $\alpha_i + \lambda_t + \beta\{\text{Instrumented } \Delta \ln Y_{it}\} + \rho\, \Delta \ln I_{it-1} + \varepsilon_{it}$

	(1)	(2)	(3)	(4)
β	2.445***	2.633***	1.719***	2.243***
	(0.726)	(0.883)	(0.371)	(0.583)
ρ	0.128*	0.179***	0.108*	0.138**
	(0.066)	(0.062)	(0.064)	(0.064)
R^2	0.652	0.465	0.511	0.659
Number of Observations	356	356	604	356
First-Stage *F*-Statistic	15.916	18.461	6.843	11.899
p-Value	<0.0001	<0.0001	0.009	<0.0001
Overidentification Restrictions *p*-Value	...	...	...	0.516
Definition of Y_{it}	GDP	C + X	GDP	GDP
Instruments for $\Delta \ln Y_{it}$	Fiscal shocks	Fiscal shocks	Housing shocks	Fiscal and housing shocks

Sources: Haver Analytics; national authorities; and IMF staff calculations.

*p < .1, ** p< .05, *** p< .01.

Country level: Actual investment close to prediction.



Secondary in some: Financial constraints, policy uncertainty.

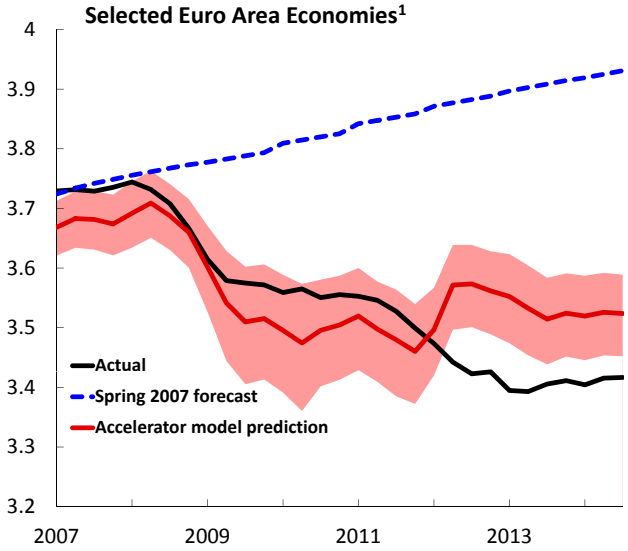
- Country-specific Accelerator Model.

$$\frac{I_t}{K_{t-1}} = \frac{\alpha}{K_{t-1}} + \sum_{i=1}^{12} \beta_i \frac{\Delta Y_{t-i}}{K_{t-1}} + \sum_{i=1}^{12} \gamma_i x_{t-i} + \delta + \varepsilon_t$$

- Exceptions in some euro area economies after 2011.

Actual and Fitted Real Business Investment

(Percent deviation from precrisis forecast; 90 percent C.I.)



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  - Financial constraints. (Survey-based measure.)

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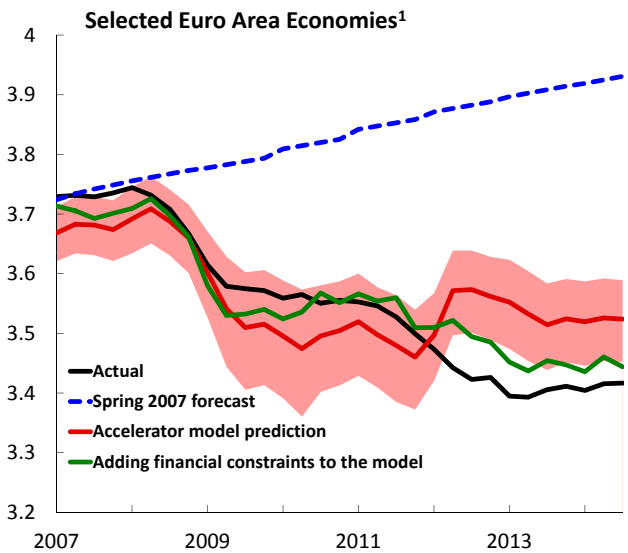

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- Exceptions in some euro area economies after 2011.
  - Financial constraints. (Survey-based measure.)
  - Policy uncertainty. (News-based measure.)

Actual and Fitted Real Business Investment

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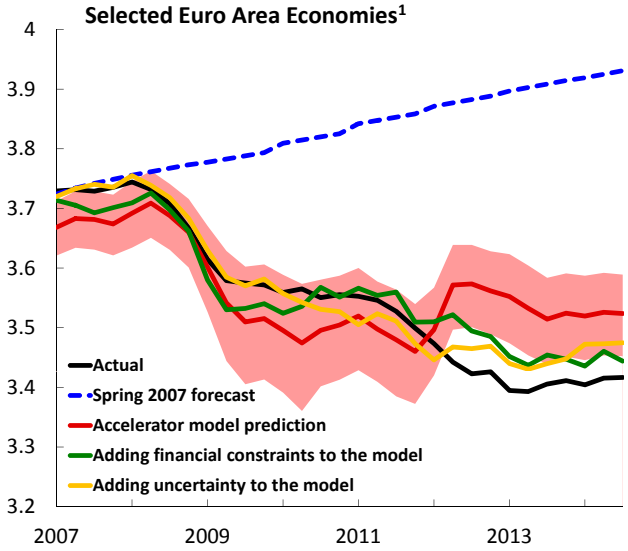


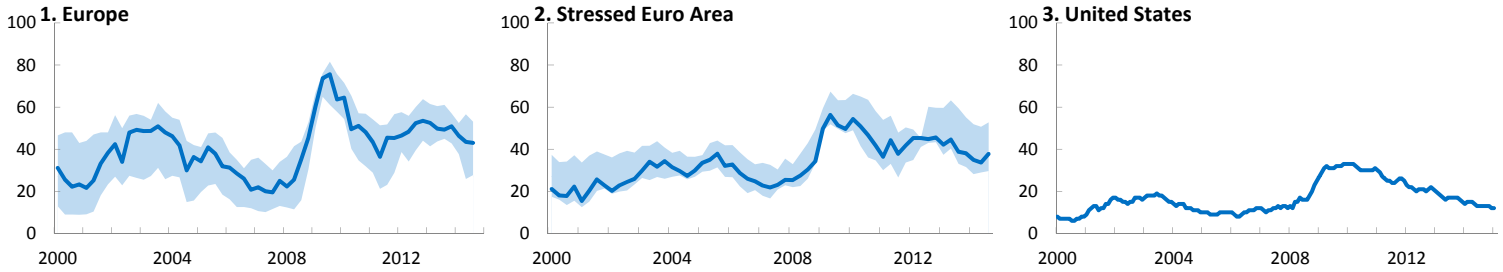
1/ Euro area economies (Greece, Ireland, Italy, Portugal, Spain) with high borrowing spreads during the 2010-11 sovereign debt crisis.

4. Which businesses have cut back more and why?

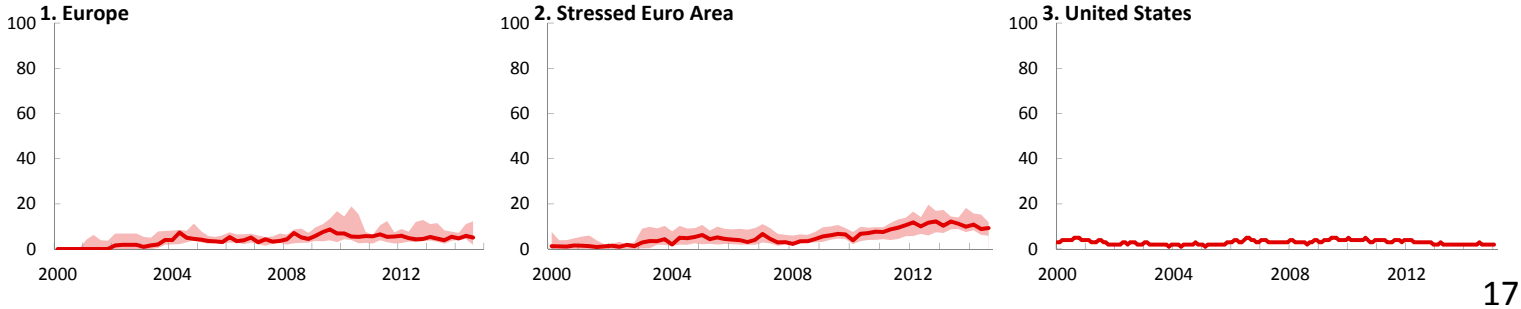
- From macro … to micro (firm-level). Why?
- Focus on role of financial constraints and uncertainty.
- Use a "difference-in-difference" approach.

Firm-level surveys cite weak demand as dominant factor.

Insufficient Demand



Financial Constraints



Estimating the role of financial constraints.

- Estimate effect on I/K ratio for firm i in sector j in country k in year t.
- "Diff-in-diff" approach of Dell'Ariccia, Detragiache, and Rajan (2008), applied to investment as in Claessens, Tong and Wei (2012).

$$\frac{I_{ijk,t}}{K_{ijk,t-1}} = \beta \,\text{Financial Dependence}_j \times \text{Crisis}_{k,t} + \sum_l \gamma_l x_{ijk,t} + \alpha_i + \sum_{k,t} \lambda_{k,t} d_{k,t} + \sum_{j,t} \phi_{j,t} d_{j,t} + \varepsilon_{ijk,t}$$

- *Intuition*: If financial constraints play a significant role, then firms in sectors that are more dependent on external finance should cut I more during a credit crunch.
- Data: Thomson Reuters Worldscope; Sample: 28 AEs, 27,661 firms, 2000-13.

How do we measure financial dependence?

- Financial dependence at sector level (Rajan and Zingales, 1998). Fixed over time.

$$\text{Financial Dependence} = \frac{\text{Capital Expenditures} - \text{Cash Flow}}{\text{Capital Expenditures}}$$

- Based on US firms. Apply to 3-digit sector level for all AEs. (Assumption.)

- Interact with country-level credit crunch:
  Banking crisis (Laeven-Valencia); real credit growth.

Financial constraints

Firm-Level Evidence: Financial Constraint Channel

Ratio of firm investment to lagged capital	(1)	(2)	(3)
Bank Crisis × Financial Dependence	–0.024***	–0.023***	–0.026***
	(0.007)	(0.007)	(0.008)
Recession × Financial Dependence			0.008
			(0.006)
Sales to Lagged Capital Ratio		0.008***	0.008***
		(0.000)	(0.000)
Lagged Tobin's Q		0.042***	0.042***
		(0.002)	(0.002)
Fixed Effects			
Firm	Y	Y	Y
Sector × Year	Y	Y	Y
Country × Year	Y	Y	Y
Number of Observations	161,073	160,239	160,239
R^2	0.03	0.13	0.13

Sources: Haver Analytics; national authorities; Thomson Reuters Worldscope; and IMF staff calculations.
***$p < 0.01$.

Financial constraints

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Estimating the role of uncertainty.

- Analogous "diff-in-diff" approach:

$$\frac{I_{ijk,t}}{K_{ijk,t-1}} = \beta \text{ Uncertainty Sensitivity}_j \times \text{Volatility}_{k,t} + \sum_l \gamma_l x_{ijk,t} + \alpha_i + \sum_{k,t} \lambda_{k,t} d_{k,t} + \sum_{j,t} \phi_{j,t} d_{j,t} + \varepsilon_{ijk,t}$$

- Intuition: If uncertainty has played a significant role, then firms whose stock prices usually respond more with aggregate measure of uncertainty ("sensitivity") should cut *I* more during periods of high aggregate uncertainty.

- Aggregate uncertainty: country-specific (SD of country stock index return).

Firm level: Measuring "sensitivity" to uncertainty.

Two measures of sensitivity (fixed over time):

- VIX-based. Regress stock return on market return and VIX for US firms. Weekly data (2000-2006). Collect coefficient for VIX, apply median of the 3-digit sector to all countries. (Assumption.)

- News-based (Bloom et al.). Regress stock return on market return and news-based index for US firms. Weekly data (2000-2006). Collect coefficient, apply median of 3-digit sector to all countries. (Assumption.)

Policy Uncertainty

Firm-Level Evidence: Policy Uncertainty Channel

Ratio of firm investment to lagged capital	(1)	(2)	(3)
Market Volatility × Policy Uncertainty Sensitivity	–0.010*	–0.028***	–0.017**
	(0.006)	(0.008)	(0.008)
Bank Crisis × Financial Dependence		–0.024***	–0.023**
		(0.007)	(0.007)
Sales to Lagged Capital Ratio			0.008***
			(0.000)
Lagged Tobin's Q			0.042***
			(0.002)
Fixed Effects			
Firm	Y	Y	Y
Sector × Year	Y	Y	Y
Country × Year	Y	Y	Y
Number of Observations	202,211	160,476	159,645
R^2	0.03	0.03	0.13

Sources: Haver Analytics; national authorities; Thomson Reuters Worldscope; and IMF staff calculations.

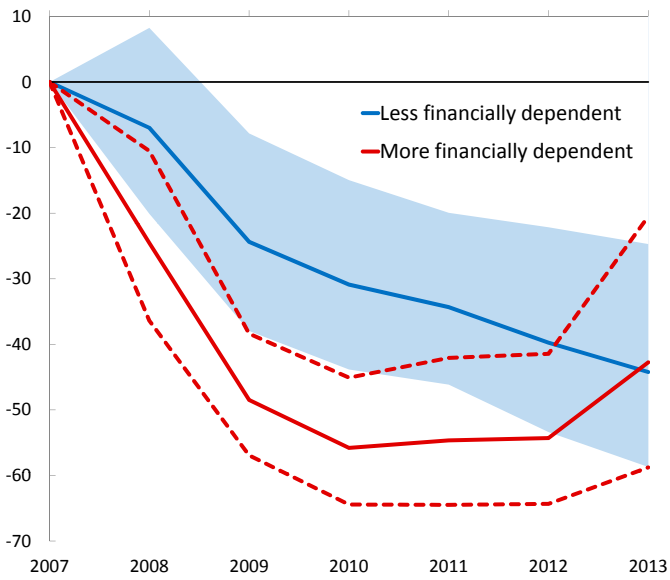
*$p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Firm level: Financial constraints: Some more intuition.

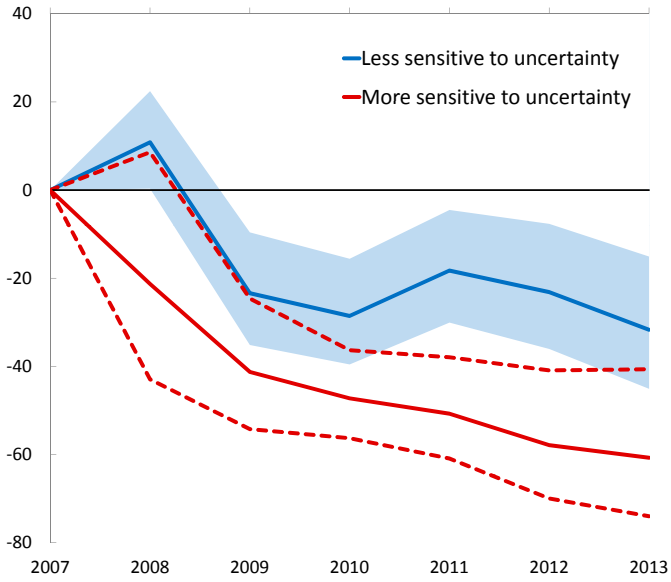
- In banking crises, more financially dependent sectors (top quartile) cut *I/K* by 1.5pp more than less dependent sectors (lowest quartile).
- Caution: Diff-in-diff speaks to *relative I* performance of different firms.
- Illustration: Relative *I* performance of different firms since the crisis.

Firm level: Financial constraints and uncertainty play a role.

Response of Firm Investment to GFC, By Firm Type
(*percent; based on local projection model*)



By Degree of Sensitivity to Policy Uncertainty
(*percent; based on local projection model*)



Conclusions

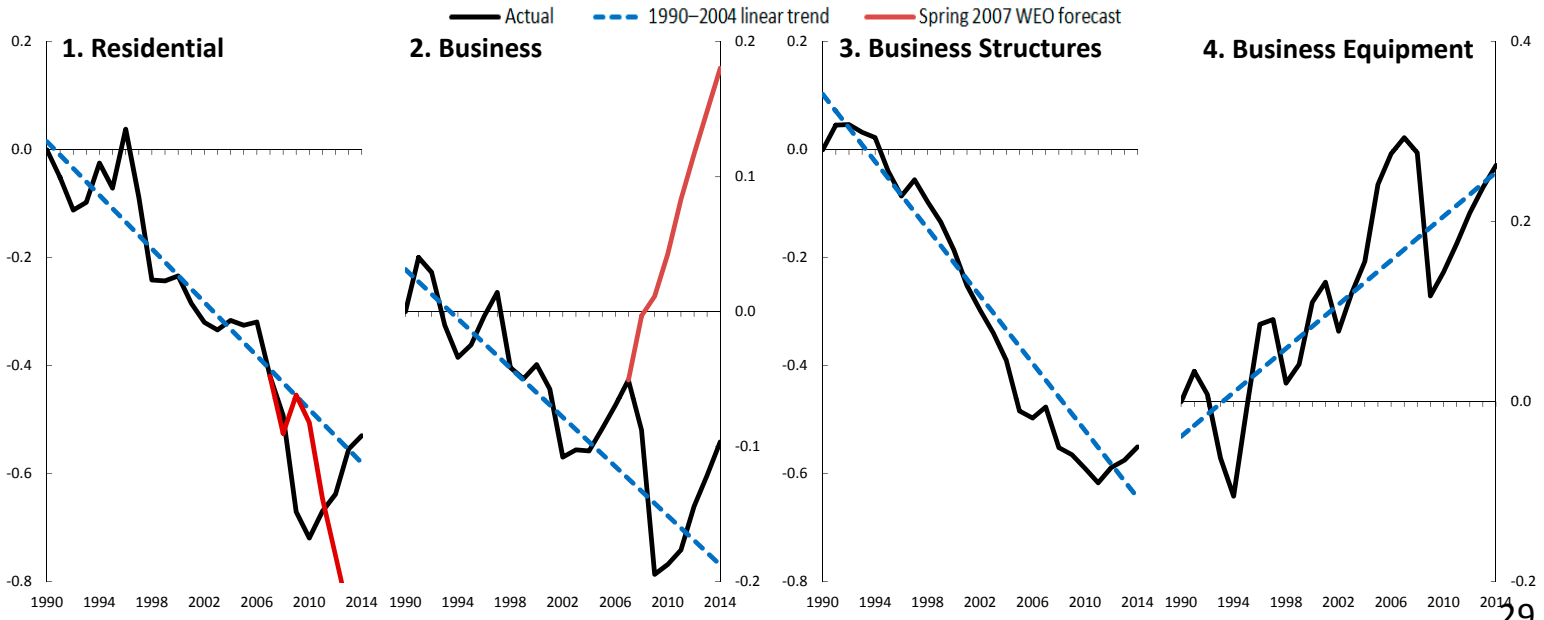
1. Slump in private investment: Mostly in AEs, broad-based. (Not just housing.)
2. Firms acting "normally" given weak economic environment. Little unexplained weakness.
3. Some exceptions: financial constraints, uncertainty.
4. Comprehensive set of policies required.
   - ❖ Support *overall* demand.
   - ❖ Faster recovery would lift investment.

Japan

Japan

Categories of Real Fixed Investment

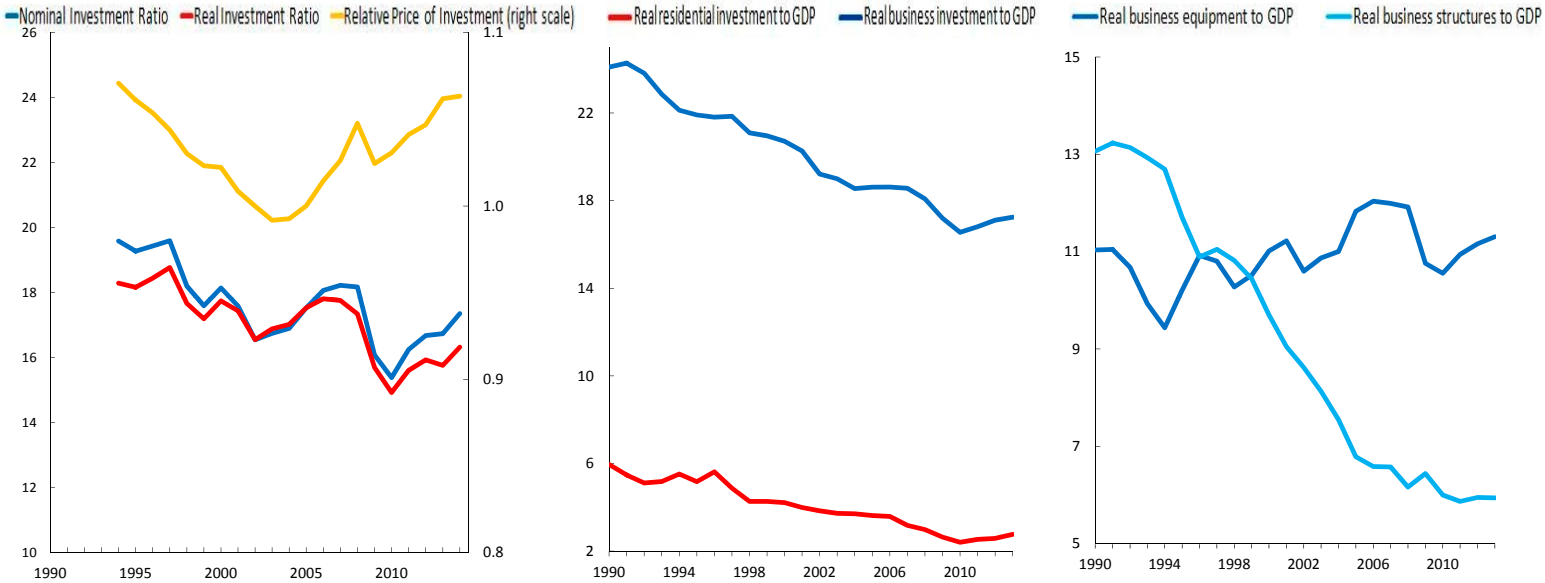
(Log index; 1990 = 0)



Sources: Haver Analytics; national authorities; and IMF staff calculations.

Japan.

Private Investment and Components-to-GDP Ratio



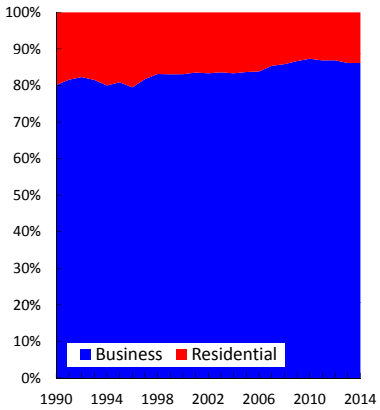
Source: IMF, World Economic Outlook.
Notes: Relative Price of Investment = Private Investment Value/ Private Investment Volume; Base year is 2005

Housing even smaller in Japan. Price of equipment flat.

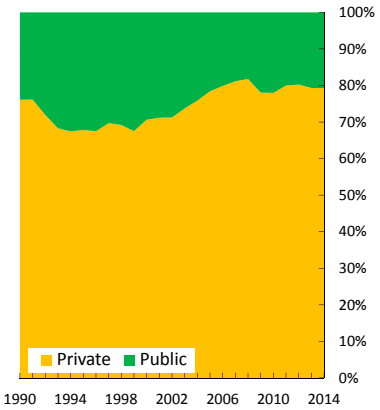
Shares and Relative Prices of Investment Categories

(Percent of total fixed investment, unless noted otherwise)

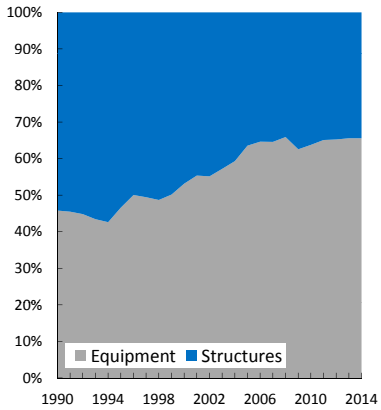
1. Residential vs. Business



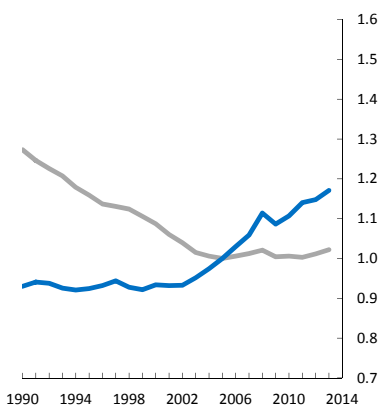
2. Private vs. Public



3. Business Investment: Equipment vs. Structures

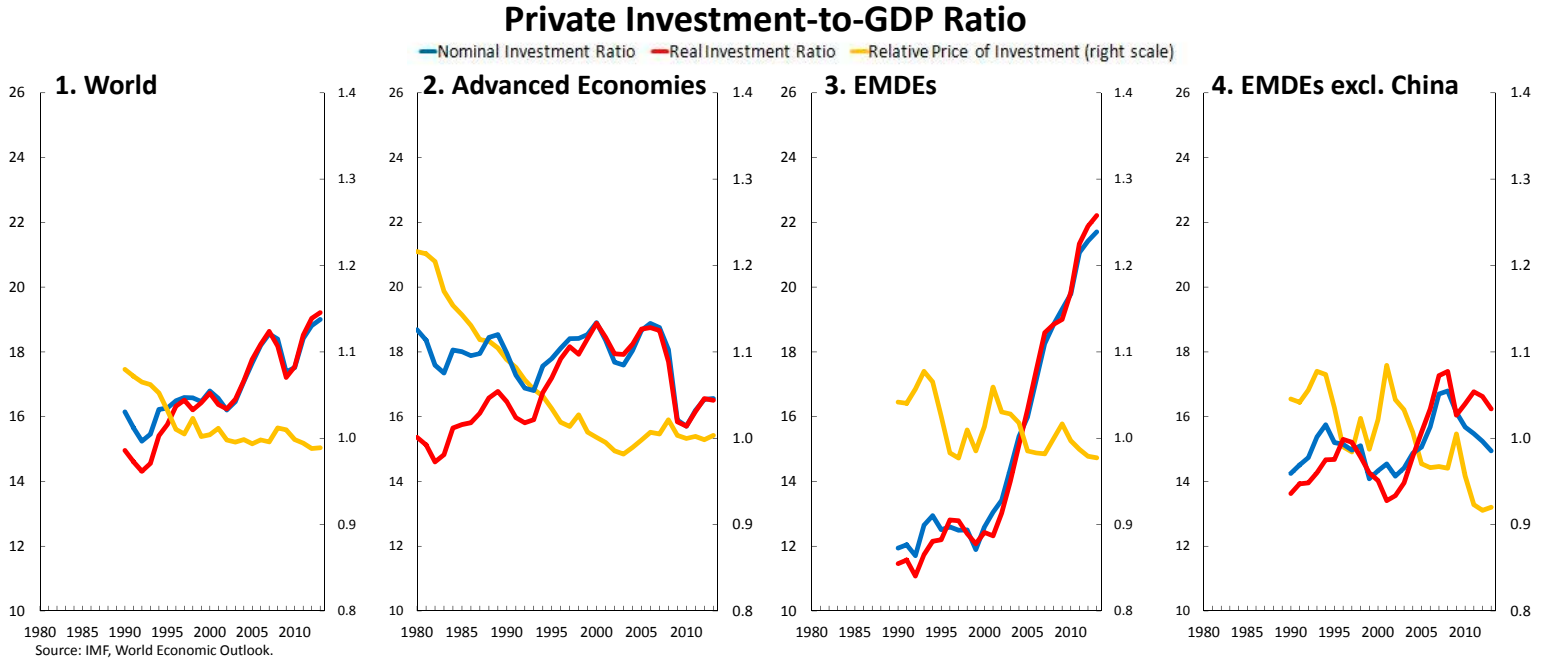


4. Relative Prices: Equipment vs. Structures[1]



OTHER

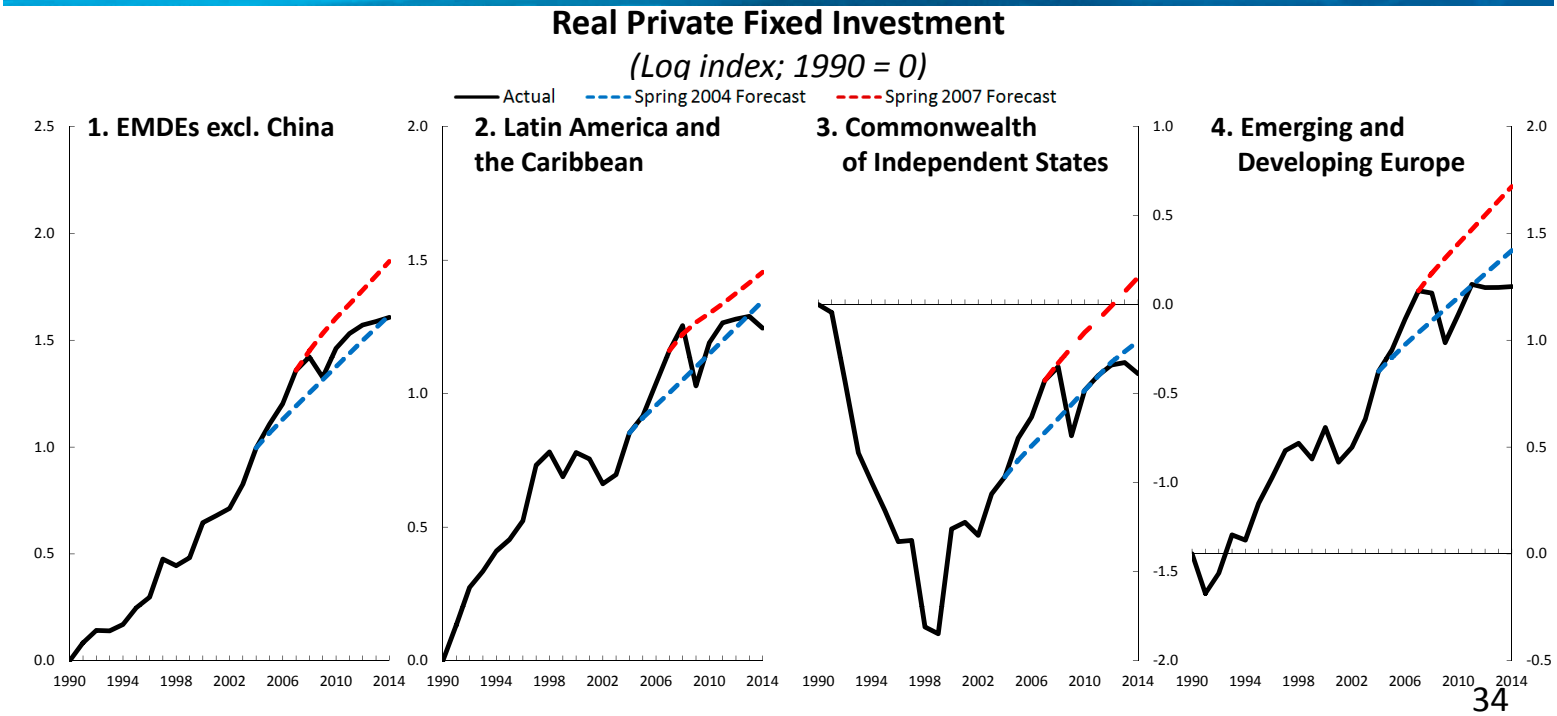
Investment ratios to GDP: Little sign of global slump.



Source: IMF, World Economic Outlook.

Notes: Relative Price of Investment = Private Investment Value/ Private Investment Volume; Base year is 2005; AEs included are: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong SAR, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, San Marino, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan Province of China, United Kingdom and United States;

Brisk investment growth in the 2000s across EMDEs, but slowdown in recent years even relative to pre-boom forecasts



A. Has the comovement of investment and output been unusual?
Emerging and Developing Economies

Responses of Business *I* and *Y* to Various Shocks

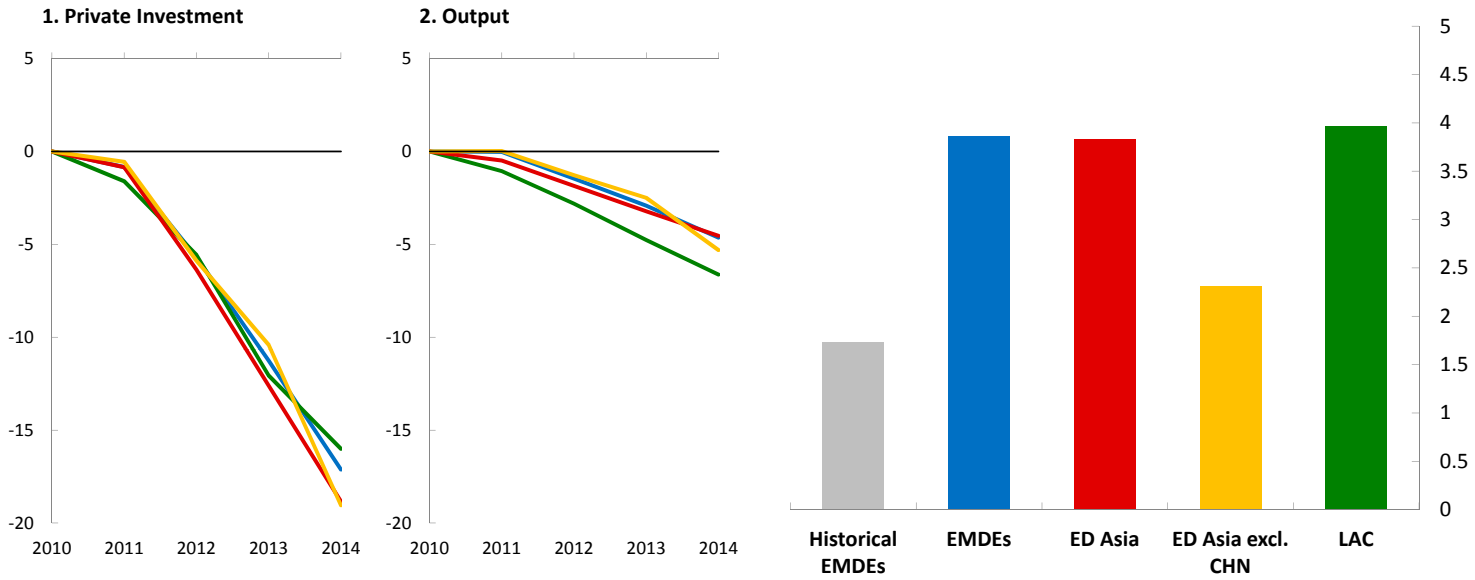
Ratio of Responses (Average *I* to Average *Y*)

Emerging and Developing Economies (EMDEs)

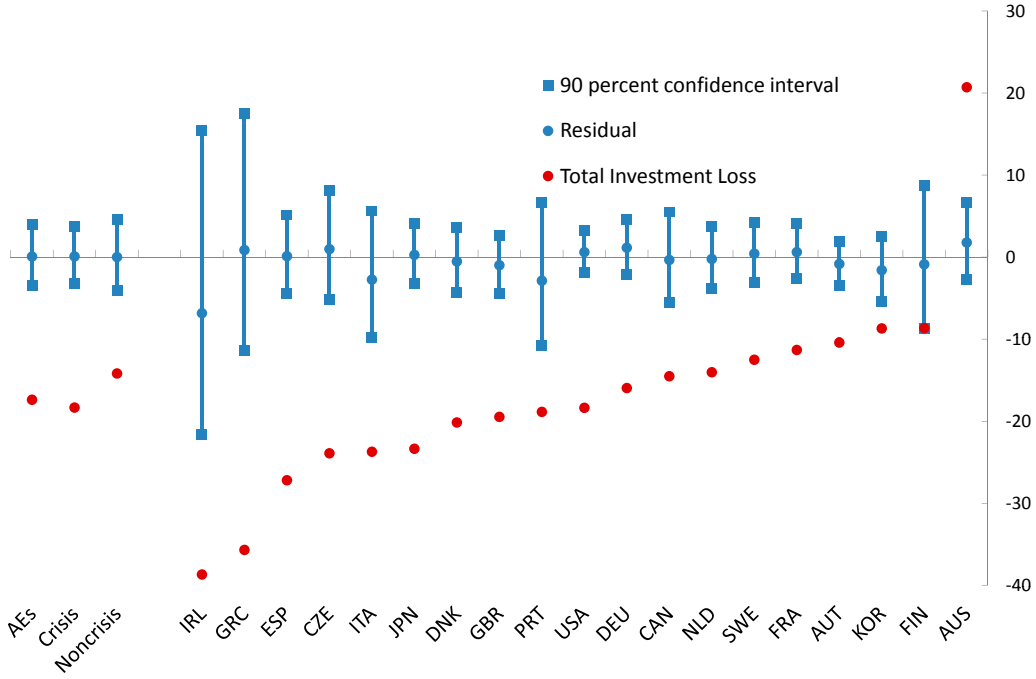
Emerging and Developing (ED) Asia

Emerging and Developing (ED) Asia excl. China

Latin America and Caribbean (LAC)

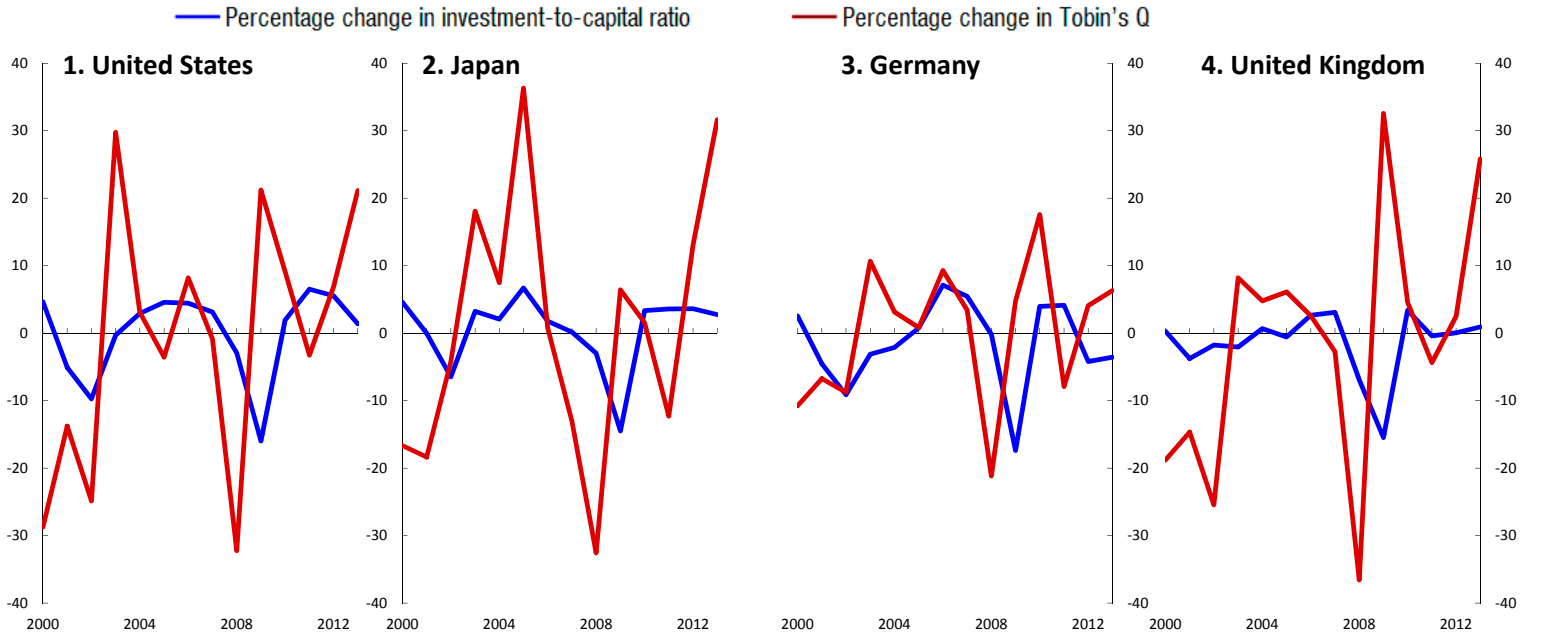


Real Business Investment: Accelerator Model Residuals and Investment Losses Relative to Precrisis Forecasts, 2008-14



Financial markets unusual given firms' investment decisions?

Tobin's Q and Real Business Investment-to-Capital Ratios



Sources: Haver Analytics; national authorities; and IMF staff calculations.

Tobin's Q not in lock step, but can predict future investment.

- What we can say: I/K and Tobin's *Q* *not* in lock step.
- But is this unusual? No. Blanchard, Rhee, Summers (1993).
- Some evidence: *Q* has lagged relation with *I*.