

EXPECTATIONS AND FISCAL STIMULUS

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A SINGULAR ECONOMIC EVENT?

- **\$11.2 Trillion** loss of wealth last year
- **5.2%** drop in GDP, 2008Q4
- **8.1%** unemployment rate in February
- **\$787 Billion** stimulus package

THE STIMULUS PACKAGE

	2009	2010	2011	2012	2013	2014	2009 -2019
Budget							
Authorization	379.0	114.7	53.6	11.2	9.8	16.2	580.7
Outlays	120.1	219.3	126.2	46.2	30.3	27.9	575.3
Revenues	-64.8	-180.1	-8.2	10	2.7	5.5	-211.8
Net Increase in Deficit	184.9	399.4	134.4	36.1	27.6	22.4	787.2

Billions of Dollars

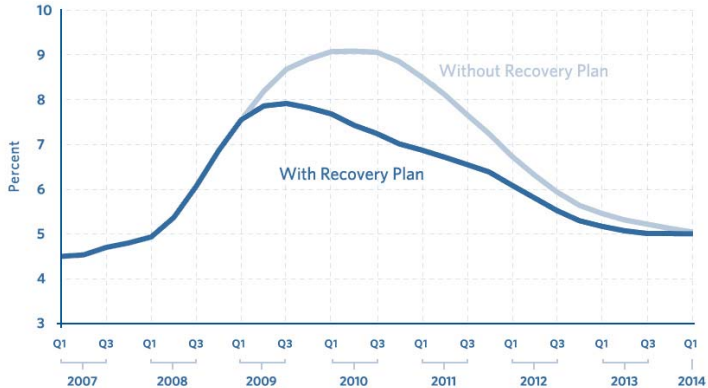
A mix of tax cuts, infrastructure spending, transfer payments, and the other white meat

LIKELY EFFECTS OF THE STIMULUS

- Begin with the government's claims
- Turn to some theoretical predictions from formal economic models

PREDICTED EFFECTS OF STIMULUS: I

Figure 1
Unemployment Rate With and Without the Recovery Plan



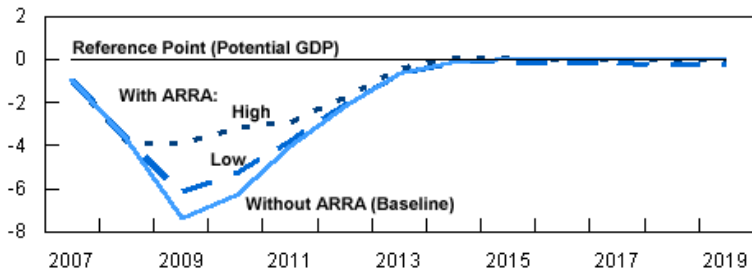
Source: Romer-Bernstein (2009)

PREDICTED EFFECTS OF STIMULUS: II

Job Creation of Recovery Package by Industry	
Industry	Job Created in 2010Q4
Mining	26,000
Construction	678,000
Manufacturing—Total	408,000
Wholesale Trade	158,000
Retail Trade	604,000
Information	50,000
Financial Activities	214,000
Professional and Business Services	345,000
Education and Health Services	240,000
Leisure and Hospitality	499,000
Other Services	99,000
Utilities	11,000
Transportation and Warehousing	98,000
Government—Total	244,000
Total	3,675,000

Source: Romer-Bernstein and Mark Zandi, Moody's economy.com

PREDICTED EFFECTS OF STIMULUS: III



Source: Congressional Budget Office (2009)

CRITICAL ELEMENTS IN ANALYSIS

- At least four important aspects of economic analysis of fiscal stimulus:
 1. Financial markets operating sluggishly
 2. Large decline in wealth & increase in savings rate
 3. Systematic analysis of monetary & fiscal policy **jointly**
 4. Possibility that future monetary-fiscal regimes may differ from current regime
- Each of these emphasizes expectations
- Here will talk about (3) & (4)

FISCAL POLICY & AGGREGATE DEMAND

- Little doubt this recession due to insufficient worldwide demand
 - increases in savings rates (even in the United States!)
- Begin with theory of price level determination
 - simplest setting to study fiscal effects on aggregate demand
- Start with *qualitative* issues in flexible-price model
- Then consider *quantitative* predictions from model with nominal rigidities

MYTH BUSTING

Myth #1

The “quantity theory of money” and the “fiscal theory of the price level” are alternative theories of price level determination.

- These are treated as dichotomous views: only M matters vs. only B matters
- There is only a single theory: the price level and inflation are always & everywhere joint monetary and fiscal phenomena
- So-called quantity and fiscal “theories” emerge as special cases

MYTH BUSTING

Myth #2

It is reasonable to study monetary policy and fiscal policy impacts separately.

- Every statement about monetary policy impacts is conditional on fiscal behavior
- Every statement about fiscal policy impacts is conditional on monetary behavior
- When we study monetary and fiscal policy separately, we do so by maintaining special assumptions about how the other policy behaves
- Every central bank models MP in isolation from FP

MYTH BUSTING

Myth #3

Monetary approaches to price level determination are “standard” and fiscal approaches are “non-standard”.

- If “standard” means traditional/textbook, then this is correct
- If “standard” means more useful or widely applicable, then this is a myth
- This myth supports the common misperception that the fiscal approach applies only in extreme circumstances—hyperinflation or zero bound interest rates
- Fiscal approach useful in general; especially useful now

UBIQUITOUS EQUILIBRIUM CONDITIONS

- Dynamic models include two equilibrium conditions:

$$M_t V_t = P_t Y_t \quad (\text{QE})$$

$$\frac{M_{t-1} + B_{t-1}}{P_t} = E_t \sum_{T=t}^{\infty} q_{t,T} S_T \quad (\text{IEC})$$

$q_{t,T}$ is pricing kernel; S_T is net-of-interest surplus inclusive of seigniorage

- These are both ***equilibrium conditions***
- They are *not* constraints on policy choices
- No policy authority must choose instruments to be consistent with (QE) or (IEC)

POLICY INTERACTIONS: SIMPLE EXAMPLE

- Endowment economy; log linearize
- Monetary policy rule

$$i_t = \alpha\pi_t + \textit{stuff}$$

- Combine with Fisher equation to yield

$$E_t\pi_{t+1} = \alpha\pi_t + \textit{stuff} \quad (\text{Inflation Dynamics})$$

POLICY INTERACTIONS: SIMPLE EXAMPLE

- Fiscal policy rule

$$\tau_t = \gamma \frac{B_{t-1}}{P_{t-1}} + \textit{stuff}$$

- Combine with government's flow budget constraint to yield

$$\frac{B_t}{P_t} = [\beta^{-1} - \gamma(\beta^{-1} - 1)] \frac{B_{t-1}}{P_{t-1}} + \textit{stuff} \quad (\text{Debt Dynamics})$$

DYNAMICS OF PRICE DETERMINATION

$$E_t \pi_{t+1} = \alpha \pi_t + \textit{stuff} \quad (\text{Inflation Dynamics})$$

$$\frac{B_t}{P_t} = [\beta^{-1} - \gamma(\beta^{-1} - 1)] \frac{B_{t-1}}{P_{t-1}} + \textit{stuff} \quad (\text{Debt Dynamics})$$

- Unique stationary equilibrium requires one equation to be stable and one to be unstable
- Properties of equilibrium very different in different regions of policy parameter space— (α, γ)

JOINT MONETARY-FISCAL BEHAVIOR

Region	Policy Behavior		Outcome
I	Active MP	$ \alpha > 1$	Unique eqm
II		Passive FP	
III		$ \gamma > 1$	
IV			

ACTIVE MONETARY/PASSIVE FISCAL

Equilibrium

- (Inflation Dynamics) explosive ($\alpha > 1$), so only stable solution makes π_t depend on expected future stuff
- Impacts of shocks on π_t mitigated by MP behavior
 - larger is α , more the impacts are eliminated
- (Debt Dynamics) stable ($\gamma > 1$)
 - wealth effects from higher B_t —arising from monetary or fiscal actions—are eliminated by higher expected τ_{t+k}
- If FP were not stabilizing debt, MP would not be able to target inflation (or conduct open-market operations)
- FP behavior important even though, *in equilibrium*, fiscal shocks do not affect inflation
- **Almost all MP analysis *assumes* this regime**

JOINT MONETARY-FISCAL BEHAVIOR

Region	Policy Behavior		Outcome		
I	Passive MP	$ \alpha < 1$	Active FP	$ \gamma < 1$	Unique eqm
II					
III					
IV					

PASSIVE MONETARY/ACTIVE FISCAL

Equilibrium

- (Debt Dynamics) explosive ($\gamma < 1$), so the only stable solution makes P_t depend on expected future net surpluses
 - debt-financed tax cut increases wealth because future taxes not expected to rise
 - increases aggregate demand \Rightarrow raises current & expected inflation and, if prices sticky, current and future GDP
- (Inflation Dynamics) stable ($\alpha < 1$)
 - determines expected inflation
- If MP were to raise i with π , debt would explode
 - by fixing i_t , MP prevents debt from exploding
- MP behavior important even though, *in equilibrium*, monetary shocks do not affect inflation

JOINT MONETARY-FISCAL BEHAVIOR

Region	Policy Behavior		Outcome		
I					
II					
III	Passive MP	$ \alpha < 1$	Passive FP	$ \gamma > 1$	Multiple eq
IV					

Both policies try to stabilize debt; neither determines price level

JOINT MONETARY-FISCAL BEHAVIOR

Region	Policy Behavior				Outcome
I					
II					
III					
IV	Active MP	$ \alpha > 1$	Active FP	$ \gamma < 1$	No eqm

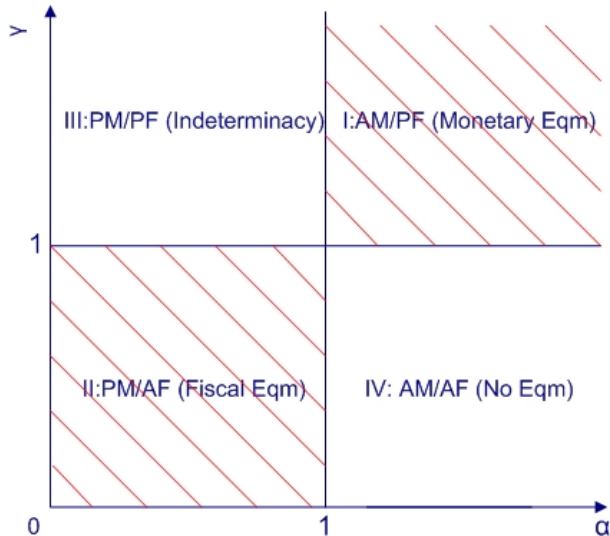
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II	Passive MP	$ \alpha < 1$	Active FP	$ \gamma < 1$	Unique eqm
III	Passive MP	$ \alpha < 1$	Passive FP	$ \gamma > 1$	Multiple eq
IV	Active MP	$ \alpha > 1$	Active FP	$ \gamma < 1$	No eqm

- Region I: “Standard”: Woodford (2003), Galí (2009)
- Region II: “Non-Standard”: “Fiscal theory of the price level”

POLICY PARAMETER SPACE



CONTEMPLATING REGIME CHANGE

- Consider (Inflation Dynamics) under active MP/passive FP ($\alpha > 1, \gamma > 1$)

$$E_t \pi_{t+1} = \alpha \pi_t + \varepsilon_t$$

- Repeated substitution, *assuming fixed policy rule*

$$\pi_t = -\frac{1}{\alpha} E_t \sum_{s=0}^{\infty} \left(\frac{1}{\alpha}\right)^s \varepsilon_{t+s}$$

- **Big Assumption:** Policy over infinite future same as it is now: $\alpha_t = \alpha$ all t
- This ain't what any central bank in the world is doing now
- Fiscal authorities are more confused about what they are doing—some active; others still passive

ESTIMATING REGIME CHANGE

- Estimate Markov-switching policy rules
- Monetary policy

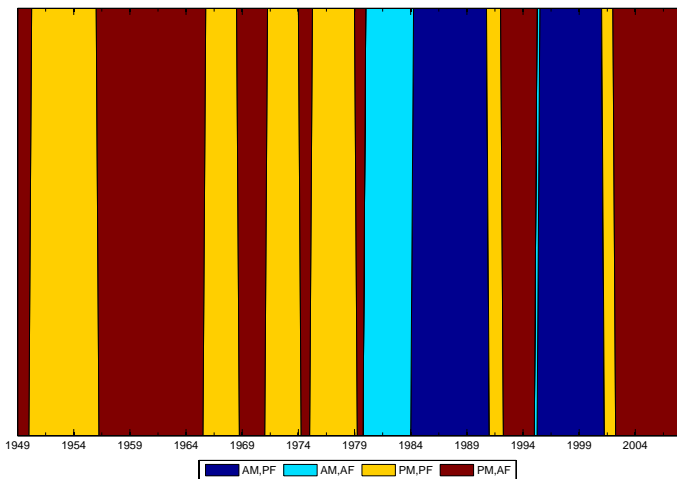
$$i_t = \alpha_0(R_t) + \alpha_\pi(R_t)\pi_t + \alpha_y(R_t)y_t + \sigma_i(R_t)\varepsilon_t^i$$

- Fiscal policy

$$\tau_t = \gamma_0(R_t) + \gamma_b(R_t)b_{t-1} + \gamma_y(R_t)y_t + \gamma_g(R_t)g_t + \sigma_\tau(R_t)\varepsilon_t^\tau$$

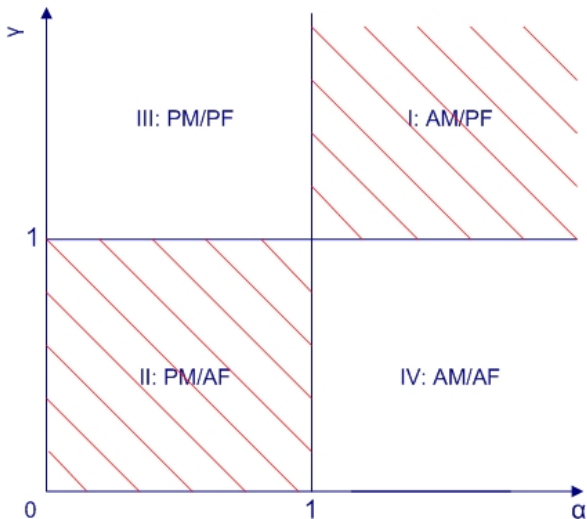
- Estimate four monetary-fiscal regimes
- In U.S. post-war experience, policies have fluctuated between active and passive

U.S. MONETARY-FISCAL REGIMES



Source: Davig-Leeper (2009)

BOUNCING AROUND THE PARAMETER SPACE



AN ECONOMIC MODEL

- Elastic labor, inelastic capital, sticky goods prices
- Lump-sum taxes, unproductive government spending
- Monetary and tax policies follow estimated rules
- Government spending follows

$$g_t = (1 - \bar{g})\rho_g + \rho_g g_{t-1} + \varepsilon_t^g$$

- Calibrate private parameters to U.S. data
- Solve nonlinear model with monotone map
- Rational expectations \Rightarrow agents form probability distribution over possible future policies

CURRENT POLICY REGIME

- Aggressive MP easing in reaction to recession \Rightarrow passive MP
 - no question that $\alpha < 1$
 - when i_t at zero bound
- Fiscal stimulus in face of rising debt \Rightarrow active FP
 - FP likely active since Bush tax cuts
- Caveat: if Obama pledge to reduce deficit 50% within 4 years is credible, then maybe people expect FP to switch to passive

GOVT SPENDING: OUTPUT MULTIPLIERS

Regime	5 qtrs	$\frac{PV(\Delta Y)}{PV(\Delta G)}$ after 10 qtrs	25 qtrs	∞
<i>Fixed</i>				
AM/PF	0.78	0.77	0.77	0.77
PM/AF				
<i>Switching</i>				
AM/PF				
PM/PF				
PM/AF				

Source: Davig-Leeper (2009)

GOVT SPENDING: OUTPUT MULTIPLIERS

Regime	5 qtrs	$\frac{PV(\Delta Y)}{PV(\Delta G)}$ after		
		10 qtrs	25 qtrs	∞
<i>Fixed</i>				
AM/PF	0.78	0.77	0.77	0.77
PM/AF	1.85	2.07	2.18	2.19
<i>Switching</i>				
AM/PF				
PM/PF				
PM/AF				

Source: Davig-Leeper (2009)

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<i>Switching</i>				
AM/PF	0.93	0.98	1.12	1.40
PM/PF				
PM/AF				

Source: Davig-Leeper (2009)

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AM/PF	0.93	0.98	1.12	1.40
PM/PF	2.10	1.92	1.72	1.68
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PM/AF	1.94	1.76	1.56	1.51

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GOVT SPENDING: CONSUMPTION MULTIPLIERS

Regime	5 qtrs	$\frac{PV(\Delta C)}{PV(\Delta G)}$ after 10 qtrs	25 qtrs	∞
<i>Fixed</i>				
AM/PF	-.22	-.23	-.23	-.23
PM/AF				
<i>Switching</i>				
AM/PF				
PM/PF				
PM/AF				

Source: Davig-Leeper (2009)

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AM/PF				
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Source: Davig-Leeper (2009)

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<i>Fixed</i>				
AM/PF	-.22	-.23	-.23	-.23
PM/AF	0.85	1.07	1.18	1.19
<i>Switching</i>				
AM/PF	-.07	-.03	0.12	0.40
PM/PF				
PM/AF				

Source: Davig-Leeper (2009)

GOVT SPENDING: CONSUMPTION MULTIPLIERS

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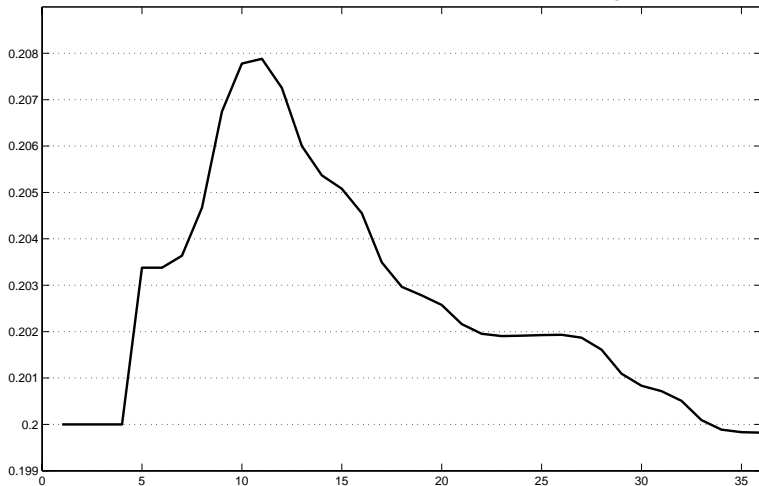
Source: Davig-Leeper (2009)

ARRA IMPACTS

- American Recovery & Reinvestment Act 2009
- Condition on path of $\{G_t\}$ from Cogan-Cwik-Taylor-Wieland (2009)
- Start from stochastic steady state
- Feed G sequence into the model as shocks—“surprises”
 - would also want to try treating $\{G_t\}$ path as known

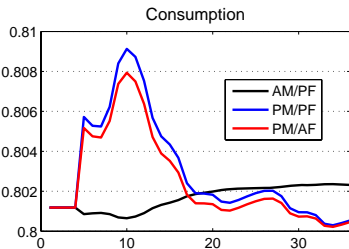
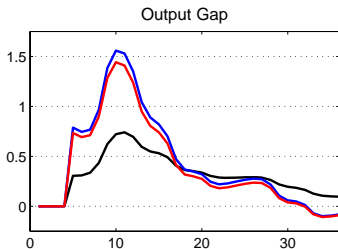
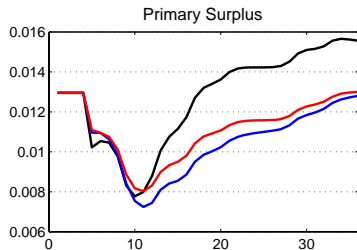
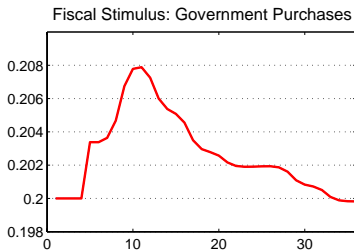
ARRA G PATH

The Fiscal Stimulus: Path of Government Spending



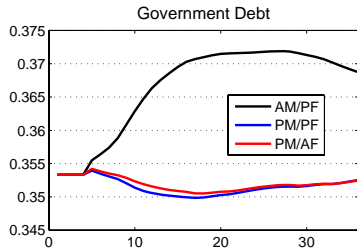
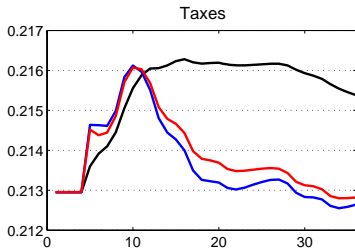
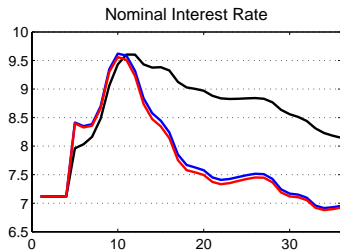
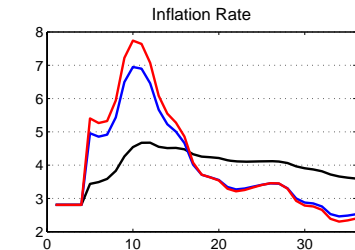
Source: Cogan-Cwik-Taylor-Wieland (2009)

ARRA: MACROECONOMIC IMPACTS



Source: Davig-Leeper (2009)

ARRA: MACROECONOMIC IMPACTS



Source: Davig-Leeper (2009)

INSTITUTIONALLY INCONVENIENT TRUTHS

1. Essential to coordinate monetary & fiscal policies: maybe counterproductive to separate monetary & fiscal decision making
2. Choice of *joint* monetary-fiscal regime important for impacts of fiscal stimulus: politicized fiscal choices & independent monetary choices unlikely to deliver best results
3. Agents' beliefs about current & future policy regimes determine impacts of stimulus: calls for enhanced monetary *and* fiscal transparency about both current and likely future policies
4. Accurate predictions of policy effects depend on entire future paths of policy choices: regime change should be the default modeling strategy