

Appendix 1: Materials used by Mr. Sack

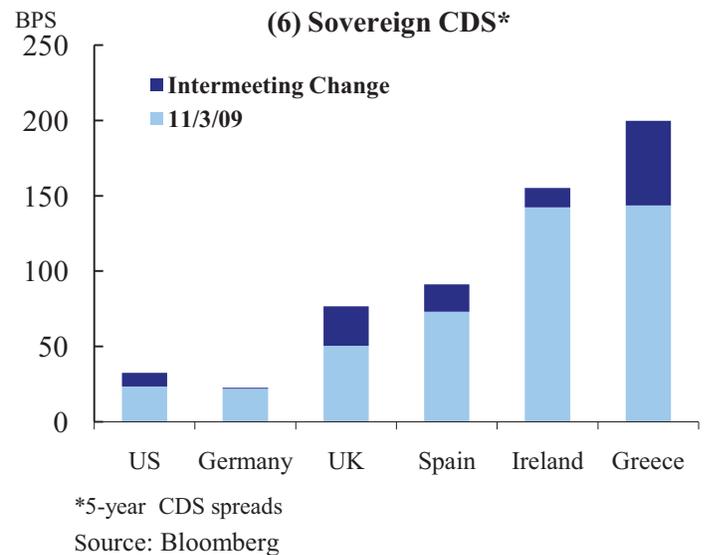
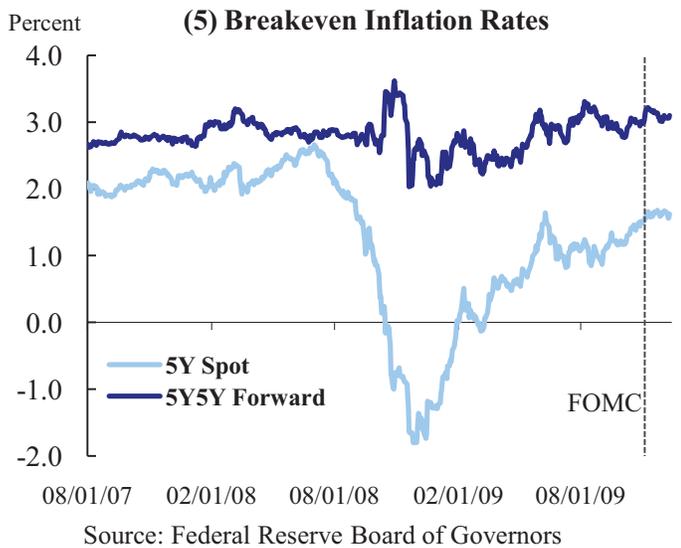
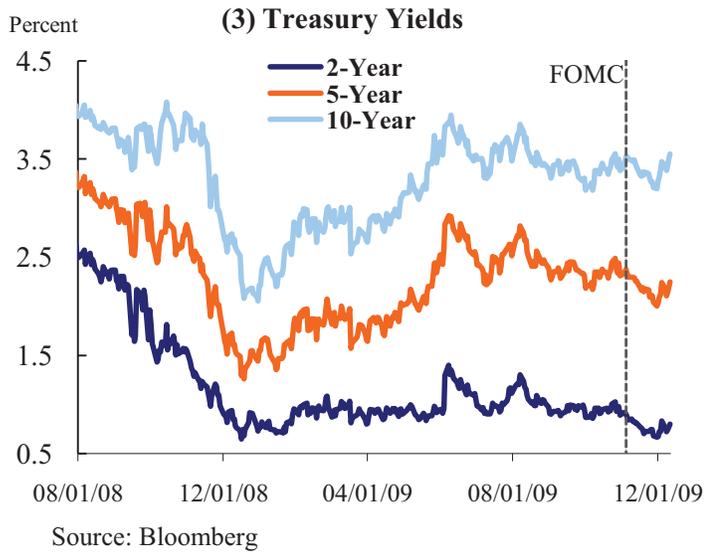
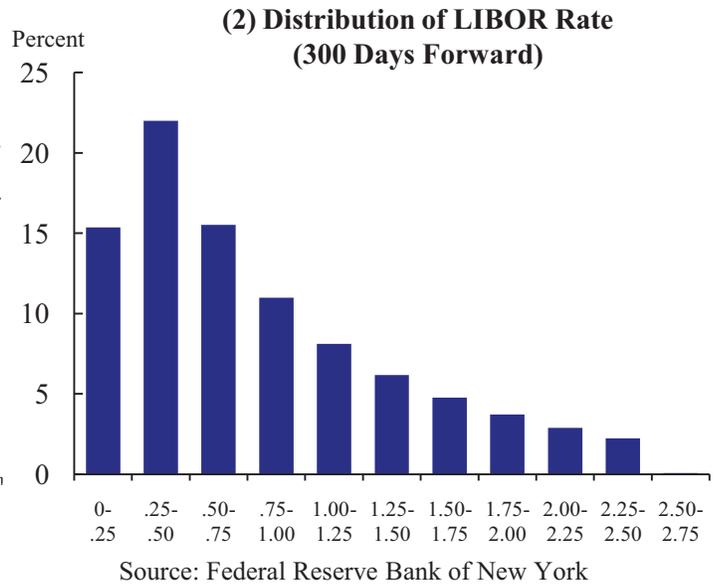
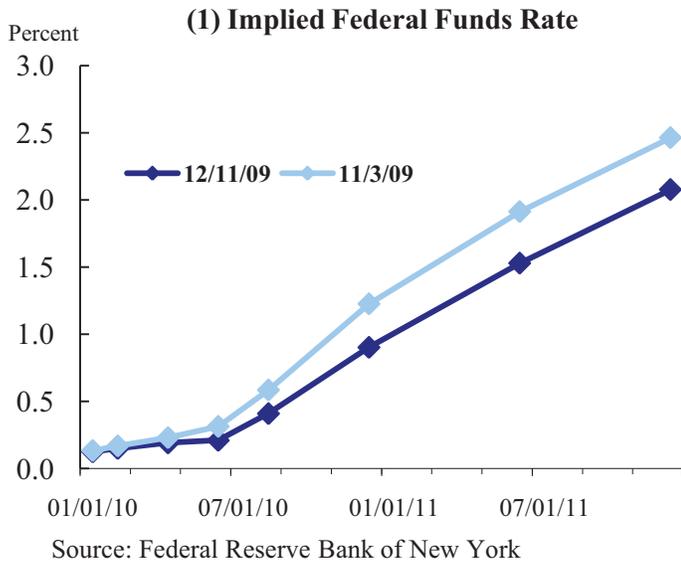
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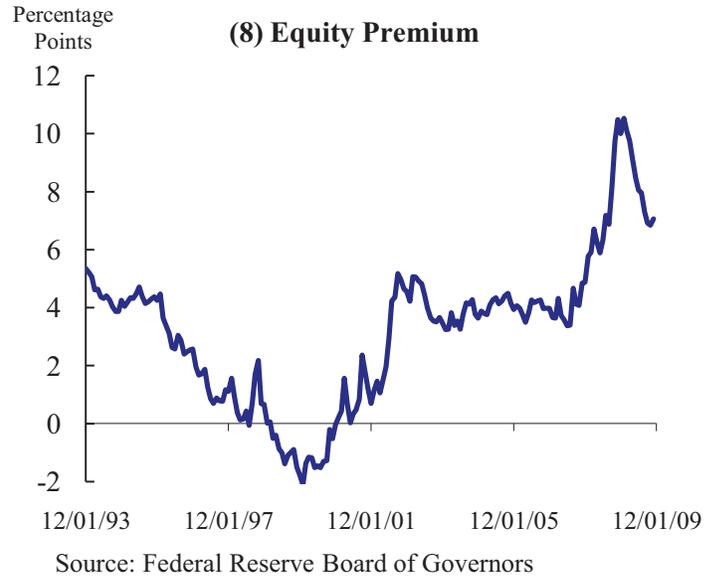
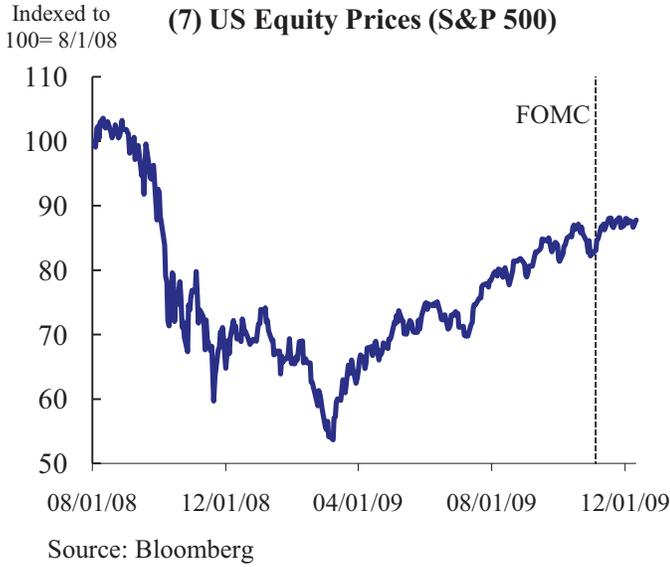
FOMC Presentation:

Financial Market Developments and Desk Operations

Brian Sack

December 15, 2009

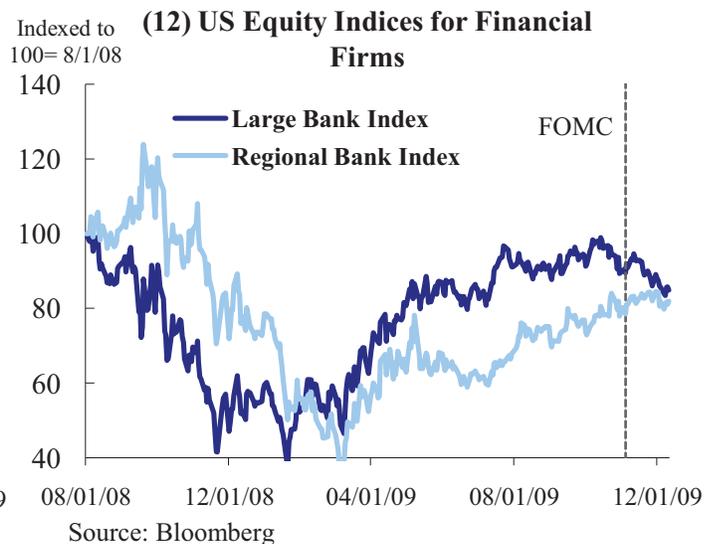
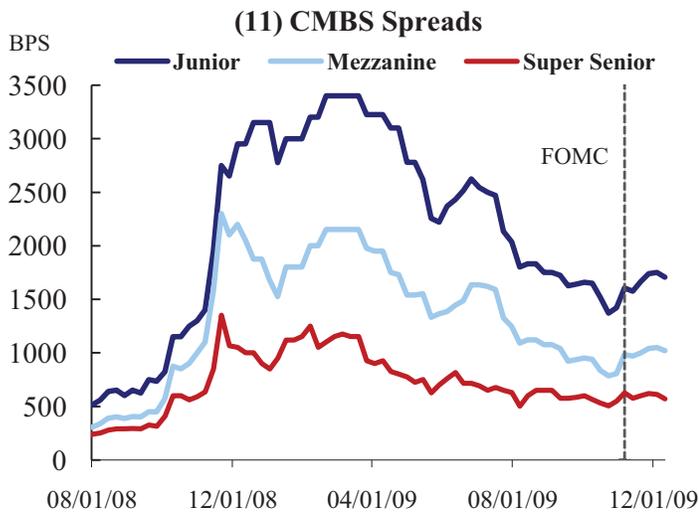
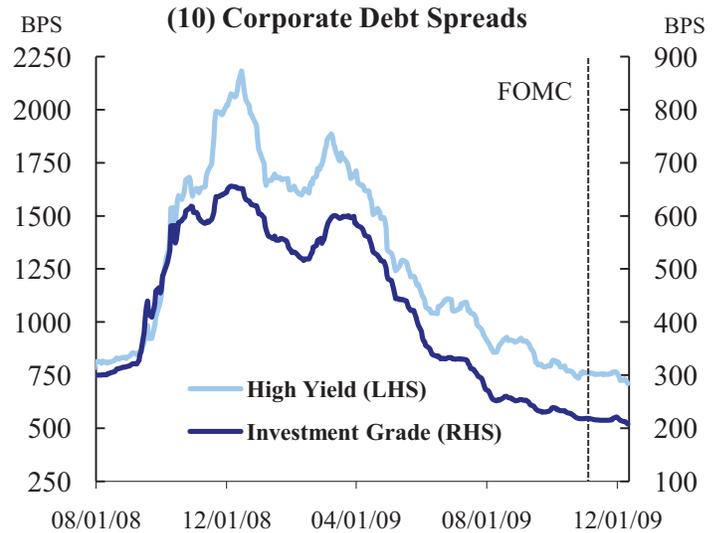




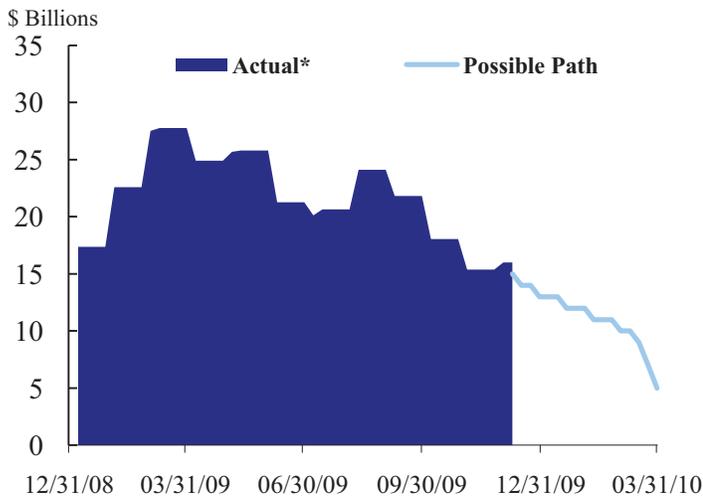
(9) Correlations with S&P 500

	Last 6 Months	2005 - 2006
Emerging Market Equities	0.58	0.30
CRB Commodity Index	0.61	0.04
High Yield Spread	-0.38	-0.10

Source: Federal Reserve Bank of New York

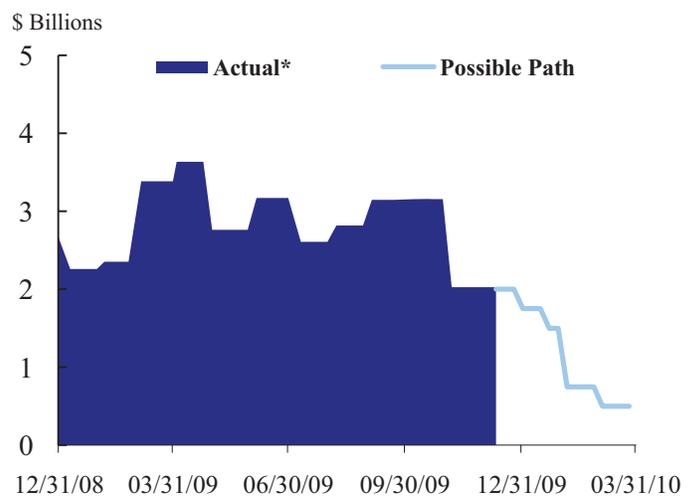


(19) Weekly Pace of MBS Purchases



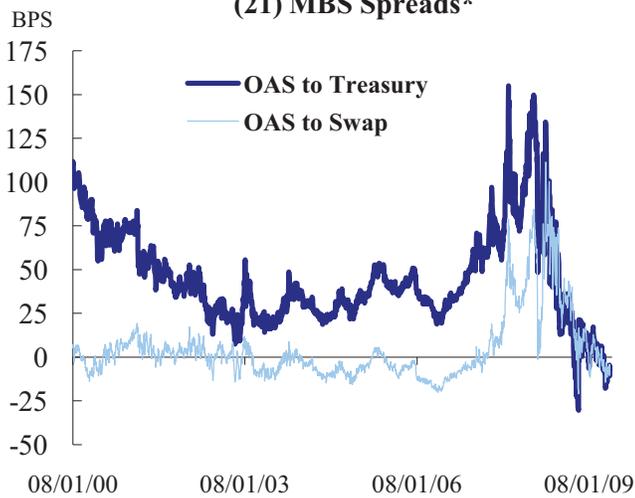
*Monthly average
Source: Federal Reserve Bank of New York

(20) Weekly Pace of Agency Debt Purchases



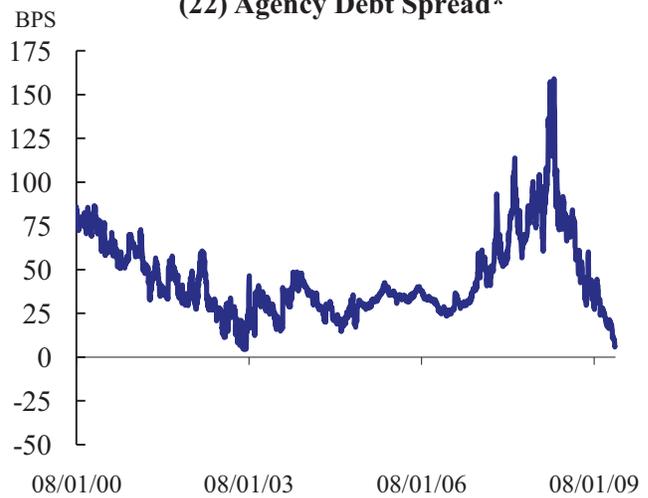
*Monthly average
Source: Federal Reserve Bank of New York

(21) MBS Spreads*



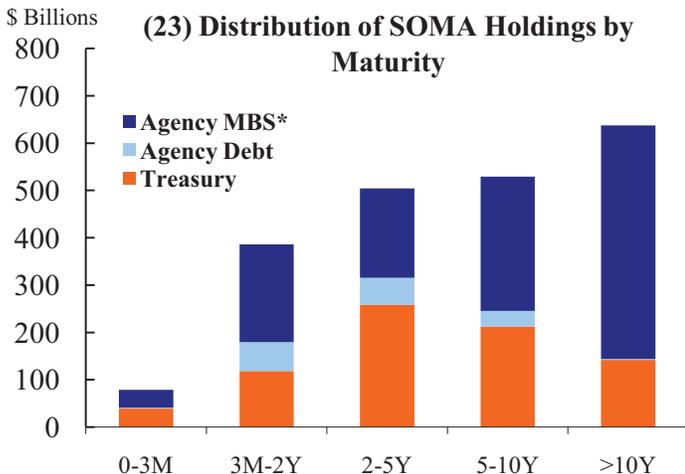
* Fannie Mae fixed-rate current coupon spreads
Source: Barclays Capital

(22) Agency Debt Spread*



*Fannie Mae 5-year benchmark spread to Treasury
Source: Bloomberg

(23) Distribution of SOMA Holdings by Maturity

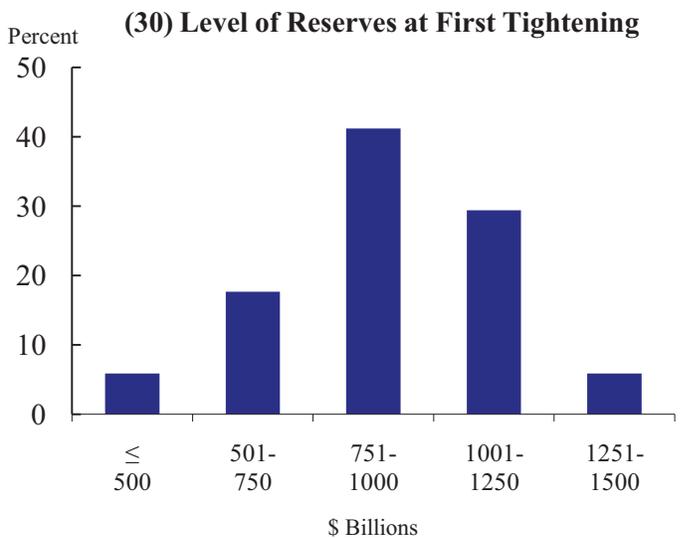
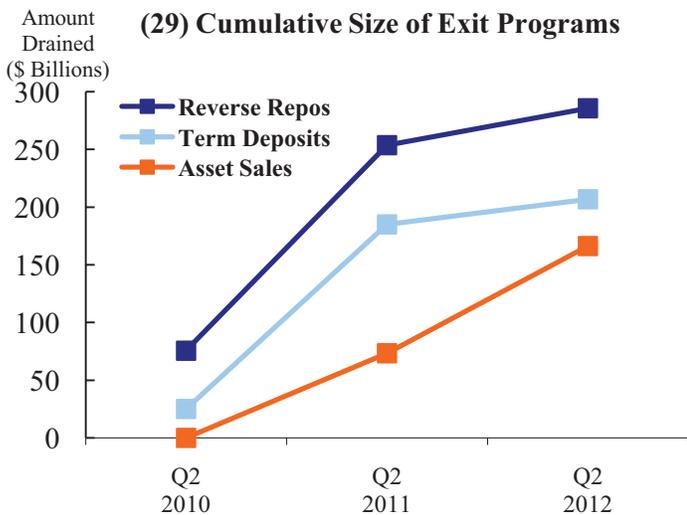
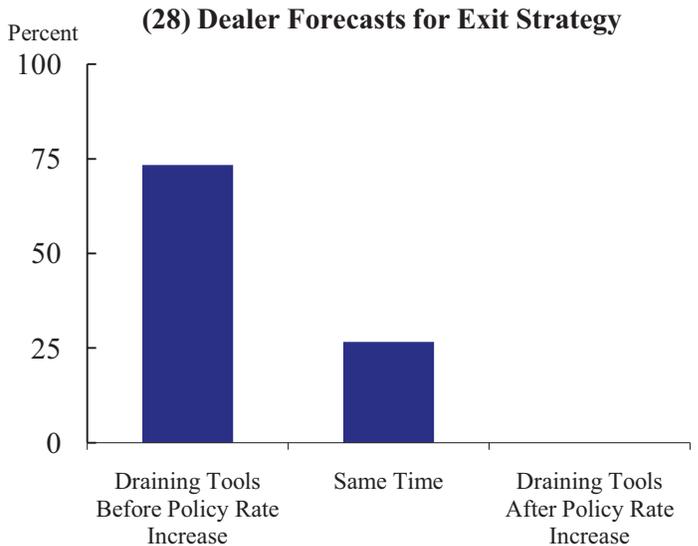
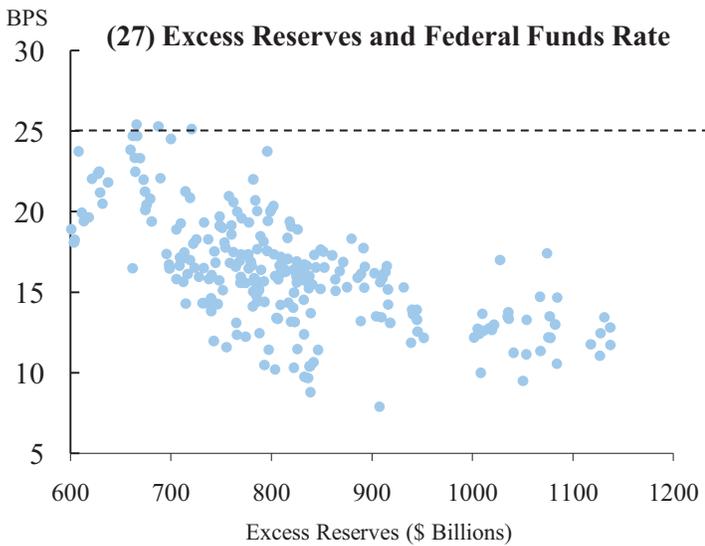
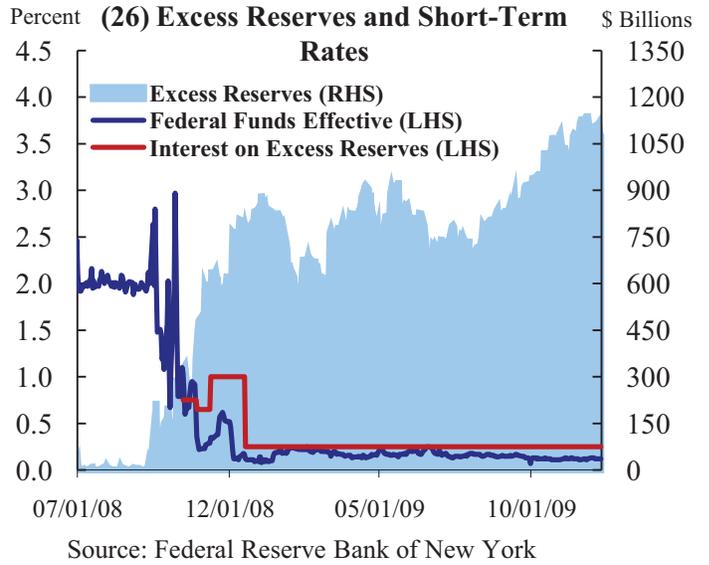
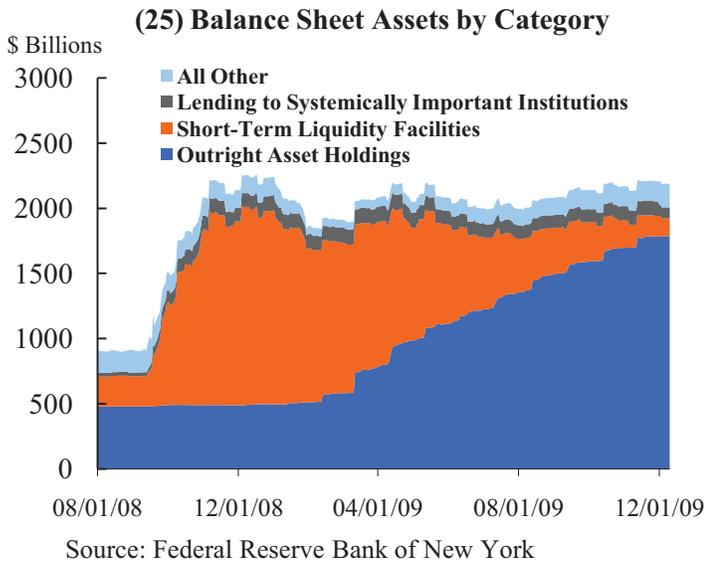


*BlackRock baseline forecast for paydowns
Source: Federal Reserve Bank of New York, BlackRock

(24) Size of Fed Balance Sheet at Year-End

<i>In Billions (\$)</i>		
	2010	2011
(1) Reinvest All	2200	2200
(2) Reinvest Treasuries Only	1972	1848
<i>Difference from (1)</i>	-228	-352
(3) Reinvest Nothing	1878	1686
<i>Difference from (1)</i>	-322	-514

Source: Federal Reserve Bank of New York



Appendix 2: Materials used by Mr. Wascher

Private Housing Construction
(Thousands of units, seasonally adjusted annual rate, except where noted)

Category	2008	2009			2009			
		Q1	Q2	Q3 ^r	Sept.	Oct. ^p	Oct. ^r	Nov. ^p
<i>Total</i>								
Starts	906	528	540	587	586	529	527	574
Permits	905	531	529	573	575	552	551	584
<i>Single-family</i>								
Starts	622	358	425	498	508	476	472	482
Permits	576	361	406	460	452	451	449	473
Adjusted permits ¹	583	374	418	478	476	459	458	483
Permits backlog ²	68	60	59	56	56	56	56	54
<i>Multifamily</i>								
Starts	284	170	115	89	78	53	55	92
Permits	330	170	123	113	123	101	102	111
Adjusted permits ¹	328	171	123	114	123	101	102	111
Permits backlog ²	53	46	39	36	36	43	40	40
<i>Regional starts³</i>								
Northeast	121	56	63	66	66	56	55	64
Midwest	135	83	90	107	104	93	101	104
South	453	278	261	289	298	272	268	301
West	196	110	126	124	118	108	103	105

r revised

p preliminary

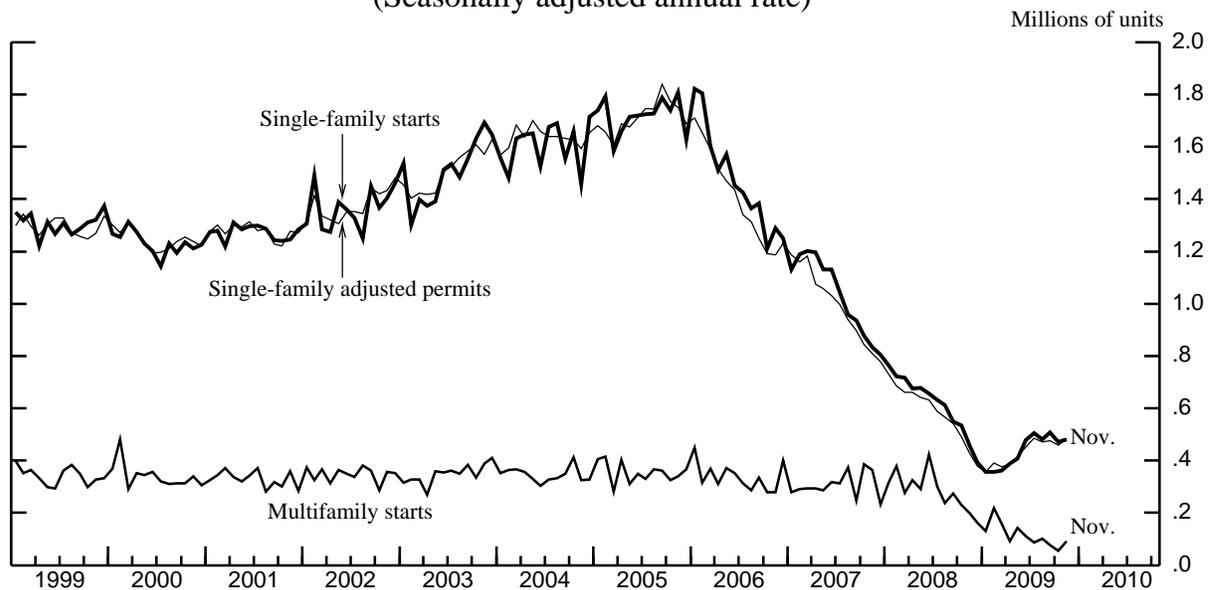
1. Adjusted permits equal permit issuance plus total starts outside of permit-issuing areas.

2. Number outstanding at end of period. Seasonally adjusted by staff. Excludes permits that have been cancelled, abandoned, expired, or revoked. Not at an annual rate.

3. Sum of single-family and multifamily starts.

Source: Census Bureau.

Private Housing Starts and Permits
(Seasonally adjusted annual rate)



Note. Adjusted permits equal permit issuance plus total starts outside of permit-issuing areas.

Source: Census Bureau.

Recent Changes in Consumer Price Indexes
(Percent change)

Item	Weights ¹	12-month change ²		3-month change		2009			
		Nov. 2008	Nov. 2009	Aug. 2009	Nov. 2009	Aug.	Sept.	Oct.	Nov.
				Annual rate		Monthly rate			
Total CPI	100.0	1.1	1.8	4.9	3.4	.4	.2	.3	.4
Food	14.6	6.0	-.7	-.5	.1	.1	-.1	.1	.1
Meats, poultry, fish, and eggs	1.9	5.5	-4.0	-4.0	-3.5	.4	-1.0	-.2	.3
Fruits and vegetables	1.2	5.7	-4.9	.5	-6.8	-.7	-1.2	-.7	.1
Other	11.5	6.2	.3	.0	1.4	.1	.2	.2	.0
Energy	7.6	-13.3	7.4	57.1	27.9	4.6	.6	1.5	4.1
Motor Fuel	3.2	-28.6	21.8	160.2	42.0	8.8	1.1	1.6	6.2
Heating oil	.3	-3.4	-7.7	20.9	74.4	3.9	1.1	6.0	7.3
Natural gas	1.2	7.5	-18.6	10.8	6.4	.4	-1.7	1.9	1.5
Electricity	3.0	8.1	.1	-10.2	11.1	-.1	.6	.6	1.4
CPI excluding food and energy	77.7	2.0	1.7	1.4	1.5	.1	.2	.2	.0
Goods ex. food and energy	21.5	-.2	2.6	1.0	3.8	-.3	.3	.4	.2
Nondurables ex. food and energy	11.0	2.1	3.3	3.2	.1	.0	.2	-.2	.0
Apparel	3.7	.0	1.0	4.8	-2.2	-.1	.1	-.4	-.3
Tobacco	.8	6.7	30.3	13.2	9.7	.1	1.0	.3	1.0
Other nondurables	6.5	2.9	1.5	.9	.1	.0	.1	-.1	.0
Durables	10.5	-2.6	1.8	-1.2	7.8	-.6	.4	1.1	.4
New vehicles	4.5	-2.9	4.9	-.7	11.2	-1.3	.4	1.6	.6
New cars		-.7	3.5	-.8	10.8	-1.2	.1	1.6	.9
New trucks		-4.9	6.4	2.0	9.2	-1.0	.3	1.6	.3
Used cars and trucks	1.6	-7.1	5.8	11.4	31.5	1.9	1.6	3.4	2.0
Computers	.2	-11.1	-12.3	-24.8	-2.5	-2.8	-.7	.3	-.2
Audio/Video Equipment	.6	-5.8	-9.0	-8.8	-11.0	-.5	-1.4	-1.7	.3
Other Durables	3.6	1.1	-1.2	-4.3	-2.2	-.7	.3	-.2	-.6
Services excluding energy	56.3	2.9	1.4	1.6	.7	.2	.1	.1	.0
Rent of shelter	32.9	2.2	.3	-.2	-.3	.1	.1	.0	-.2
Owners' equivalent rent	24.4	2.3	.8	.4	-1.1	.1	-.1	.0	-.1
Rent of primary residence	6.0	3.6	.9	.1	-.9	.0	-.1	-.1	-.1
Lodging away from home	2.5	-2.3	-6.1	-5.0	1.2	.5	1.5	.4	-1.5
Services ex. energy and shelter	23.4	3.9	2.9	3.9	2.9	.4	.3	.2	.2
Medical services	4.8	3.1	3.5	2.9	3.6	.2	.4	.2	.4
Tuition and other school fees	2.9	5.6	4.6	5.3	2.0	.5	.0	.3	.2
Air fares	.7	4.0	.6	13.5	42.1	1.7	3.4	1.7	3.8
Other services	15.0	3.8	2.5	3.6	1.3	.3	.2	.1	.0
Memo:									
Chained CPI	100.0	.6	1.6	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
All items less food and energy	77.6	1.5	1.3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

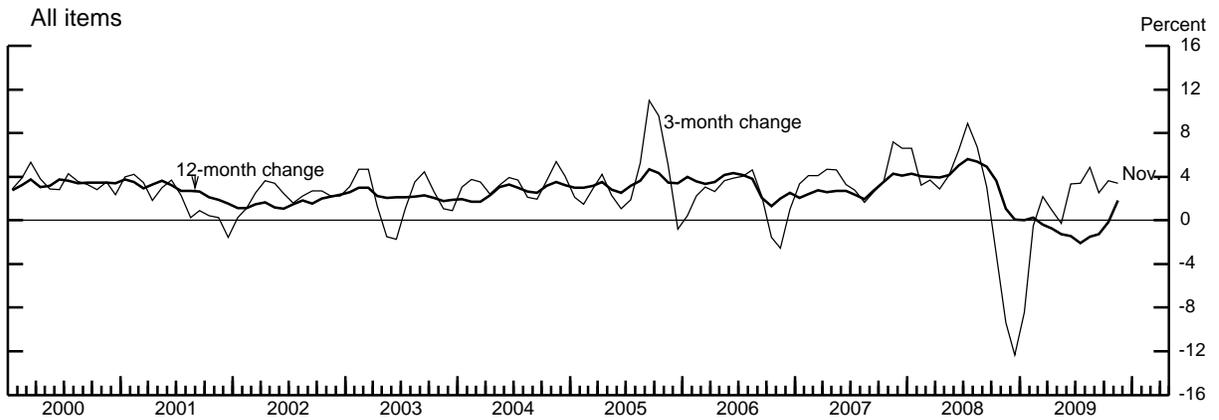
1. Relative importance weights for December 2008, which are based on 2005-2006 expenditure weights.

For the chained CPI, the 2005-2006 expenditure weights are shown.

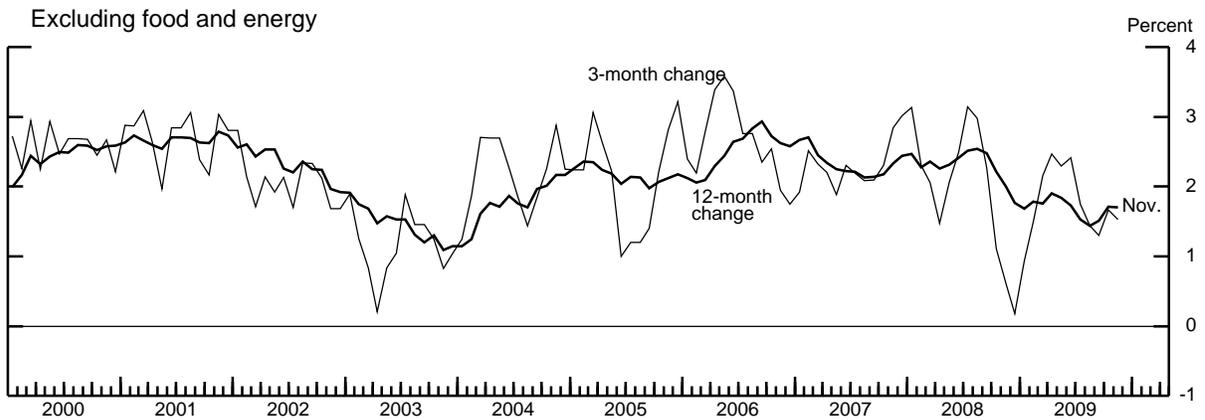
2. Not seasonally adjusted.

Source: Bureau of Labor Statistics.

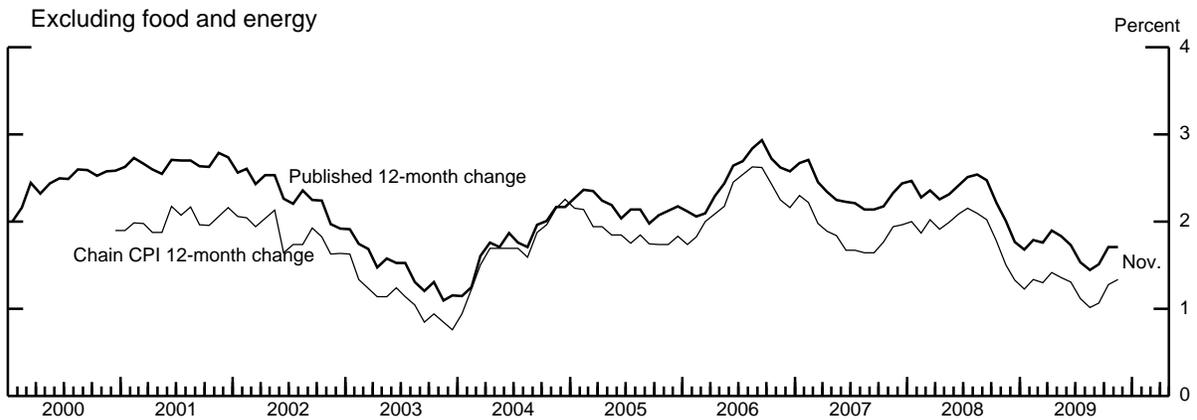
Consumer Price Index (Percent change at annual rate)



Source: Bureau of Labor Statistics.



Source: Bureau of Labor Statistics.



Source: Bureau of Labor Statistics.

Appendix 3: Materials used by Mr. Madigan

Class I FOMC – Restricted Controlled (FR)

*Material for Briefing on
Monetary Policy Alternatives*

Brian Madigan
December 15-16, 2009

November FOMC Statement

Information received since the Federal Open Market Committee met in September suggests that economic activity has continued to pick up. Conditions in financial markets were roughly unchanged, on balance, over the intermeeting period. Activity in the housing sector has increased over recent months. Household spending appears to be expanding but remains constrained by ongoing job losses, sluggish income growth, lower housing wealth, and tight credit. Businesses are still cutting back on fixed investment and staffing, though at a slower pace; they continue to make progress in bringing inventory stocks into better alignment with sales. Although economic activity is likely to remain weak for a time, the Committee anticipates that policy actions to stabilize financial markets and institutions, fiscal and monetary stimulus, and market forces will support a strengthening of economic growth and a gradual return to higher levels of resource utilization in a context of price stability.

With substantial resource slack likely to continue to dampen cost pressures and with longer-term inflation expectations stable, the Committee expects that inflation will remain subdued for some time.

In these circumstances, the Federal Reserve will continue to employ a wide range of tools to promote economic recovery and to preserve price stability. The Committee will maintain the target range for the federal funds rate at 0 to $\frac{1}{4}$ percent and continues to anticipate that economic conditions, including low rates of resource utilization, subdued inflation trends, and stable inflation expectations, are likely to warrant exceptionally low levels of the federal funds rate for an extended period. To provide support to mortgage lending and housing markets and to improve overall conditions in private credit markets, the Federal Reserve will purchase a total of \$1.25 trillion of agency mortgage-backed securities and about \$175 billion of agency debt. The amount of agency debt purchases, while somewhat less than the previously announced maximum of \$200 billion, is consistent with the recent path of purchases and reflects the limited availability of agency debt. In order to promote a smooth transition in markets, the Committee will gradually slow the pace of its purchases of both agency debt and agency mortgage-backed securities and anticipates that these transactions will be executed by the end of the first quarter of 2010. The Committee will continue to evaluate the timing and overall amounts of its purchases of securities in light of the evolving economic outlook and conditions in financial markets. The Federal Reserve is monitoring the size and composition of its balance sheet and will make adjustments to its credit and liquidity programs as warranted.

December FOMC Statement—Alternative A

1. Information received since the Federal Open Market Committee met in **November** suggests that economic activity has continued to pick up **and that the deterioration in the labor market is abating.** The housing sector has **shown some signs of improvement** over recent months, **boosted in part by government incentives for first-time homebuyers.** Household spending appears to be expanding but remains constrained by **the weak labor market, modest** income growth, lower housing wealth, and tight credit. **Business spending is being dampened by firms' efforts to reduce inventories to bring them into better alignment with sales and by cutbacks in fixed investment. Partly reflecting these factors, the Committee anticipates that the economic recovery will be sluggish and that slack in resource utilization will diminish quite slowly absent further policy action.**
2. **Inflation has fallen considerably over the past year.** With substantial resource slack likely to continue to dampen cost pressures and with longer-term inflation expectations stable, the Committee expects that inflation will remain subdued for some time.
3. **To promote a stronger economic recovery and higher resource utilization, the Committee will provide additional monetary stimulus by increasing its purchases of agency mortgage-backed securities to a total of \$1.5 trillion, up from the previously announced amount of \$1.25 trillion; the Committee anticipates that these purchases will be executed by the end of the second quarter of 2010. The Committee is also in the process of purchasing** \$175 billion of agency debt; **it** anticipates that these purchases will be **completed** by the end of the first quarter of 2010. The Committee will continue to evaluate the timing and overall amounts of its purchases of securities in light of the evolving economic outlook and conditions in financial markets. The Committee will maintain the target range for the federal funds rate at 0 to ¼ percent and continues to anticipate that low rates of resource utilization, subdued inflation trends, and stable inflation expectations are likely to warrant **this** exceptionally low **range for** the federal funds rate for an extended period. The Federal Reserve will continue to employ a wide range of tools to promote economic recovery and to preserve price stability. The Federal Reserve is monitoring the size and composition of its balance sheet and will make adjustments to its credit and liquidity programs as warranted.

December FOMC Statement—Alternative B

1. Information received since the Federal Open Market Committee met in **November** suggests that economic activity has continued to pick up **and that the deterioration in the labor market is abating**. The housing sector has **shown some signs of improvement** over recent months. Household spending appears to be expanding **at a moderate rate, though it** remains constrained by **a weak labor market, modest** income growth, lower housing wealth, and tight credit. Businesses are still cutting back on fixed investment, though at a slower pace; they continue to make progress in bringing inventory stocks into better alignment with sales. **Financial market conditions have become more supportive of economic growth**. Although economic activity is likely to remain weak for a time, the Committee anticipates that policy actions to stabilize financial markets and institutions, fiscal and monetary stimulus, and market forces will **contribute to** a strengthening of economic growth and a gradual return to higher levels of resource utilization in a context of price stability.
2. With substantial resource slack likely to continue to dampen cost pressures and with longer-term inflation expectations stable, the Committee expects that inflation will remain subdued for some time.
3. The Committee will maintain the target range for the federal funds rate at 0 to $\frac{1}{4}$ percent and continues to anticipate that economic conditions, including low rates of resource utilization, subdued inflation trends, and stable inflation expectations, are likely to warrant exceptionally low levels of the federal funds rate for an extended period. To provide support to mortgage lending and housing markets and to improve overall conditions in private credit markets, the Federal Reserve **is in the process of purchasing** \$1.25 trillion of agency mortgage-backed securities and about \$175 billion of agency debt. In order to promote a smooth transition in markets, the Committee **is** gradually **slowing** the pace of **these** purchases, and **it** anticipates that these transactions will be executed by the end of the first quarter of 2010. The Committee will continue to evaluate the timing and overall amounts of its purchases of securities in light of the evolving economic outlook and conditions in financial markets.
4. **In light of ongoing improvements in the functioning of financial markets, the Committee and the Board of Governors anticipate that most of the Federal Reserve's special liquidity facilities will expire on February 1, 2010, consistent with the Federal Reserve's announcement of June 25, 2009. These facilities include the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility, the Commercial Paper Funding Facility, the Primary Dealer Credit Facility, and the Term Securities Lending Facility. The Federal Reserve will also be working with its central bank counterparties to close its temporary liquidity swap arrangements by February 1. The Federal Reserve expects that amounts provided under the Term Auction Facility will continue to be scaled back in early 2010. The anticipated expiration dates for the Term Asset-Backed Securities Loan Facility remain set at June 30, 2010, for loans backed by new-issue commercial mortgage-backed securities and March 31, 2010, for loans backed by all other types of collateral. The Federal Reserve is prepared to modify these plans if necessary to support financial stability and economic growth.**

December FOMC Statement—Alternative C

1. Information received since the Federal Open Market Committee met in **November indicates** that **a recovery in** economic activity **is under way**. The housing sector has **shown some signs of improvement** over recent months. **The deterioration in the labor market appears to be abating and** household spending **is** expanding. Businesses **have made additional** progress in bringing inventory stocks into better alignment with sales. **Financial market conditions have become more supportive of economic growth**. Although economic activity is likely to remain weak for a time, the Committee anticipates that policy actions to stabilize financial markets and institutions, fiscal and monetary stimulus, and market forces will **contribute to** a strengthening of economic growth and a gradual return to higher levels of resource utilization in a context of price stability.
2. Longer term inflation expectations **have been** stable, **and** the Committee expects that, **with appropriate monetary policy adjustments**, inflation will remain **at levels consistent with price stability**.
3. **At this meeting**, the Committee **maintained** the target range for the federal funds rate at **its** exceptionally low level of 0 to $\frac{1}{4}$ percent, and **it** anticipates that economic conditions, including low rates of resource utilization, subdued inflation trends, and stable inflation expectations, are likely to warrant low levels of the federal funds rate for **some time**. **In view of continued improvements in financial market conditions and the economic outlook, the Committee decided to cap its purchases of agency mortgage-backed securities at \$1.1 trillion and its purchases of agency debt at \$160 billion, and it** anticipates that these transactions will be executed by the end of **January 2010**. The Committee will continue to evaluate the timing and overall amounts of its purchases of securities in light of the evolving economic outlook and conditions in financial markets.
4. **In light of ongoing improvements in the functioning of financial markets, the Committee and the Board of Governors anticipate that most of the Federal Reserve's special liquidity facilities will expire on February 1, 2010, consistent with the Federal Reserve's announcement of June 25, 2009. These facilities include the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility, the Commercial Paper Funding Facility, the Primary Dealer Credit Facility, and the Term Securities Lending Facility. The Federal Reserve will also be working with its central bank counterparties to close its temporary liquidity swap arrangements by February 1. The Federal Reserve expects that amounts provided under the Term Auction Facility will continue to be scaled back in early 2010. The anticipated expiration dates for the Term Asset-Backed Securities Loan Facility remain set at June 30, 2010, for loans backed by new-issue commercial mortgage-backed securities and March 31, 2010, for loans backed by all other types of collateral. The Federal Reserve is prepared to modify these plans if necessary to support financial stability and economic growth.**

**Table 1: Overview of Alternative Language
for the December 15-16, 2009 FOMC Announcement**

November FOMC	December Alternatives			
	A	B	C	
<i>Forward Guidance on Funds Rate Path</i>				
	“exceptionally low levels of the federal funds rate for an extended period”	“this exceptionally low range for the federal funds rate for an extended period”	“exceptionally low levels of the federal funds rate for an extended period”	“low levels of the federal funds rate for some time”
<i>Agency MBS Purchases</i>				
Total Amount	“a total of” \$1.25 trillion	“a total of” \$1.5 trillion	\$1.25 trillion	“cap” at \$1.1 trillion
Pace	pace will “gradually slow”		“is gradually slowing”	
Completion	by the end of the first quarter of 2010	through the second quarter of 2010	by the end of the first quarter of 2010	by the end of January 2010
<i>Agency Debt Purchases</i>				
Total Amount	“about” \$175 billion	\$175 billion	“about” \$175 billion	“cap” at \$160 billion
Pace	pace will “gradually slow”		“is gradually slowing”	
Completion	by the end of the first quarter of 2010	by the first quarter of 2010	by the end of the first quarter of 2010	by the end of January 2010
<i>Evaluation of LSAP Timing and Overall Amounts</i>				
	timing and amounts of all LSAPs will continue to be evaluated		timing and amounts of all LSAPs will continue to be evaluated	
<i>Liquidity Facilities</i>				
	adjustments as warranted	adjustments as warranted	expire on February 1	

DIRECTIVES

NOVEMBER FOMC MEETING

The Federal Open Market Committee seeks monetary and financial conditions that will foster price stability and promote sustainable growth in output. To further its long-run objectives, the Committee seeks conditions in reserve markets consistent with federal funds trading in a range from 0 to 1/4 percent. The Committee directs the Desk to purchase agency debt and agency MBS during the intermeeting period with the aim of providing support to private credit markets and economic activity. The timing and pace of these purchases should depend on conditions in the markets for such securities and on a broader assessment of private credit market conditions. The Desk is expected to execute purchases of about \$175 billion in housing-related agency debt and about \$1.25 trillion of agency MBS by the end of the first quarter of 2010. The Desk is expected to gradually slow the pace of these purchases as they near completion. The Committee anticipates that outright purchases of securities will cause the size of the Federal Reserve's balance sheet to expand significantly in coming months. The System Open Market Account Manager and the Secretary will keep the Committee informed of ongoing developments regarding the System's balance sheet that could affect the attainment over time of the Committee's objectives of maximum employment and price stability.

DECEMBER FOMC MEETING — ALTERNATIVE A

The Federal Open Market Committee seeks monetary and financial conditions that will foster price stability and promote sustainable growth in output. To further its long-run objectives, the Committee seeks conditions in reserve markets consistent with federal funds trading in a range from 0 to ¼ percent. The Committee directs the Desk to purchase agency debt and agency MBS during the intermeeting period with the aim of providing support to private credit markets and economic activity. The timing and pace of these purchases should depend on conditions in the markets for such securities and on a broader assessment of private credit market conditions. The Desk is expected to execute purchases of up to \$175 billion in housing-related agency debt by the end of the first quarter of 2010 and about \$1.5 trillion of agency MBS by the end of the second quarter of 2010. The Desk is expected to gradually slow the pace of these purchases as they near completion. The Committee anticipates that outright purchases of securities will cause the size of the Federal Reserve's balance sheet to expand significantly in coming months. The System Open Market Account Manager and the Secretary will keep the Committee informed of ongoing developments regarding the System's balance sheet that could affect the attainment over time of the Committee's objectives of maximum employment and price stability.

DECEMBER FOMC MEETING — ALTERNATIVE B

The Federal Open Market Committee seeks monetary and financial conditions that will foster price stability and promote sustainable growth in output. To further its long-run objectives, the Committee seeks conditions in reserve markets consistent with federal funds trading in a range from 0 to ¼ percent. The Committee directs the Desk to purchase agency debt and agency MBS during the intermeeting period with the aim of providing support to private credit markets and economic activity. The timing and pace of these purchases should depend on conditions in the markets for such securities and on a broader assessment of private credit market conditions. The Desk is expected to execute purchases of about \$175 billion in housing-related agency debt and about \$1.25 trillion of agency MBS by the end of the first quarter of 2010. The Desk is expected to gradually slow the pace of these purchases as they near completion. The Committee anticipates that outright purchases of securities will cause the size of the Federal Reserve's balance sheet to expand significantly in coming months. The System Open Market Account Manager and the Secretary will keep the Committee informed of ongoing developments regarding the System's balance sheet that could affect the attainment over time of the Committee's objectives of maximum employment and price stability.

DECEMBER FOMC MEETING — ALTERNATIVE C

The Federal Open Market Committee seeks monetary and financial conditions that will foster price stability and promote sustainable growth in output. To further its long-run objectives, the Committee seeks conditions in reserve markets consistent with federal funds trading in a range from 0 to ¼ percent. The Committee directs the Desk to purchase agency debt and agency MBS during the intermeeting period with the aim of providing support to private credit markets and economic activity. The timing and pace of these purchases should depend on conditions in the markets for such securities and on a broader assessment of private credit market conditions. The Desk is expected to execute purchases of about \$160 billion in housing-related agency debt and about \$1.1 trillion of agency MBS by the end of January 2010. The Desk is expected to slow the pace of these purchases as they near completion. The System Open Market Account Manager and the Secretary will keep the Committee informed of ongoing developments regarding the System's balance sheet that could affect the attainment over time of the Committee's objectives of maximum employment and price stability.

Appendix 4: Materials used by Mr. Dotsey

Class II FOMC – Restricted (FR)

*Material for Briefing on
Inflation Persistence, Output Gaps and
Monetary Policy*

Michael Dotsey
December 16, 2009

Overview

- Inflation Persistence and output gaps are linked through the Phillips Curve.
- Three main points.
 - Inflation persistence is largely an outcome of monetary policy and not structural features.
 - Statistically derived output gaps are not useful.
 - Theoretical measures of output gaps may be useful in principle but not in practice.

Inflation Persistence

- Reduced-form Phillips Curve.

$$\ln \pi_t = \alpha \ln \pi_{t-1} + (1-\alpha) \ln \pi_t^* + \kappa mc_t + \lambda e_t$$

Π is the gross inflation rate,

π^* is the inflation trend,

mc is marginal cost,

and e is a mark-up shock.

- Modeling trend inflation is of key importance.
 - If trend is stochastic our model implies structural rigidities are less important in explaining inflation persistence.

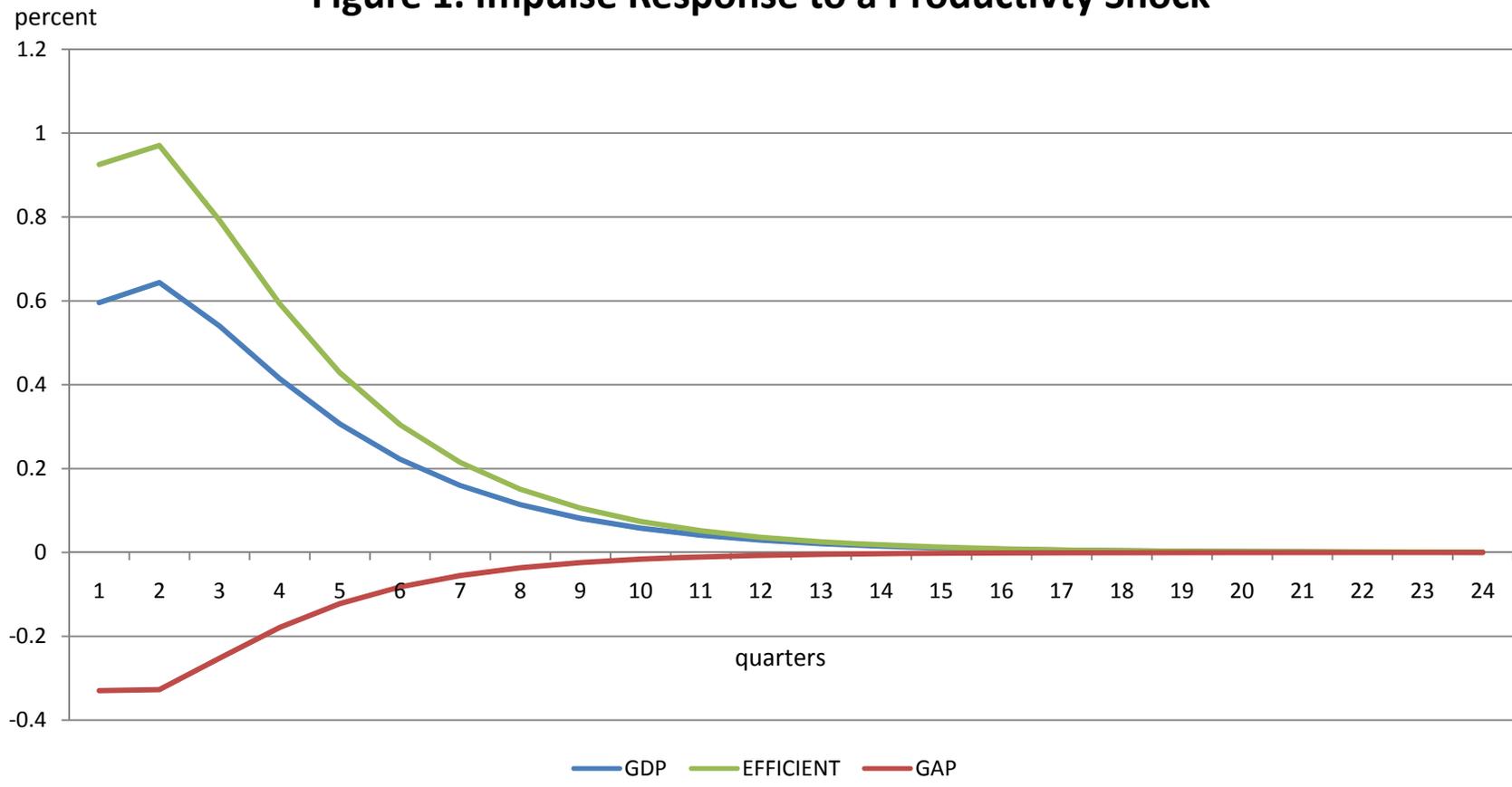
Policy Implication

- Inflation trend is a result of past policy.
 - Controlling inflation may not be too costly, especially if inflationary expectations are well anchored.

Output Gaps

- Gap = output – desired output.
- Desired output can be calculated either.
 - Statistically (deviation from a trend), or
 - From an estimated theoretical model.
- Model-based measures are potentially a useful guide for conducting monetary policy.
- Statistical and model-based measures may differ (figure 1).

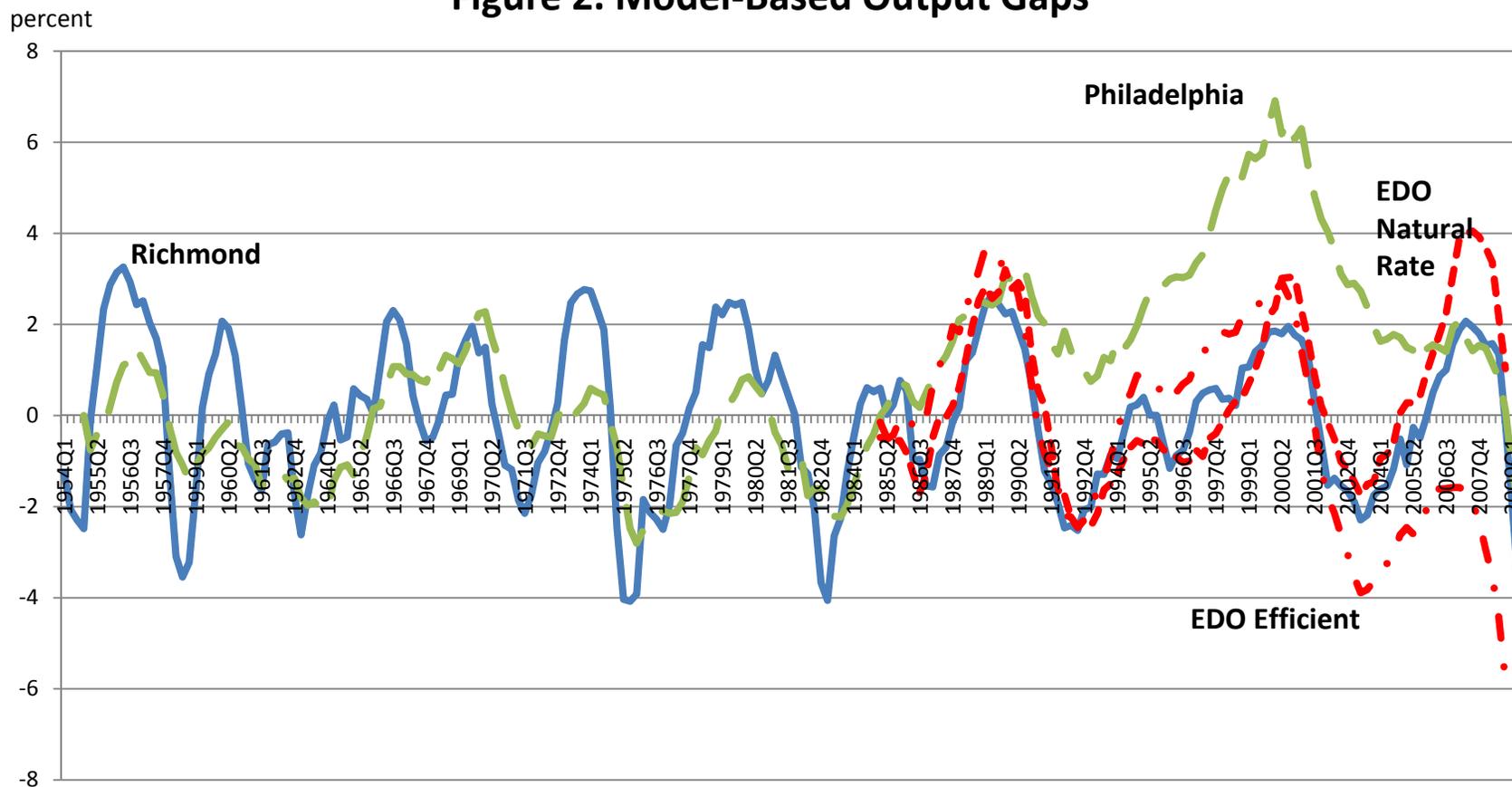
Figure 1. Impulse Response to a Productivity Shock



Theoretical Gaps

- Not quite ready for use in policy because:
 - In complex models the output gap is no longer sufficient statistic for welfare.
 - Models are still preliminary
 - Different models produce very different output gaps (figure 2).

Figure 2. Model-Based Output Gaps



Models are Useful

- Models can inform of us about shocks.
- Need to look at a number of models, because they produce different results.
- Models can place discipline on policy discussions.

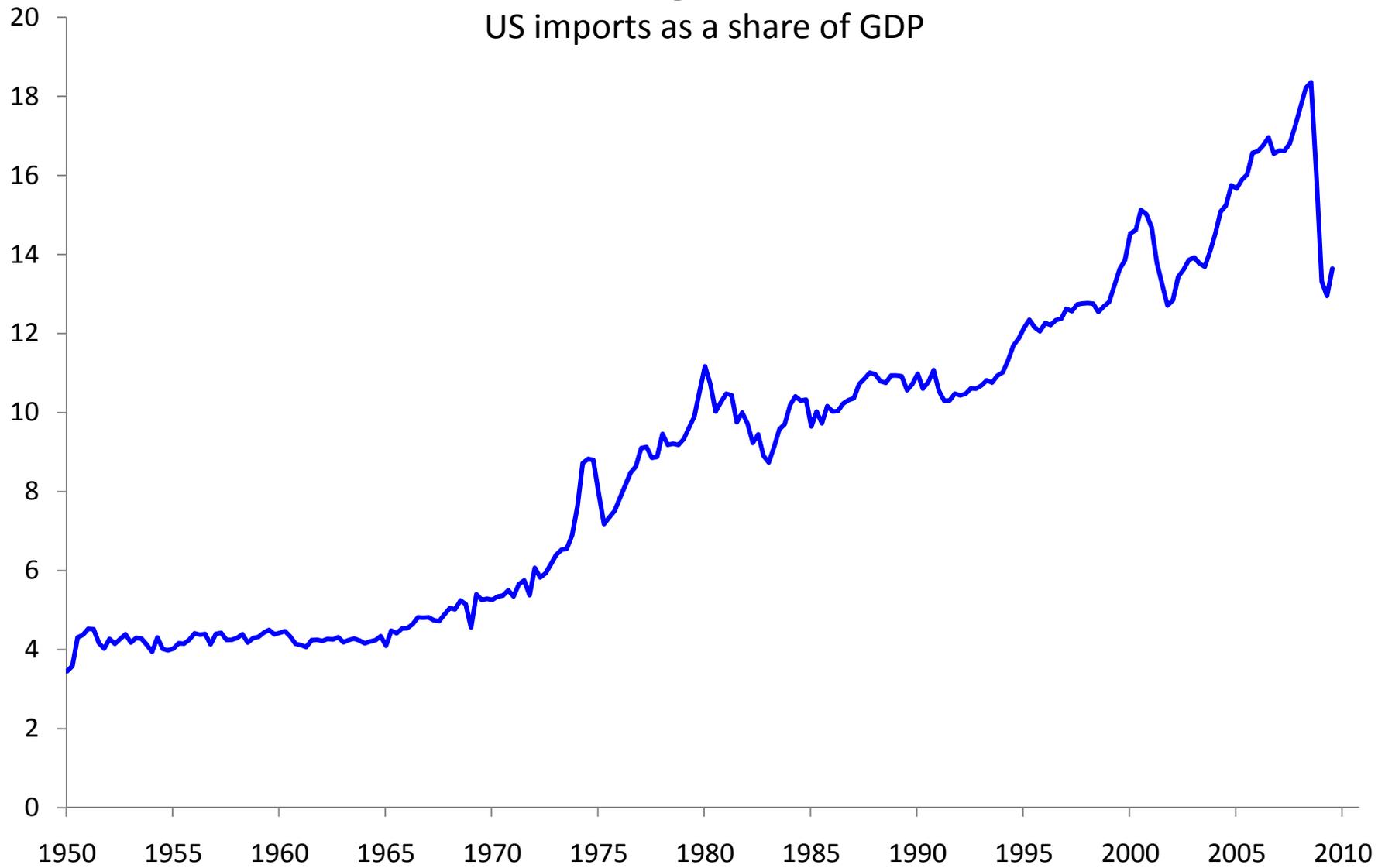
Appendix 5: Materials used by Mr. Wynne

*Material for Briefing on
The Global Slack Hypothesis*

Mark A. Wynne
December 16, 2009

Percent

Figure 1
US imports as a share of GDP



Global slack hypothesis

- Does globalization matter for U.S. inflation dynamics?
- Important as a real phenomenon
- Implications for monetary policy?
 - Yes: Global slack rather than domestic slack
 - No: Flexible exchange rates insulate domestic price developments from foreign influences

Globalization does matter...

- ...for inflation over the long term
 - Impact on “inflation bias” under discretionary monetary policy making
- ...for short term inflation dynamics
 - Open economy Phillips Curve differs from that of a closed economy

Open economy pricing

$$\underbrace{\hat{\pi}_t}_{\text{Rate of CPI inflation}} = \underbrace{\xi \hat{\pi}_t^H + (1 - \xi) \hat{\pi}_t^F}_{\text{Weighted average of the rate of increase of the prices of Home and Foreign goods}}$$

$$\underbrace{\hat{\pi}_t^H}_{\text{Rate of increase of the prices of Home goods}} = \beta \underbrace{E_t \hat{\pi}_{t+1}^H}_{\text{Expected rate of increase of the prices of Home goods next quarter}} + \lambda \underbrace{(\widehat{mc}_t - \hat{p}_t^H)}_{\text{Real marginal cost of producing Home goods}}$$

$$\underbrace{\hat{\pi}_t^F}_{\text{Rate of increase of the prices of Foreign goods}} = \beta \underbrace{E_t \hat{\pi}_{t+1}^F}_{\text{Expected rate of increase of the prices of Foreign goods next quarter}} + \lambda \underbrace{(\widehat{mc}_t^* - \hat{p}_t^F + \hat{s}_t)}_{\text{Real marginal cost of producing Foreign goods}}$$

The open economy Phillips Curve

$$\underbrace{\hat{\pi}_t}_{\text{CPI inflation this quarter}} = \underbrace{\beta E_t \hat{\pi}_{t+1}}_{\text{Expected CPI inflation next quarter}} + \lambda \left[\underbrace{\Psi_{\pi,x} x_t}_{\text{Domestic output gap}} + \underbrace{\Psi_{\pi,x^*} x_t^*}_{\text{Foreign output gap}} + \underbrace{\varepsilon \Psi_{\pi,rp} (\xi - \xi^*) \widehat{tot}_t}_{\text{Terms of trade}} - \underbrace{\varepsilon \Psi_{\pi,rp} \widehat{rs}_t}_{\text{Real exchange rate}} \right]$$

Domestic output gap term declines in importance as share of foreign goods in consumption basket increases

Terms of trade and real exchange rate terms only appear if some fraction ε of foreign firms engage in local currency pricing

Foreign output gap term grows in importance as share of foreign goods in consumption basket increases

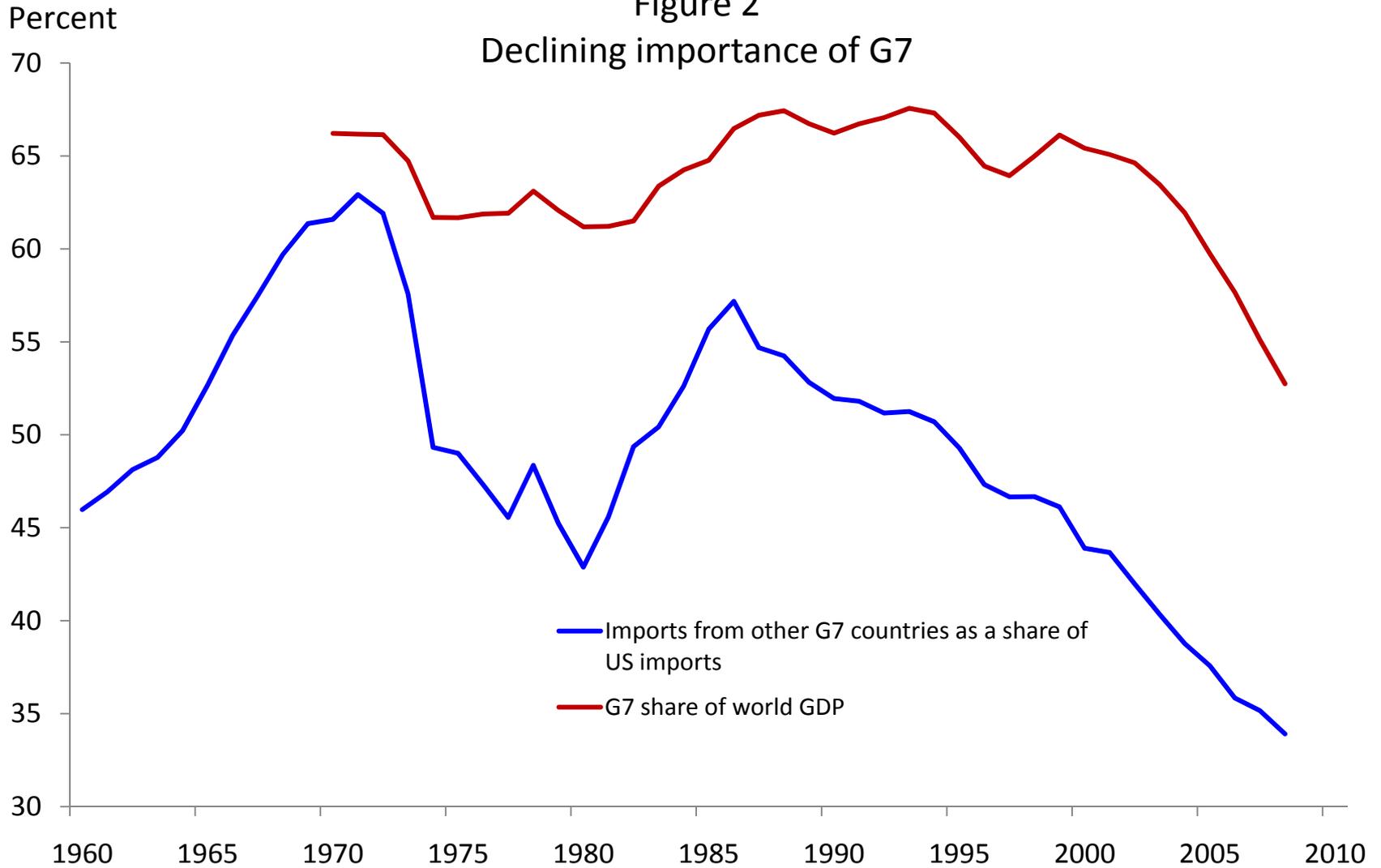
Is the Global Slack Hypothesis consistent with the data?

- Early studies
 - Orr (1994), Garner (1994), Tootell (1998)
 - No role for foreign slack
 - Focus on G7
- Revived debate
 - Borio and Filardo (2007): foreign slack matters
 - Ihrig, et al. (2007): no it doesn't

Our approach

- Focus on cyclical components of inflation etc.
- Start with G7 group of countries
 - Measures of foreign slack (unemployment, capacity utilization in mfg., output gaps) seem to matter
- Changing trade patterns
 - Look at broader group of countries

Figure 2
Declining importance of G7



Foreign slack appears to matter...

$$(1) \quad \hat{\pi}_t = \underbrace{-0.217}_{(0.190)} \hat{\pi}_{t-1} + \underbrace{0.124}_{(0.228)} \hat{y}_t^{US} + \underbrace{1.236}_{(0.591)^{**}} \hat{y}_t^{G26}$$

$$(2) \quad \hat{\pi}_t^{Core} = \underbrace{-0.225}_{(0.108)^{**}} \hat{\pi}_{t-1}^{Core} + \underbrace{0.020}_{(0.082)} \hat{y}_t^{US} + \underbrace{0.347}_{(0.121)^{***}} \hat{y}_t^{G26}$$

$$(3) \quad \hat{\pi}_t = \underbrace{-0.430}_{(0.178)^{***}} \hat{\pi}_{t-1} + \underbrace{0.090}_{(0.261)^{***}} \hat{y}_t^{US} + \underbrace{0.782}_{(0.620)} \hat{y}_t^{G26} - \underbrace{0.260}_{(0.114)} \widehat{tot}_t - \underbrace{0.143}_{(0.067)^{**}} \widehat{rer}_t$$

$$(4) \quad \hat{\pi}_t^{Core} = \underbrace{-0.223}_{(0.122)^*} \hat{\pi}_{t-1}^{Core} + \underbrace{0.005}_{(0.084)} \hat{y}_t^{US} + \underbrace{0.286}_{(0.133)^{***}} \hat{y}_t^{G26} - \underbrace{0.009}_{(0.036)} \widehat{tot}_t - \underbrace{0.030}_{(0.017)^{**}} \widehat{rer}_t$$

The open economy Phillips Curve...

Under producer currency pricing:

$$\underbrace{\hat{\pi}_t}_{\text{CPI inflation this quarter}} = \underbrace{\beta E_t \hat{\pi}_{t+1}}_{\text{Expected CPI inflation next quarter}} + \underbrace{\lambda[(\varphi + \gamma)x_t]}_{\text{Domestic output gap term}} - \underbrace{\Psi_{\pi, x^*} \Gamma(\widehat{tot}_t - \widehat{tot}_t^*)}_{\text{Terms of trade gap term}}$$

Slope of the Phillips Curve with respect to domestic output gap does not change as the share of foreign goods in the consumption basket increases if we rely on the terms of trade gap to capture the effects of the foreign output gap

Key points

- The global slack hypothesis, the idea that foreign slack plays a role commensurate with domestic slack in short-term inflation dynamics, has analytical content
- The data are also consistent with the global slack hypothesis
- Accurate measurement of slack, both domestic and foreign, remains a challenge
 - Data availability & quality
 - Conceptual problems
- The terms of trade (in gap form) may adequately capture foreign influences

Appendix 6: Materials used by Mr. Fuhrer

Class II FOMC – Restricted (FR)

*Material for Briefing on
The Role of Expectations and Output in the
Inflation Process*

Jeff Fuhrer

December 16, 2009

Class II FOMC-Restricted (FR)

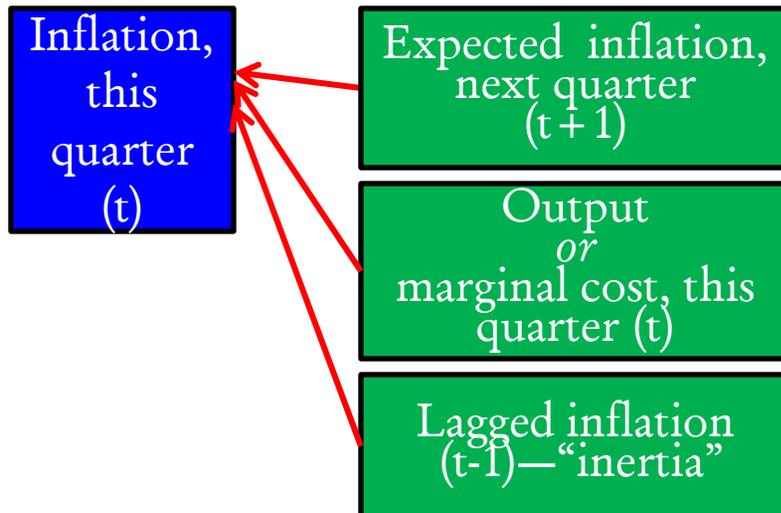
Overview

- Two key determinants of inflation in current economic thinking
 - Marginal cost or output gap
 - Expectations (of inflation and, implicitly, of costs and monetary policy)
- Both are the subject of considerable discussion
 - Can we measure gaps well? How reliable are gaps as forecasters of inflation?
 - Are expectations well-anchored? What do we mean by that? If so, will they offset downward pressure from costs or output? How are they connected to monetary policy?
- Goals of presentation
 - Add some economic structure to the discussion
 - Examine some empirical evidence on the role of gaps and expectations in determining inflation

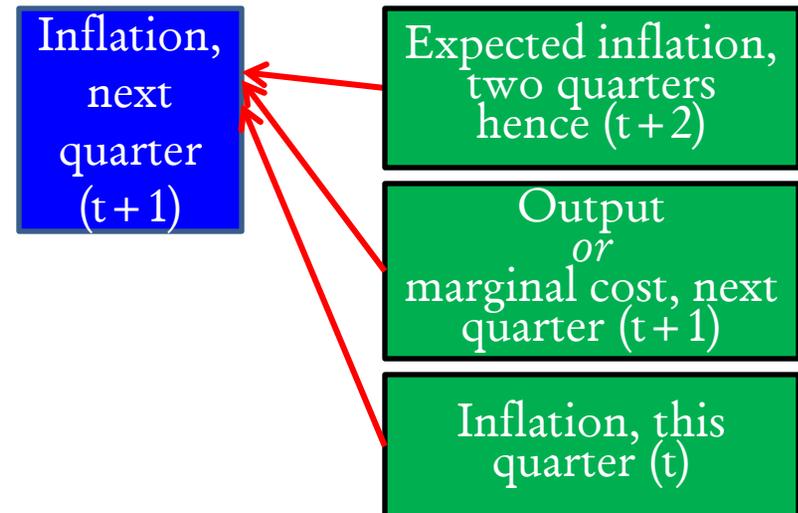
Class II FOMC-Restricted (FR)

Inflation, expectations, and monetary policy

1. A standard inflation framework



2. This relationship also holds in "t + 1"



3. Implications for expectations, I

- Inflation depends on current and expected costs/output
- These depend (in part) on monetary policy
- Monetary policy depends (in part) on the inflation goal, which may vary over time
- Expectations of policy actions and the inflation goal matter

4. Implications for expectations, II

- In practical terms, the expectations that should matter are:
 - Short-run inflation expectations
 - Long-run inflation expectations, as a proxy for the Fed's long-run inflation goal
 - Longer-run cost or output expectations

Class II FOMC-Restricted (FR)

“Anchored” expectations in this framework

- People know the Fed’s inflation goal, whether it’s subject to change, and how vigorously the Fed will pursue its inflation goal

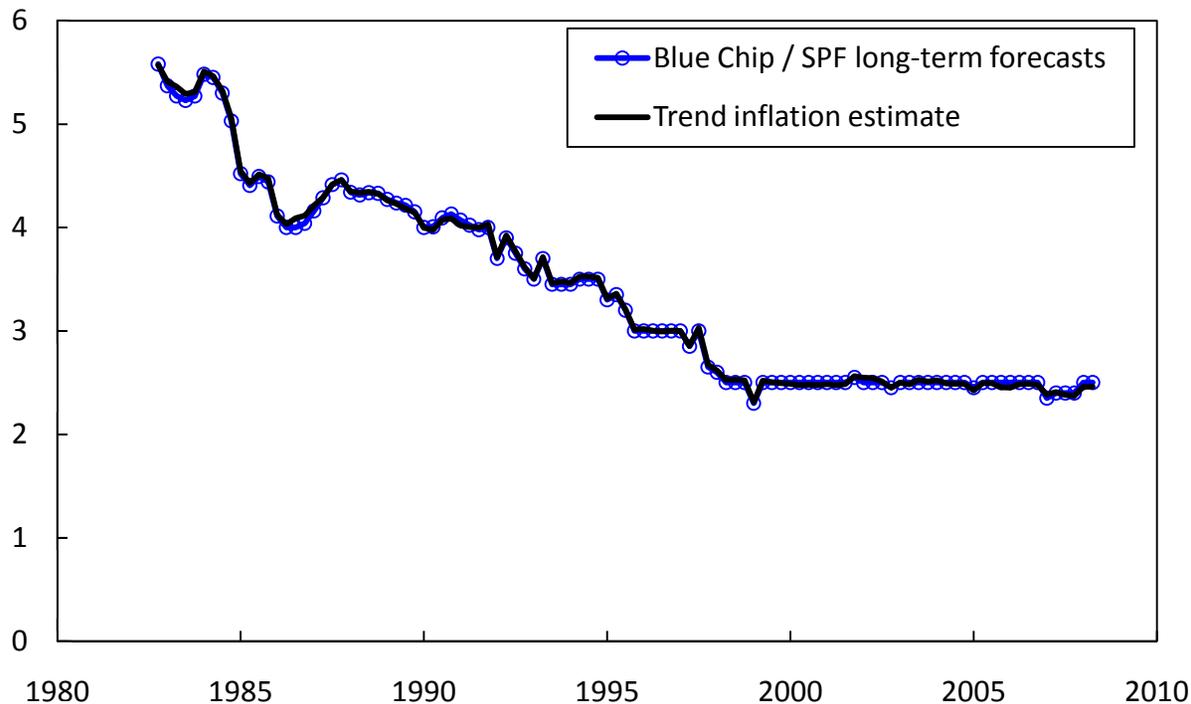
- People expect the goal to remain reasonably stable
 - Note: Historically, some of the longer-term movements in inflation may well have been caused by fluctuations in the Fed’s inflation goal
 - For that reason, and because the goal *could* (in principle) change over time, we allow for this effect of the Fed’s goal on inflation in our framework
 - We expect (and empirical evidence confirms) that this source of variation is smaller today than it was several decades ago

Class II FOMC-Restricted (FR)

“Anchored” expectations and the Fed’s long-run inflation goal

- Clark and Davig estimate a reduced-form model which shows that long-term expectations (the 10-year SPF forecast) are an excellent proxy for “trend inflation”
- Trend inflation may be thought of as an indicator of the public’s perception of the Federal Reserve’s inflation goal

CPI inflation



Model: Inflation depends on

- Past inflation
- Inflation trend (unobserved)
- Monetary policy

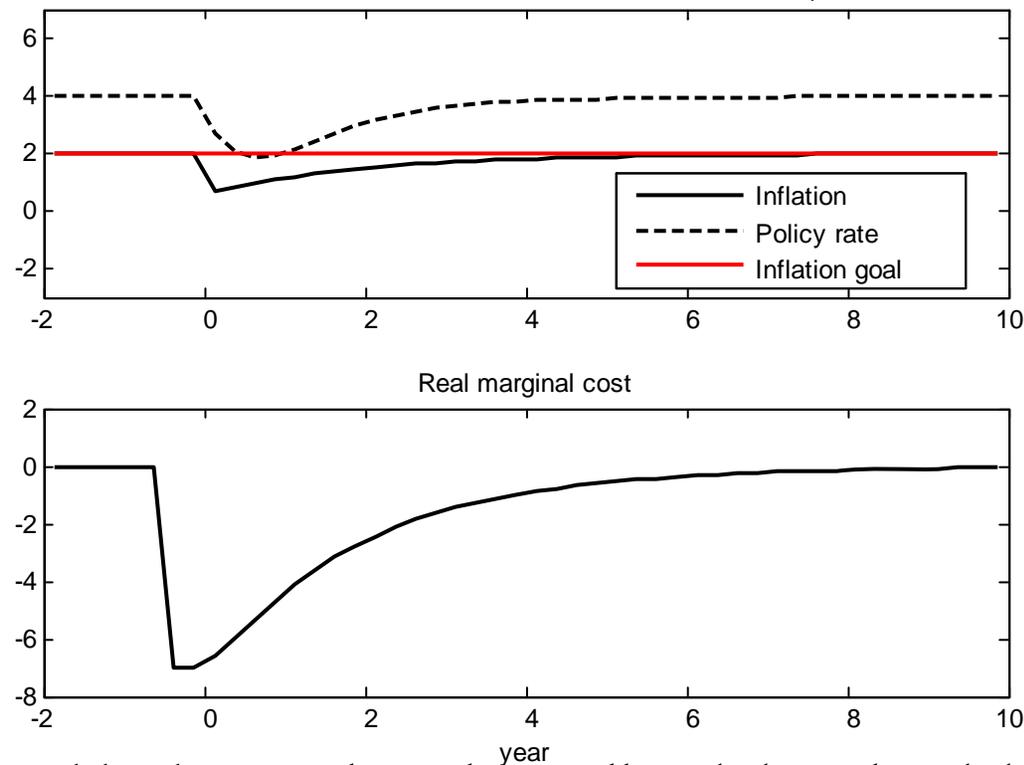
- Long-run expectations/perception of the Fed’s goal “well-anchored” of late

Class II FOMC-Restricted (FR)

How much could anchored expectations offset downward cost and output pressures?

- Answer: depends on how “forward-looking” price-setters are
- Consider two options:
 1. Purely forward-looking/model-consistent
 2. Combination of above and backward-looking

1. Purely forward-looking/model-consistent

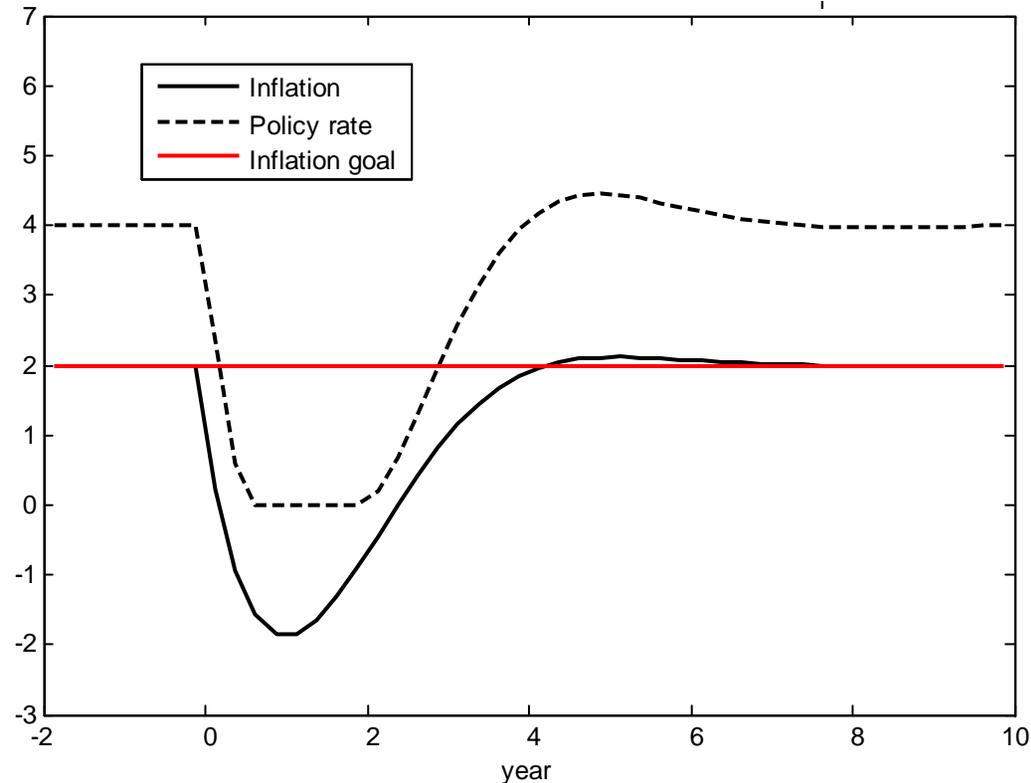


Purely forward-looking: relatively small and short-lived decline in inflation

Class II FOMC-Restricted (FR)

Anchored expectations versus declining marginal cost: an intermediate case

2. Mixed model-consistent/backward-looking (50-50)



Mixed model: Very different results. Significant disinflation, with a period during which funds rate is stuck at zero lower bound

Class II FOMC-Restricted (FR)

So which model is more realistic?

- A somewhat structural approach: modified New Keynesian Phillips Curve, in which expectations may be any combination of
 - “Model-consistent” or “rational” expectations
 - Backward-looking behavior (average of past four quarters)
 - Survey-based inflation expectations
 - SPF one-year-ahead (median of forecasts)
 - SPF 10-year average (median of forecasts)

$$\pi_t = \mu_1 \pi_{t-1}^{avg} + \mu_2 E_{t-1} \pi_{t+1} + \mu_3 \pi_t^{S1} + (1 - \mu_1 - \mu_2 - \mu_3) \pi_t^{S10} + \gamma \tilde{y}_t + d \Delta \frac{p_{t-1}^o}{p_{t-1}} + \varepsilon_t$$

- See how these have changed over time, and what is important today

Class II FOMC-Restricted (FR)

Results

Which expectations proxies best explain inflation?		
Proxy	Weight in model over past 30 years	Past 10 years: larger or smaller influence?
Model-consistent expectations	Small to moderate	Smaller
Lagged inflation	Moderate	Smaller
1- year SPF survey	Small to moderate in some cases	Mixed
10-year SPF survey	Small to moderate in some cases	Larger in some cases

- **Bottom line:**
 - Model-consistent expectations matter relatively little
 - The extreme model with purely forward-looking expectations is not well-supported in the data
 - Modest role for inertial survey expectations in explaining short-run fluctuations in inflation

Class II FOMC-Restricted (FR)

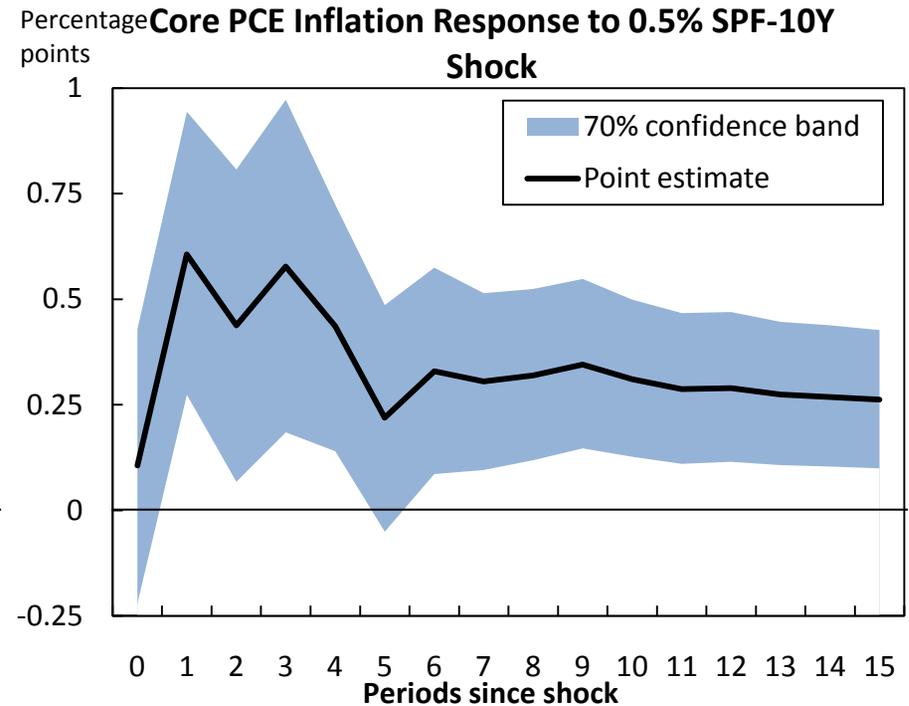
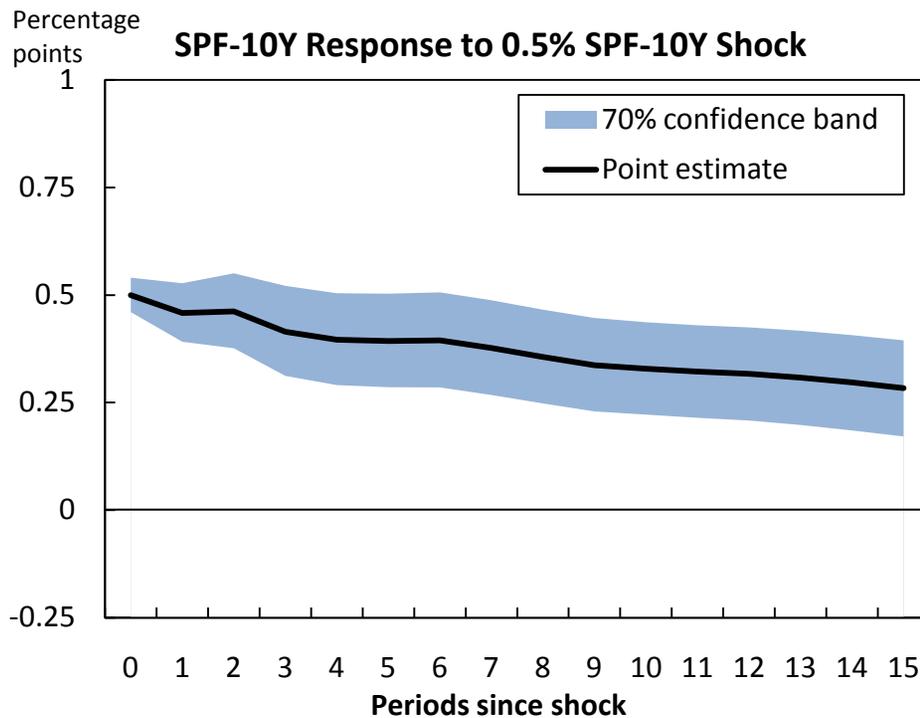
What if expectations are not fully anchored?**How would a change in long-term inflation expectations affect inflation?**

- The inflation scenarios just presented treat long-term expectations as anchored at the Fed's inflation goal
- But expectations have moved historically, perhaps because the Fed's inflation goal has changed significantly over time
 - From the early 1980s to the early 2000s, long-run expectations dropped from just below 6% to 2.5%
- The models used in the scenarios imply that inflation eventually moves one-for-one with a sustained change in expectations
- An empirical model that does not impose the one-for-one pass-through of expectations into actual inflation validates this assumption

Class II FOMC-Restricted (FR)

Estimate of the effect on inflation of a change in long-term inflation expectations

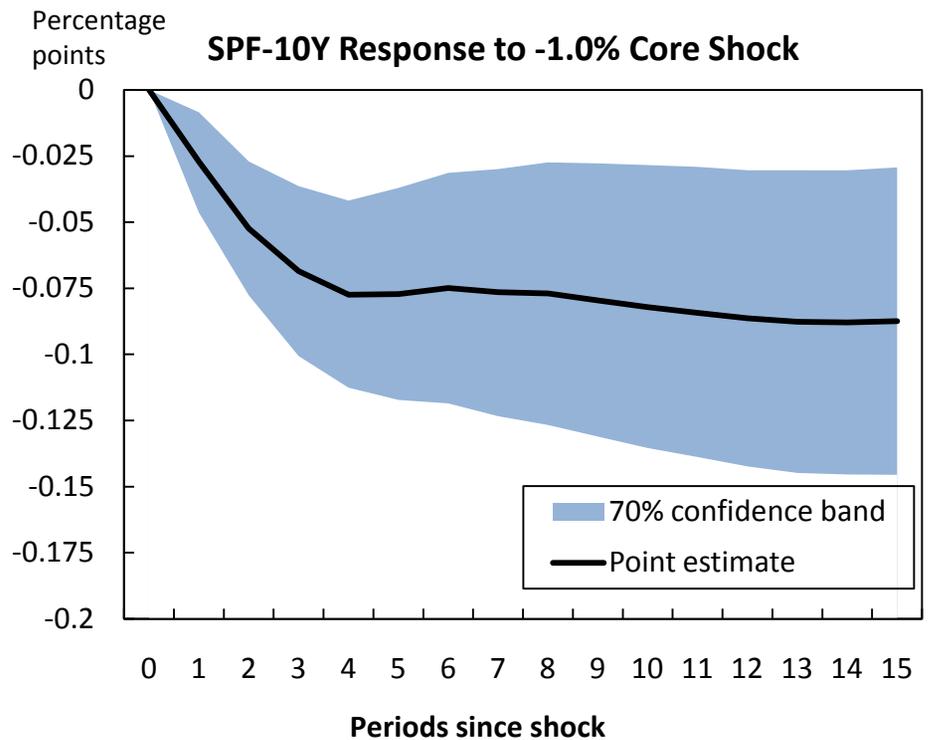
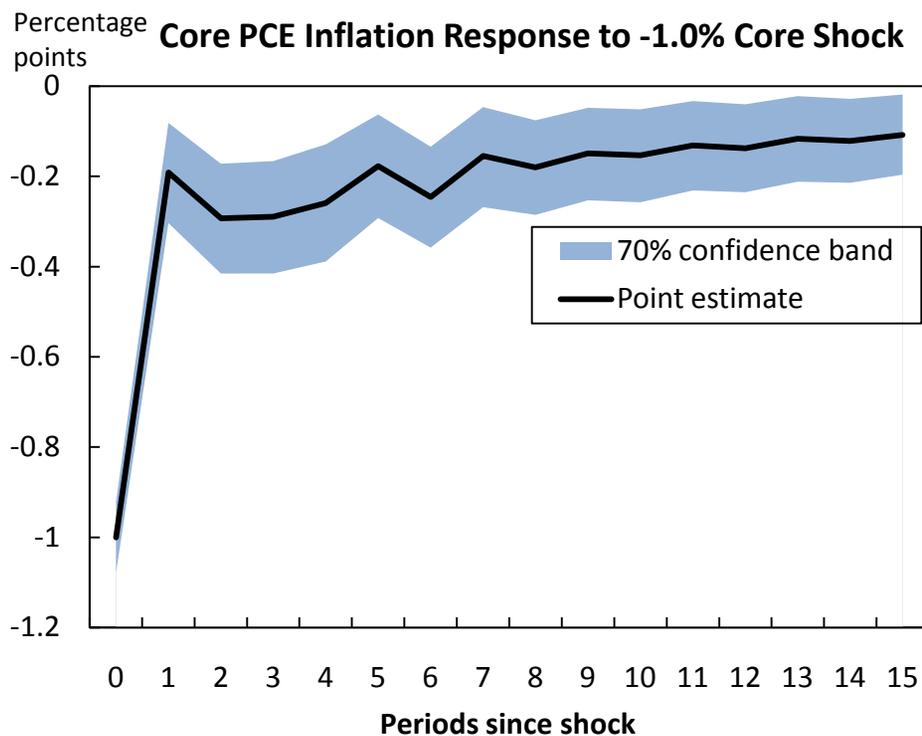
- Model: vector autoregression including the SPF-10 year expectation, core PCE inflation, economic activity, and the federal funds rate (estimated 1983-2009)
- Consider response to a 50 basis point one-time shock to the SPF 10-year expectation
 - The shock results in a persistent increase in the SPF expectation
 - The shock also generates a persistent rise in inflation, which roughly matches the rise in expectations
- Change in long-run expectations—inflation goal?—reflected one-for-one in inflation



Class II FOMC-Restricted (FR)

What factors could un-anchor inflation expectations?

- Vector autoregressive models indicate survey-based expectations generally respond more to price variables than to economic activity or monetary policy
- The scenario: a -1%, one period shock to core PCE inflation
 - The shock results in a sustained reduction in core inflation of about -0.25%
 - The federal funds rate (not shown) falls in response
- Long-run expectations gradually decline, but by a small amount—about 0.08%
- Expectations should remain anchored as long as policy responds appropriately to inflation developments



Class II FOMC-Restricted (FR)

Survey Results: Government Debt and Inflation Expectations

Exhibit 13a: Perceptions of Consumers and Financial Experts

A. Consider the following scenario: over the next 12 months, the government debt ends up growing substantially more than the administration has predicted BECAUSE tax revenues are lower than expected while the level of government spending remains on target. Under this scenario, how would this change your forecast for the rate of inflation over the next 12 months?

B. Now consider this alternative scenario: over the next 12 months, the government debt ends up growing substantially more than the administration has predicted BECAUSE the level of government spending is much higher than expected while tax revenues remain on target. Under this alternative scenario, how would this change your forecast for the rate of inflation over the next 12 months?

Number (percentage) responding:	Question A		Question B	
	Consumers	Experts	Consumers	Experts
I would expect much lower inflation	8 (2%)	1	12 (3%)	0
I would expect somewhat lower inflation	41 (10%)	5	37 (9%)	0
I don't believe that it would have an effect on inflation	74 (18%)	4	94 (23%)	1
I would expect somewhat higher inflation	245 (60%)	1	196 (48%)	10
I would expect much higher inflation	37 (9%)	0	69 (17%)	0
Total responses	409	11	408	11

Exhibit 13b: Consumer Expectations

In percentage terms, by how much do you expect the level of government debt to be [higher/lower] twelve months from now?

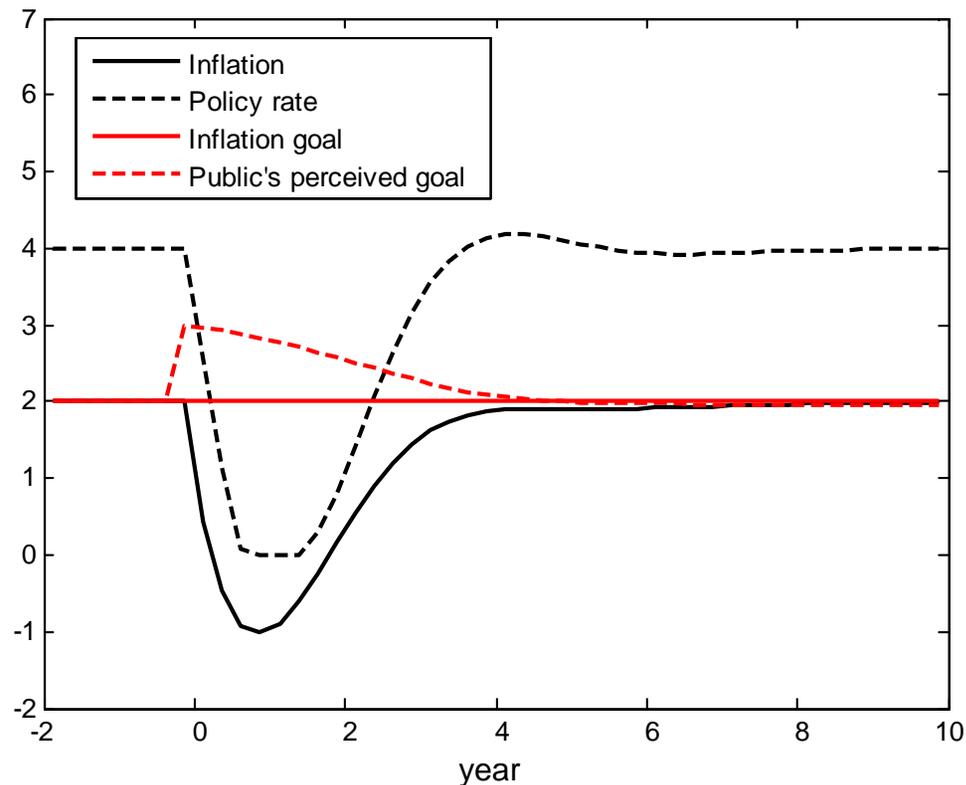
Quartiles of distribution of expected percentage change in government debt	All	College	Less than College
25 th percentile	+5%	+5%	+5%
Median	+10%	+10%	+12%
75 th percentile	+20%	+20%	+25%
Total responses	1,198	615	583

Class II FOMC-Restricted (FR)

An unanchored expectations scenario

- Public believes inflation target has risen to 3% (deficit fears?)
- Other economic conditions the same as previous simulations

Mixed model-consistent/backward-looking (50-50)



- Still implies a significant drop in inflation and policy rate

Class II FOMC-Restricted (FR)

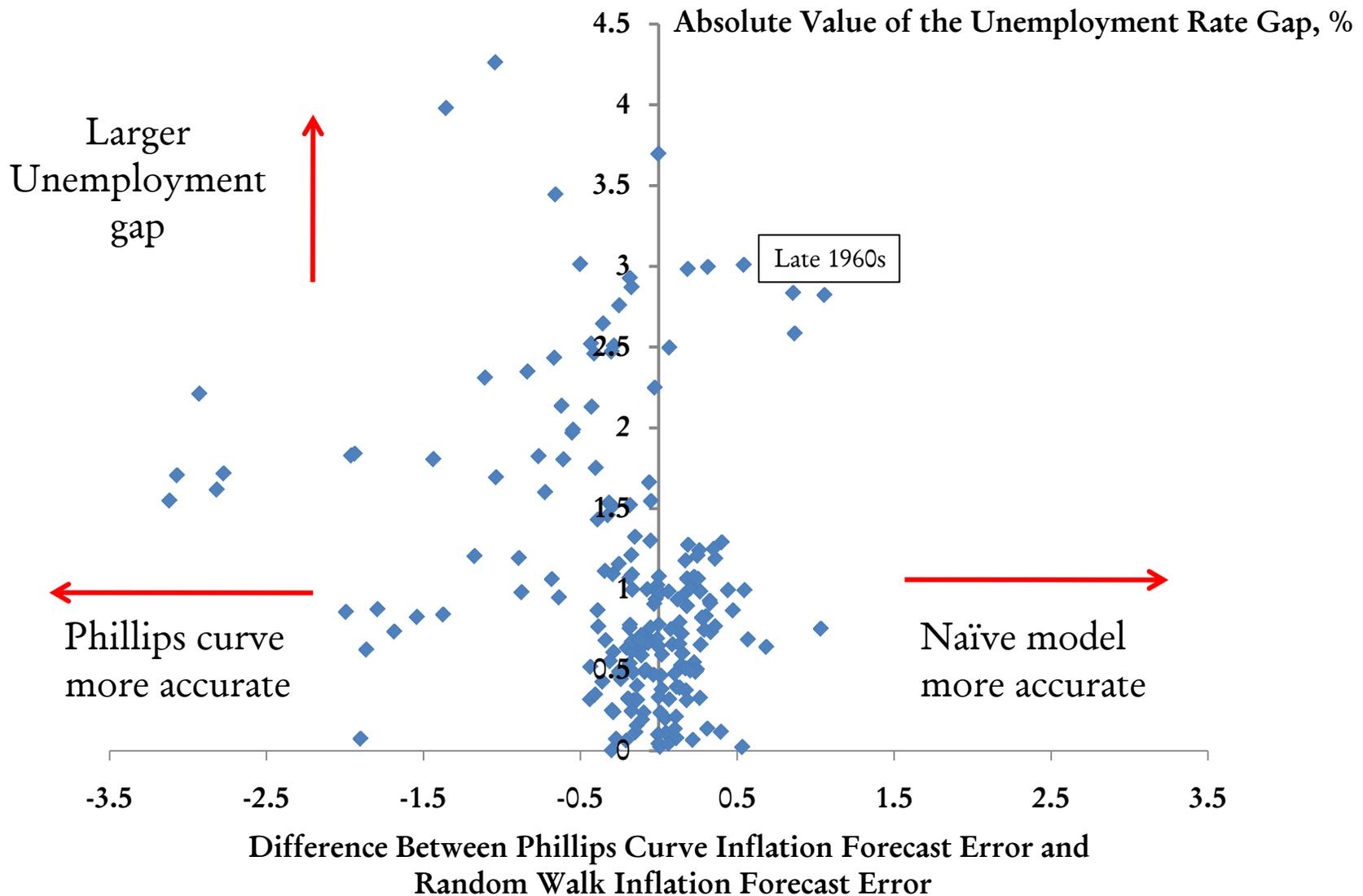
Do output gaps matter?

- Much appropriate discussion about difficulty of measurement, small coefficients in estimated equations, etc.
- We allow for a “nonlinearity”—*viz* that output or unemployment gaps matter when they’re large, not much when they’re smaller
- How large is large?
 - Stock and Watson (2009) and Fuhrer and Olivei (2009) find threshold for output gap at approximately 3 percentage points (1.5 percentage points away from estimated NAIRU for unemployment)

Class II FOMC-Restricted (FR)

Gaps matter when they're large

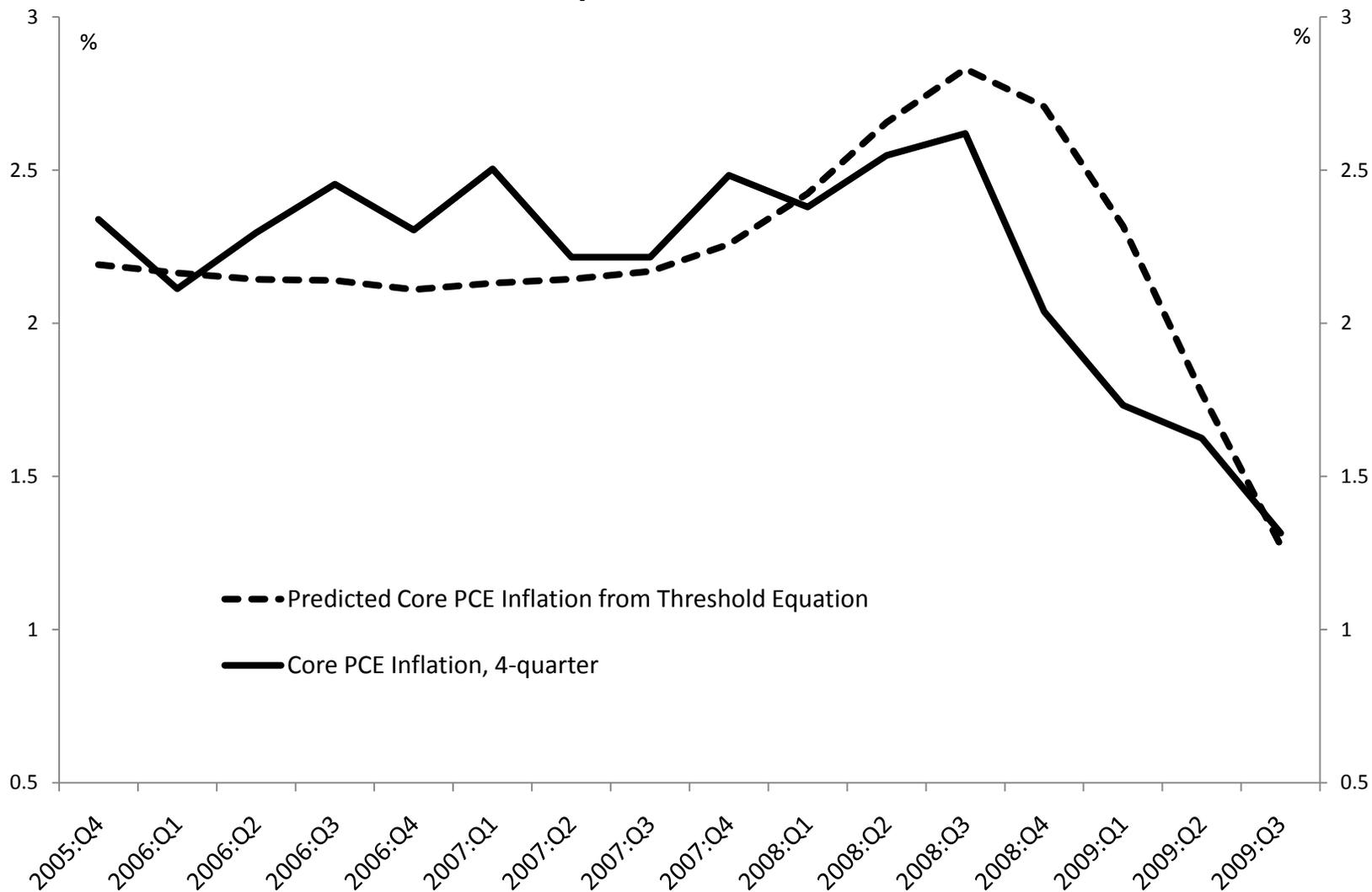
Improvement in forecast error from including gap variables



Class II FOMC-Restricted (FR)

What does this model imply for the current outlook?

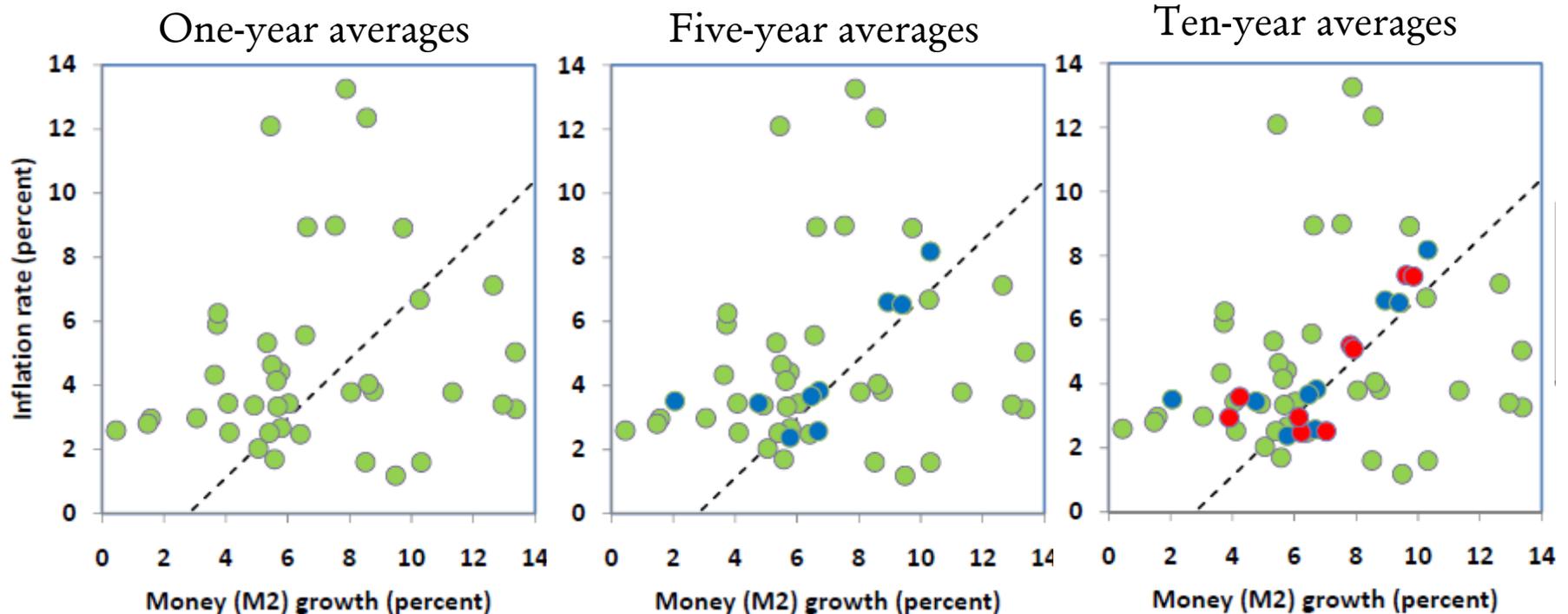
Out-of-sample fit of threshold model



Class II FOMC-Restricted (FR)

Money and Inflation

We had to say something, or Milton Friedman would have been very angry



- The correlation improves as the horizon lengthens
- Correlation does not imply causality
 - But many would expect a money-to-inflation causality, in the long run
- Contemporaneous correlations: Prediction not implied
 - High money growth now does not necessarily imply high inflation later