

Econ 702 Macroeconomics I

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Spring 2020

Lecture 24: Monetary Policy at
the Zero Lower Bound

Outline

- Zero Lower Bound
- Unconventional Monetary Policy

Zero Lower Bound

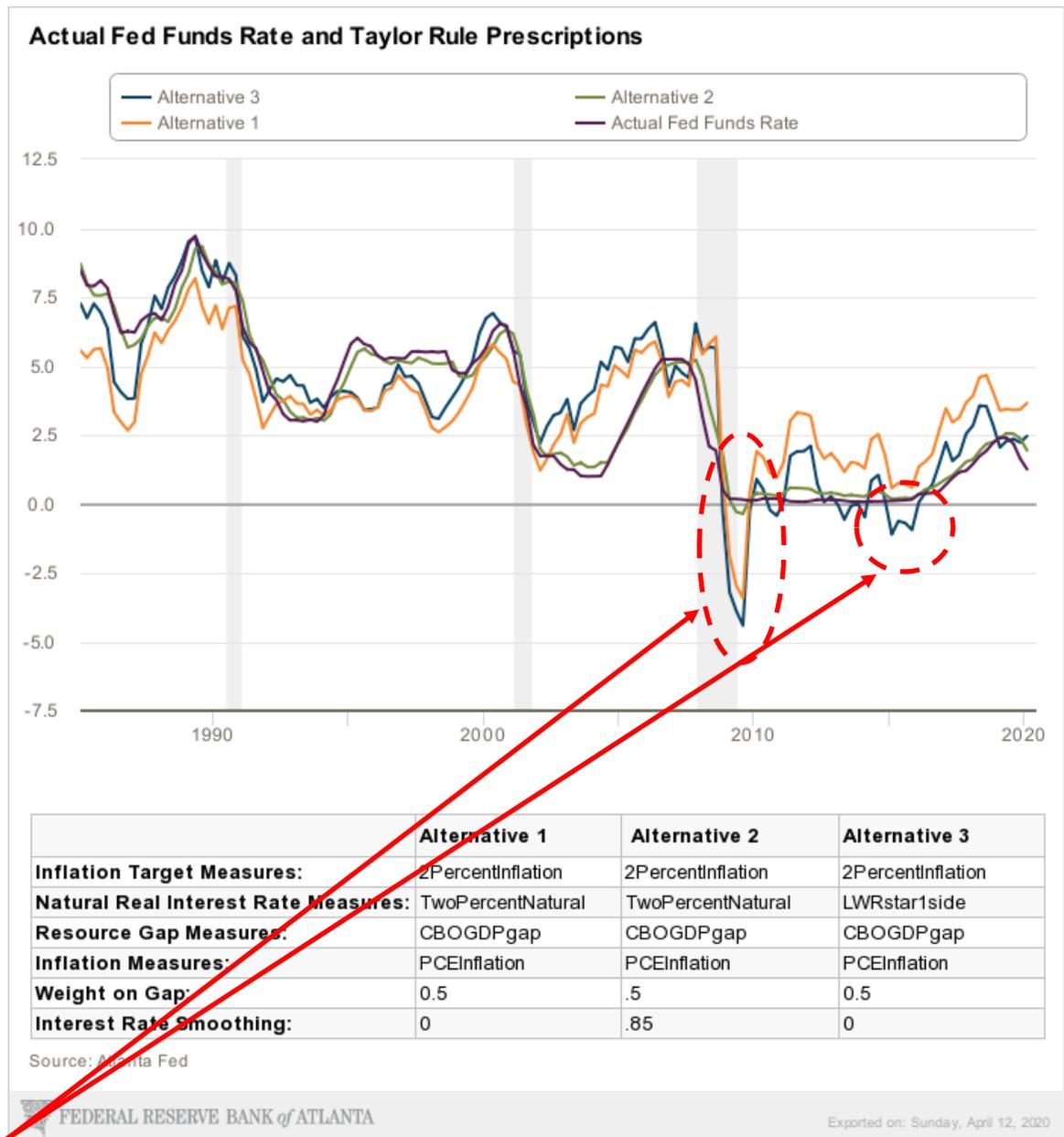
Flat LM – interest semi-elasticity is infinite or at ZLB

$$v' \left(\frac{M_t}{P_t} \right) = \frac{i_t}{1 + i_t} u_C(C_t, 1 - N_t) \quad (28.1)$$

In (28.1), if $i_t = 0$, then the only way for this expression to hold is if $\frac{M_t}{P_t} \rightarrow \infty$, which in drives the marginal utility of holding money to zero. In other words, if the nominal interest rate goes to zero, there is an infinite demand for real money balances. For this reason, the nominal interest rate going to zero is sometimes called a “liquidity trap”

So the interest rate cannot be below 0.

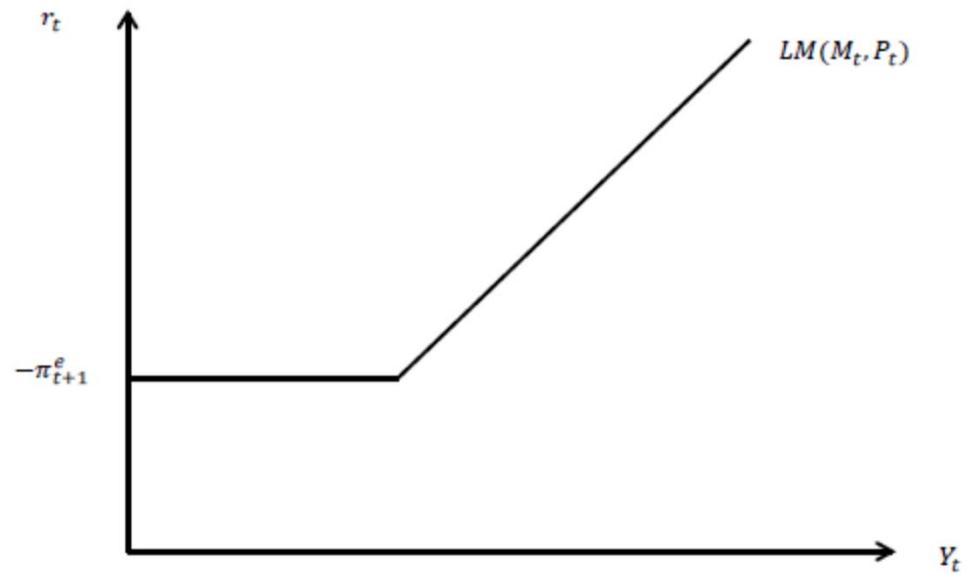
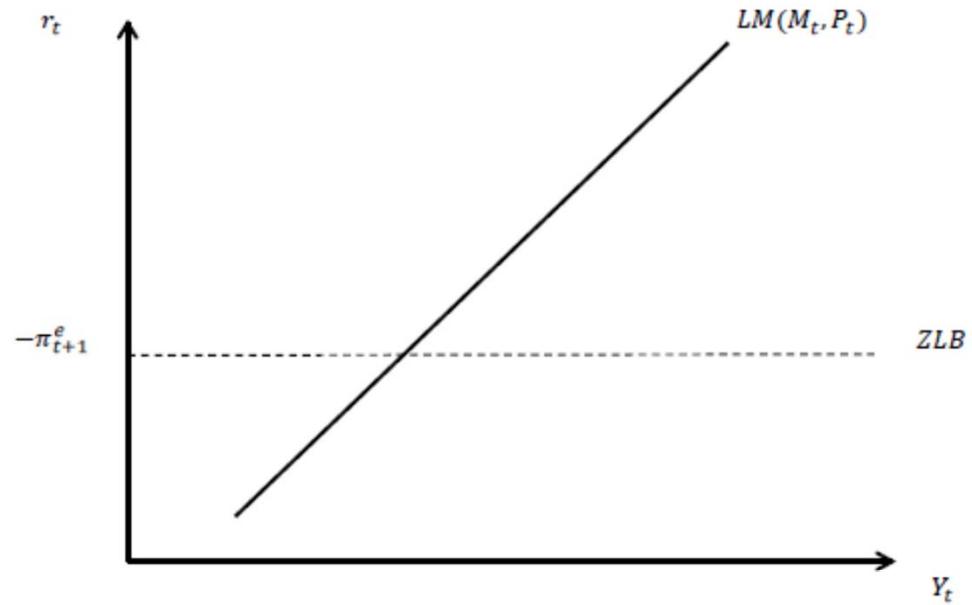
- Alt 1: Eqn 27.11 except $r^* = 2\%$
- Alt 2: Eqn 27.11, but w/smoothing parameter = 0.85
- Alt 3: Eqn 27.11, except r^* estimated



Notice that at certain points, during the Great Recession and 2015, implied rate under Alt 1 and Alt 3 was below 0%

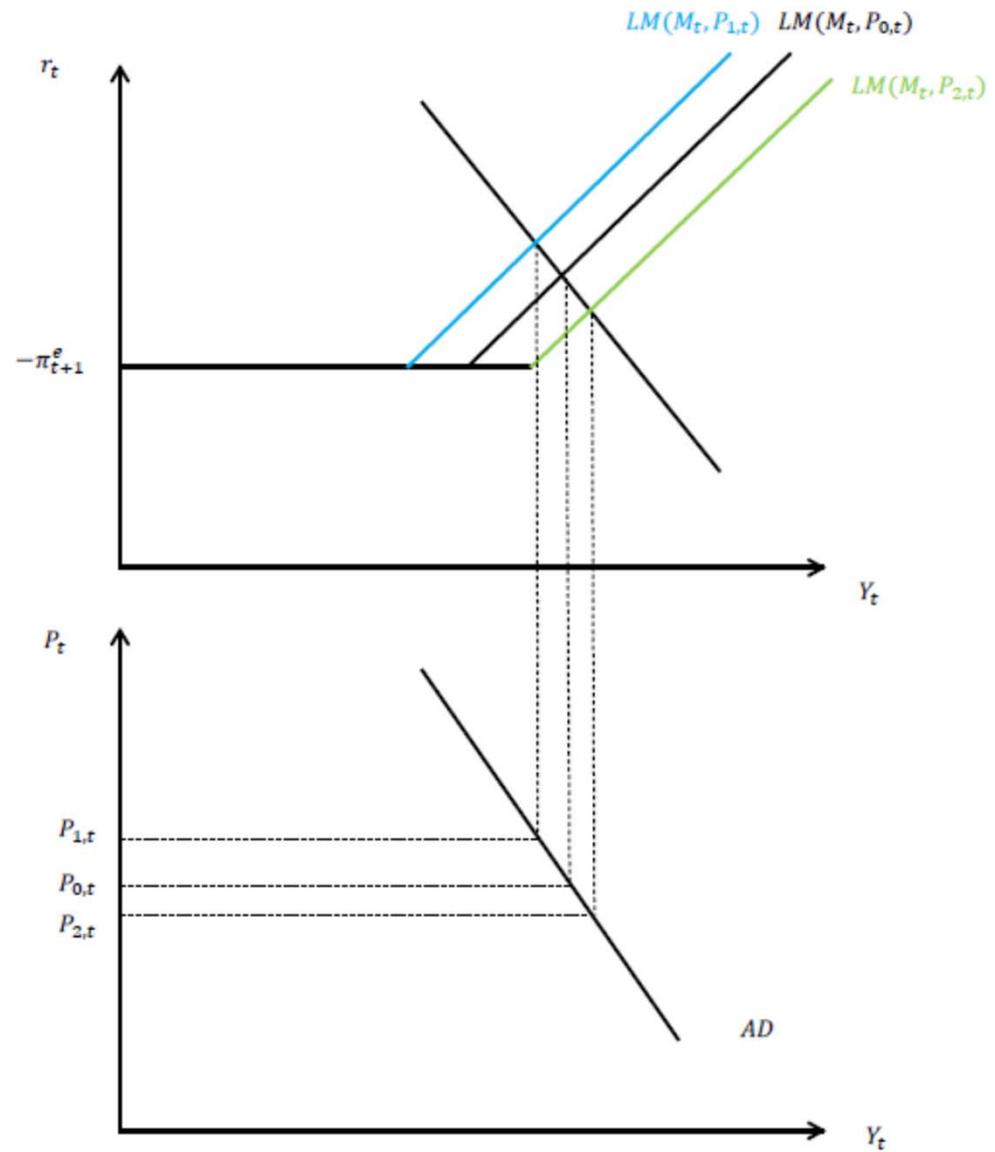
IS-LM-AD with ZLB

Figure 28.1: The LM Curve and the ZLB



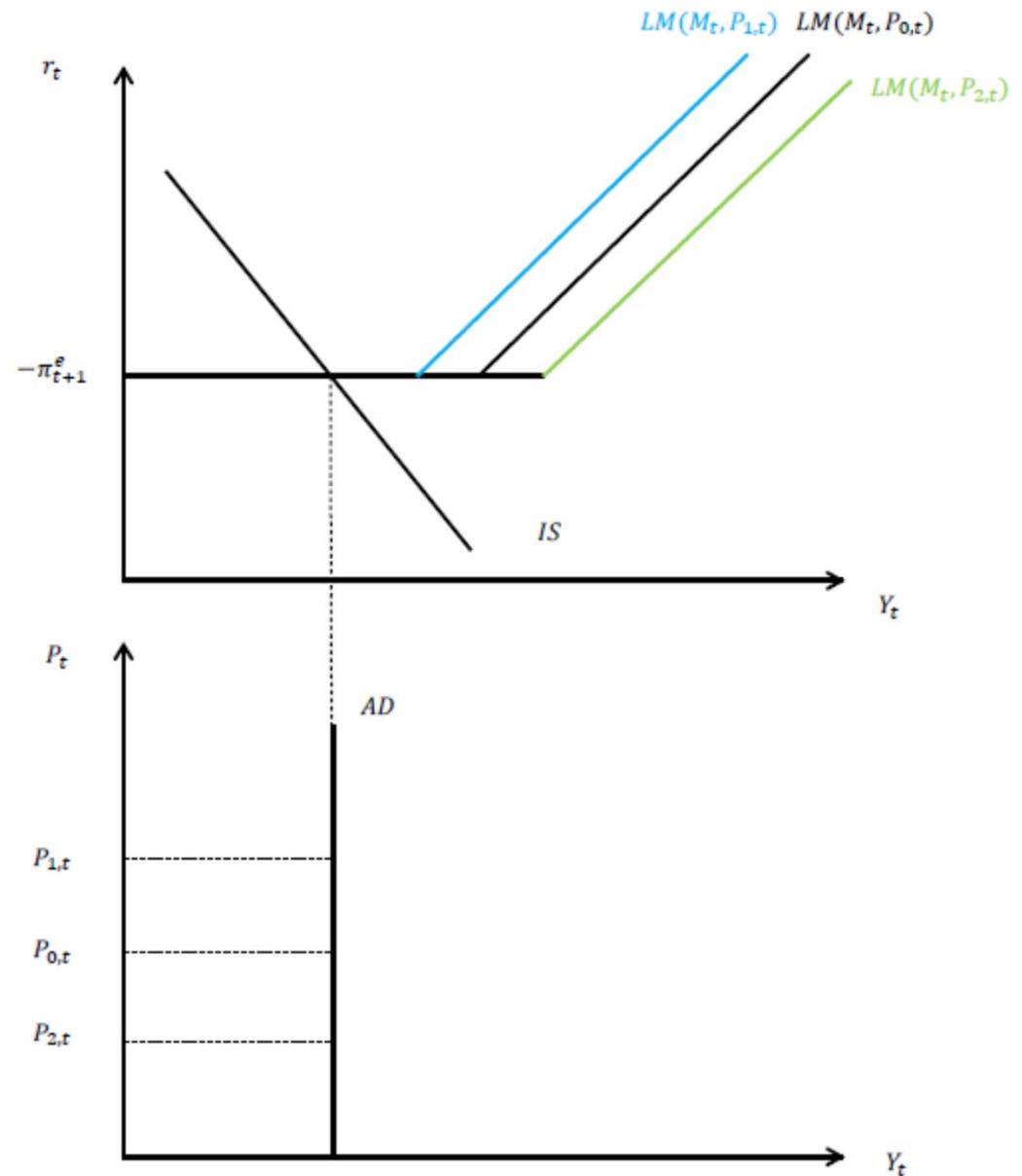
As long interest rate above zero...

Figure 28.2: AD Derivation with a Non-Binding ZLB



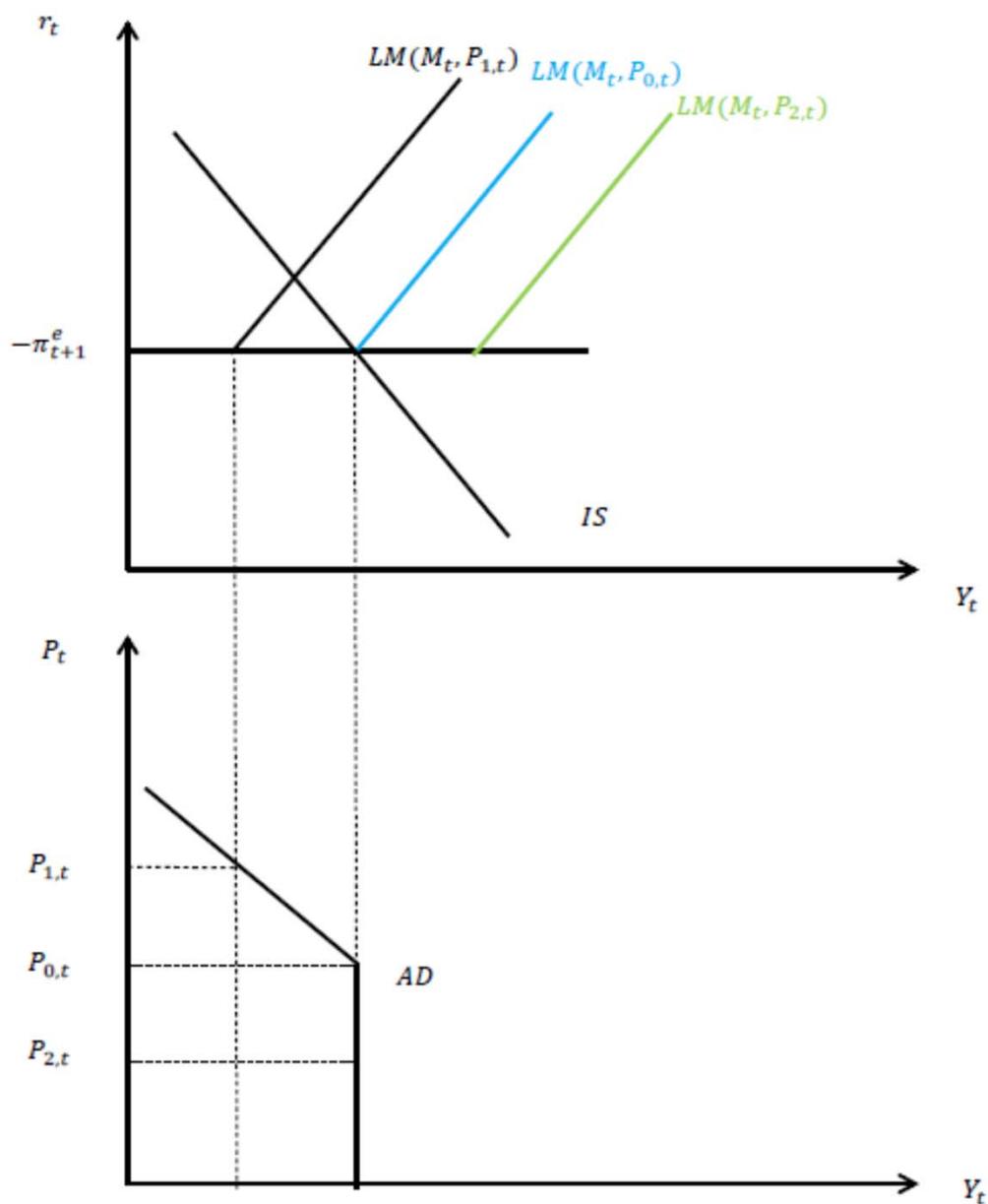
But when ZLB
is binding...

Figure 28.3: AD Derivation with a Binding ZLB



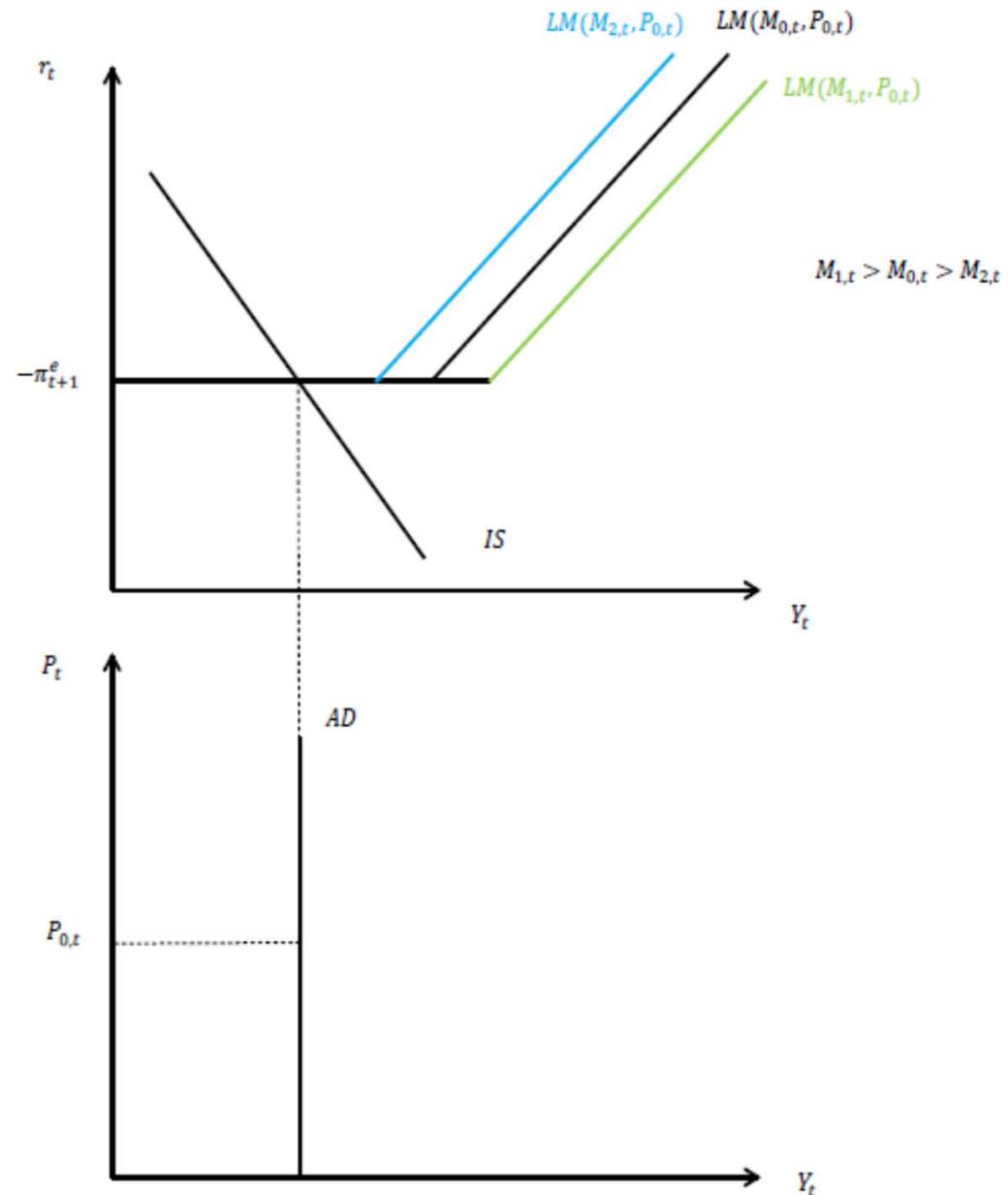
Or when binds
intermittently

Figure 28.4: AD Derivation with Both a Binding and Non-Binding ZLB



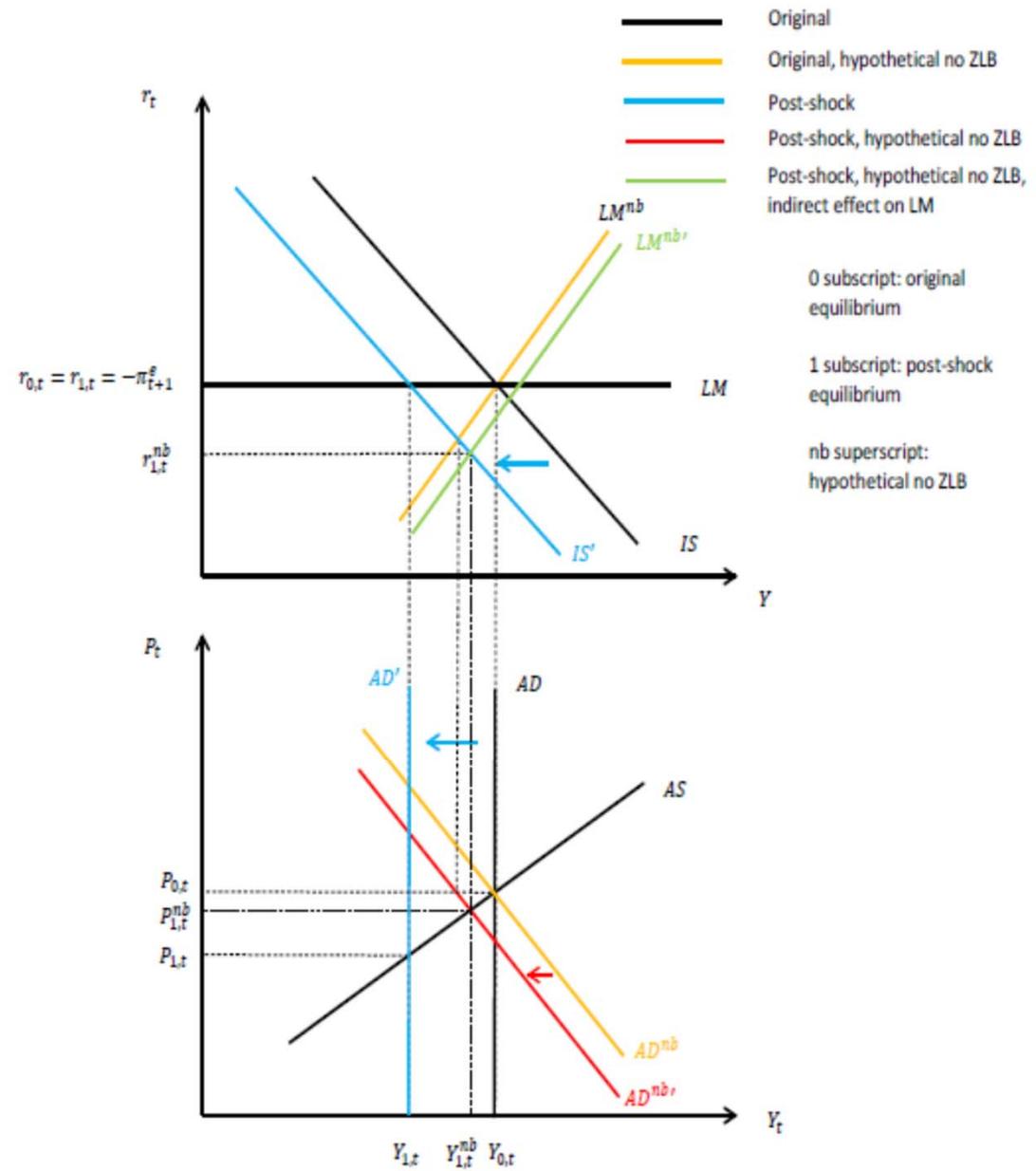
Monetary Policy at ZLB

Figure 28.5: Changes in the Money Supply and a Binding ZLB



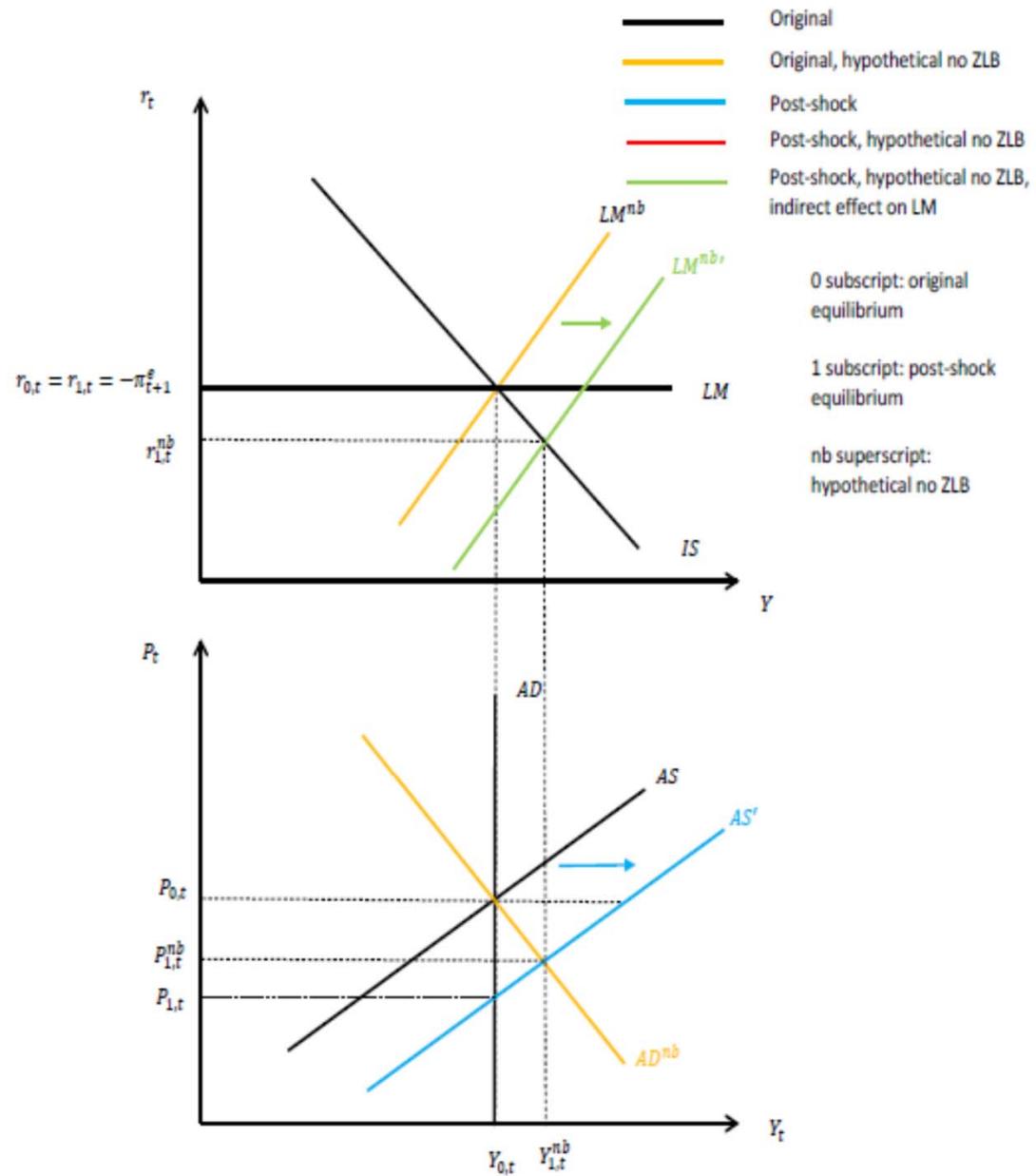
Shocks at ZLB

Figure 28.6: Sticky Price Model: Negative IS Shock with Binding ZLB



Shocks at ZLB

Figure 28.7: Sticky Price Model: Positive Supply Shock with Binding ZLB



ZLB Is Costly

Figure 28.8: Medium Run Supply-Side Dynamics at the ZLB, Sticky Price Model

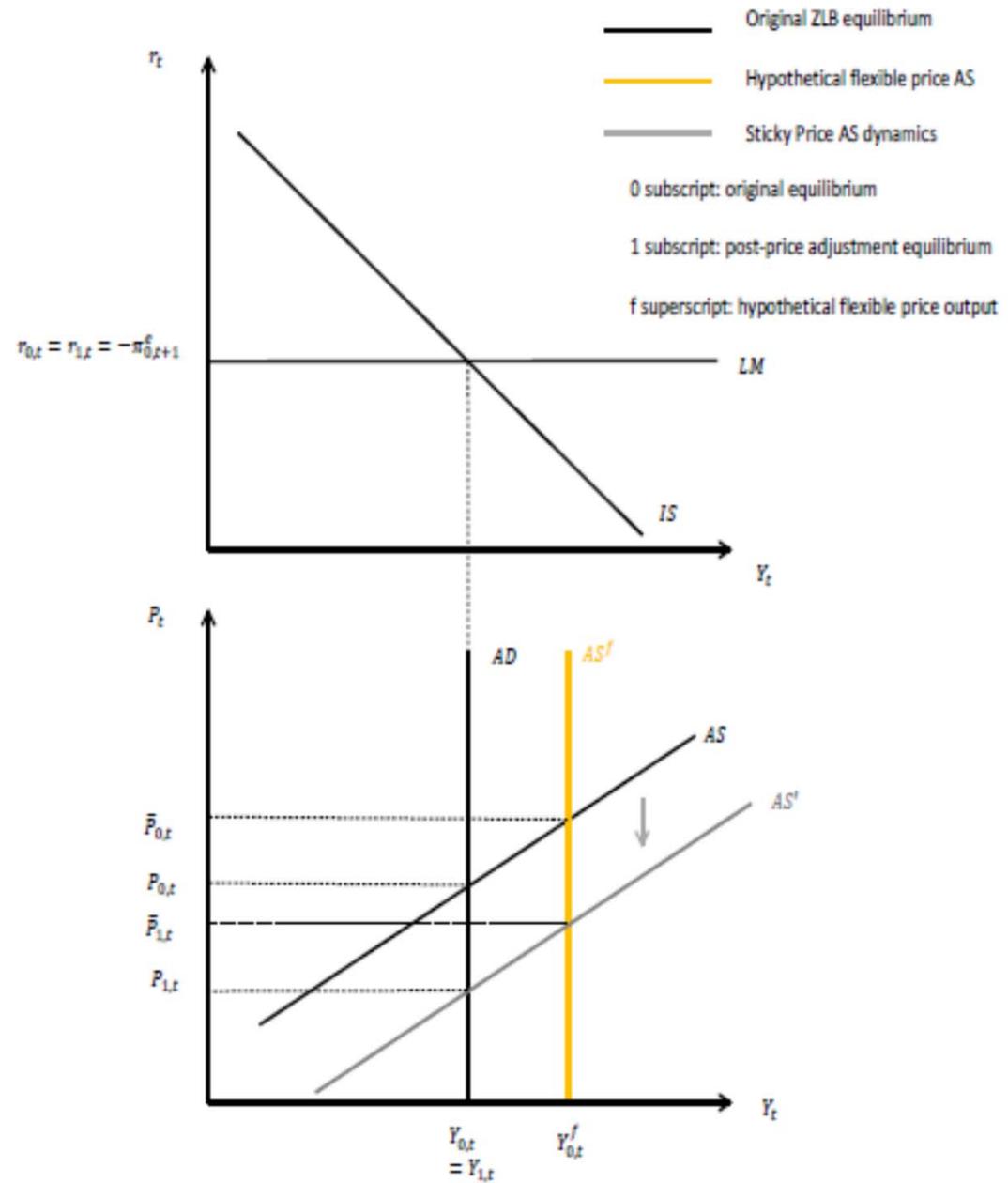
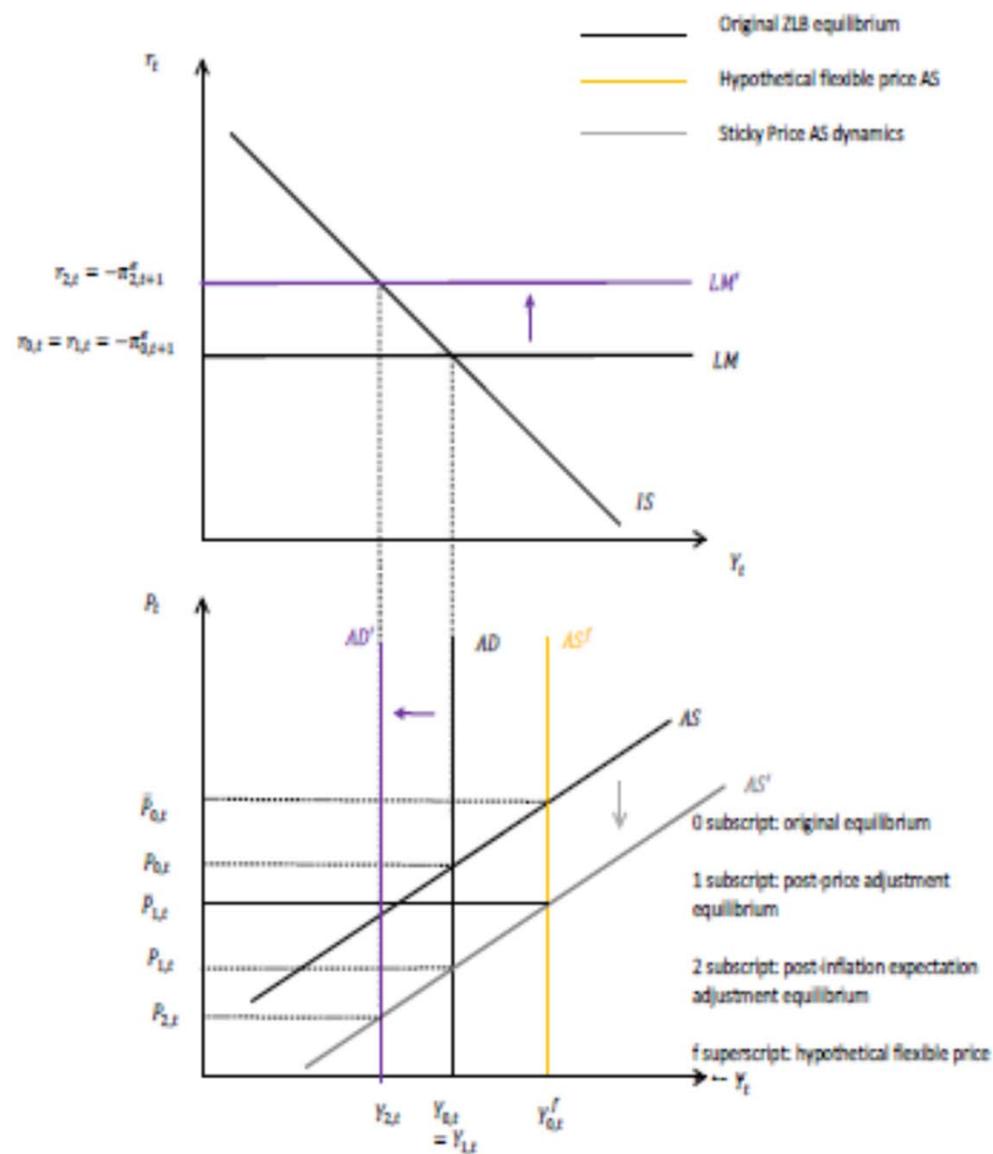
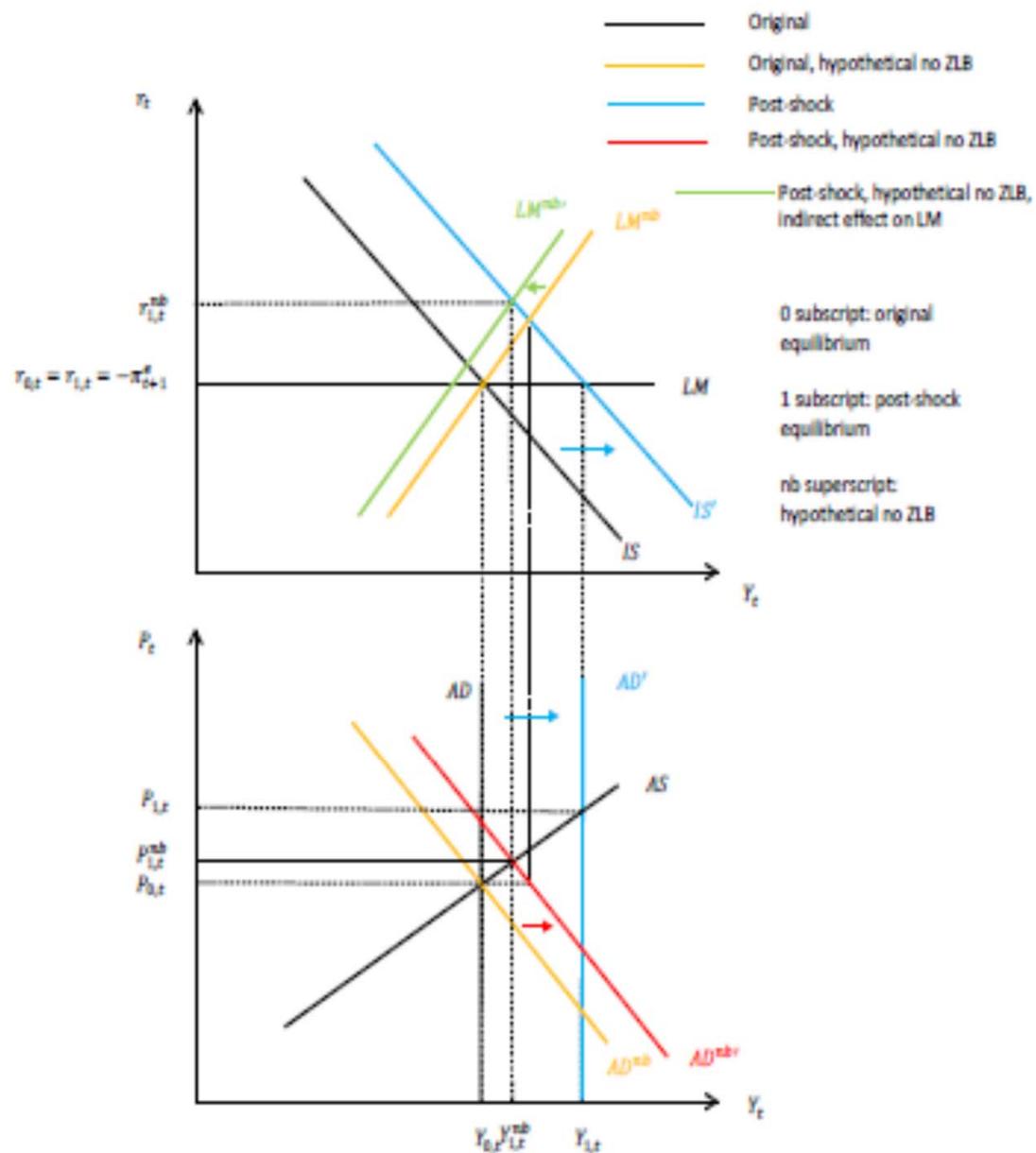


Figure 28.9: Medium Run Supply-Side Dynamics at the ZLB, Deflationary Expectations, Sticky Price Model



Fiscal Policy at ZLB

Figure 28.10: Sticky Price Model: Fiscal Expansion with Binding ZLB



Escaping ZLB

Figure 28.11: Fiscal Expansion to Exit the ZLB

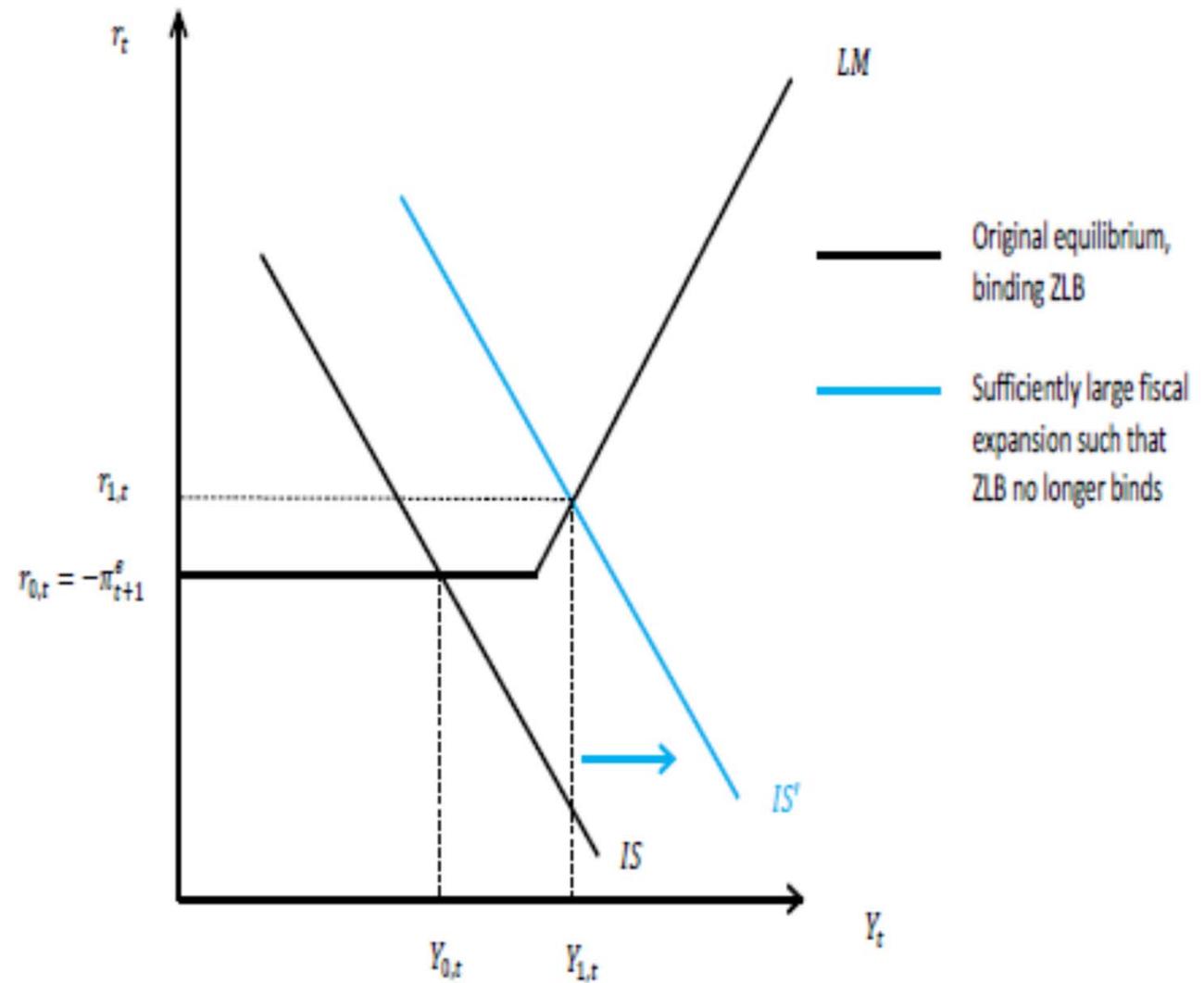
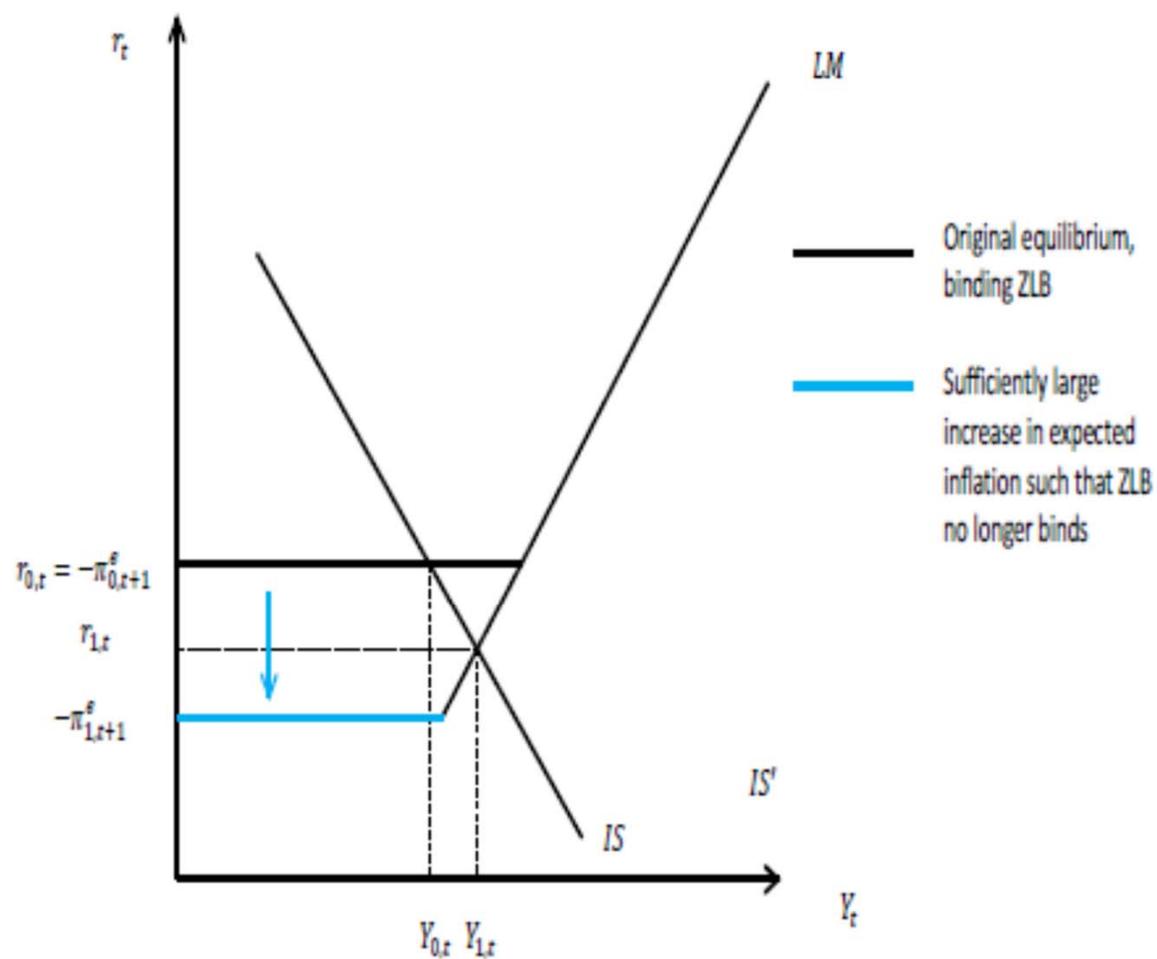


Figure 28.12: Engineering Higher Expected Inflation to Exit the ZLB



How to Avoid the ZLB

- Nominal rate is sum of ex ante real rate and expected inflation
- So keep expected inflation higher
- Weigh against costs of inflation in terms of shoe leather costs
- Also distortions get larger with higher inflation when some firms can't adjust prices (Coibion, Gorodnichenko, Wieland)

Unconventional Monetary Policy

Unconventional Monetary Policy (UMP)

- Most central banks set a target for the overnight interbank lending rate.
- However there are two circumstances when additional policy tools can play a useful stabilization role:
 1. When lowering the policy rate i_t (Fed funds) to zero is not sufficient to stimulate the economy; and
 2. Long term rate is relevant

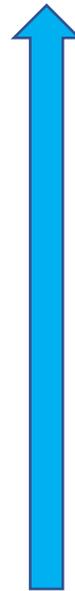
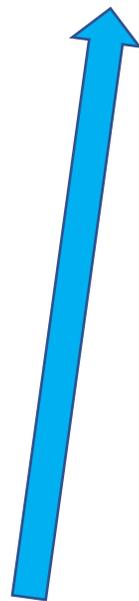
Interpreting UMP

$$i_{nt} = \frac{\widetilde{(i_{1t} + i_{1t+1}^e + \dots + i_{1t+n-1}^e)}}{n} + t\rho_{nt}$$

Quantitative
easing

Forward guidance

Credit
easing



Unconventional Policy Tools

1. A policy duration commitment.
 - This is when the central bank promises to keep interest rates low in the future.
2. Quantitative easing (QE).
 - When the central bank supplies aggregate reserves beyond the quantity needed to lower the policy rate to zero.
3. Credit easing (CE).
 - When the central bank alters the mix of assets it holds on its balance sheet in order to change their relative prices in a way that stimulates economic activity.

Interpreting QE

$$i_{nt} = \frac{\tilde{i}_{1t} + i_{1t+1}^e + \dots + i_{1t+n-1}^e}{n} + t\rho_{nt}$$

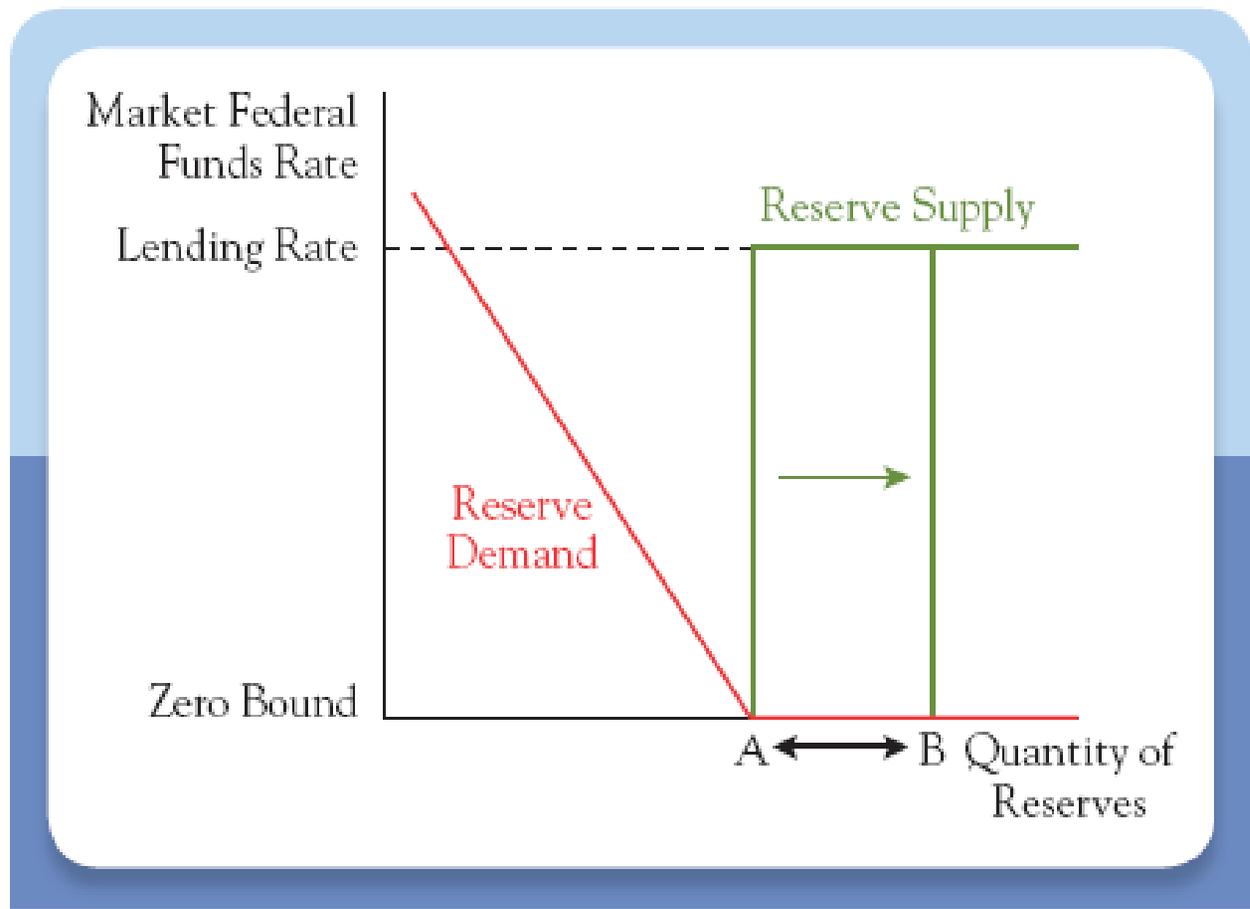


Quantitative
easing

Quantitative Easing

- At a rate of zero, banks hold cash rather than lend.
- The Fed can add limitlessly to reserves without affecting the market federal funds rate.
- QE is the difference between A and B.

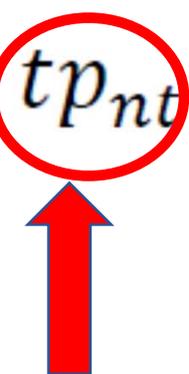
Figure 18.10 Quantitative Easing



Quantitative Easing

- It is difficult to predict the effects of QE.
- Our limited experience means that we have little data on which to base such a forecast.
- Moreover, the mechanism by which QE affects economic prospects is not clear.
- An increase in the supply of reserves (QE) may simply lead banks to hold more of them rather than provide additional loans.

Interpreting Credit Easing

$$i_{nt} = \frac{\widetilde{(i_{1t} + i_{1t+1}^e + \dots + i_{1t+n-1}^e)}}{n} + \underbrace{tp_{nt}}_{\substack{\text{Credit} \\ \text{easing}}}$$


Credit Easing

- *Credit easing* (CE) shifts the *composition* of the balance sheet away from risk-free assets and toward risky assets.
- The central bank's actions can influence both the cost and availability of credit, changing spreads
- In the absence of private demand for the risky asset, the central bank's purchase makes credit available where none existed.
- Impact:
 - To be greater in thin, illiquid markets.
 - To be larger the bigger the difference between the yield on the asset that the central bank buys and the yield on the asset that the central bank sells.

Credit Easing

Table 1

Characteristics of the Four Asset Purchase Programs

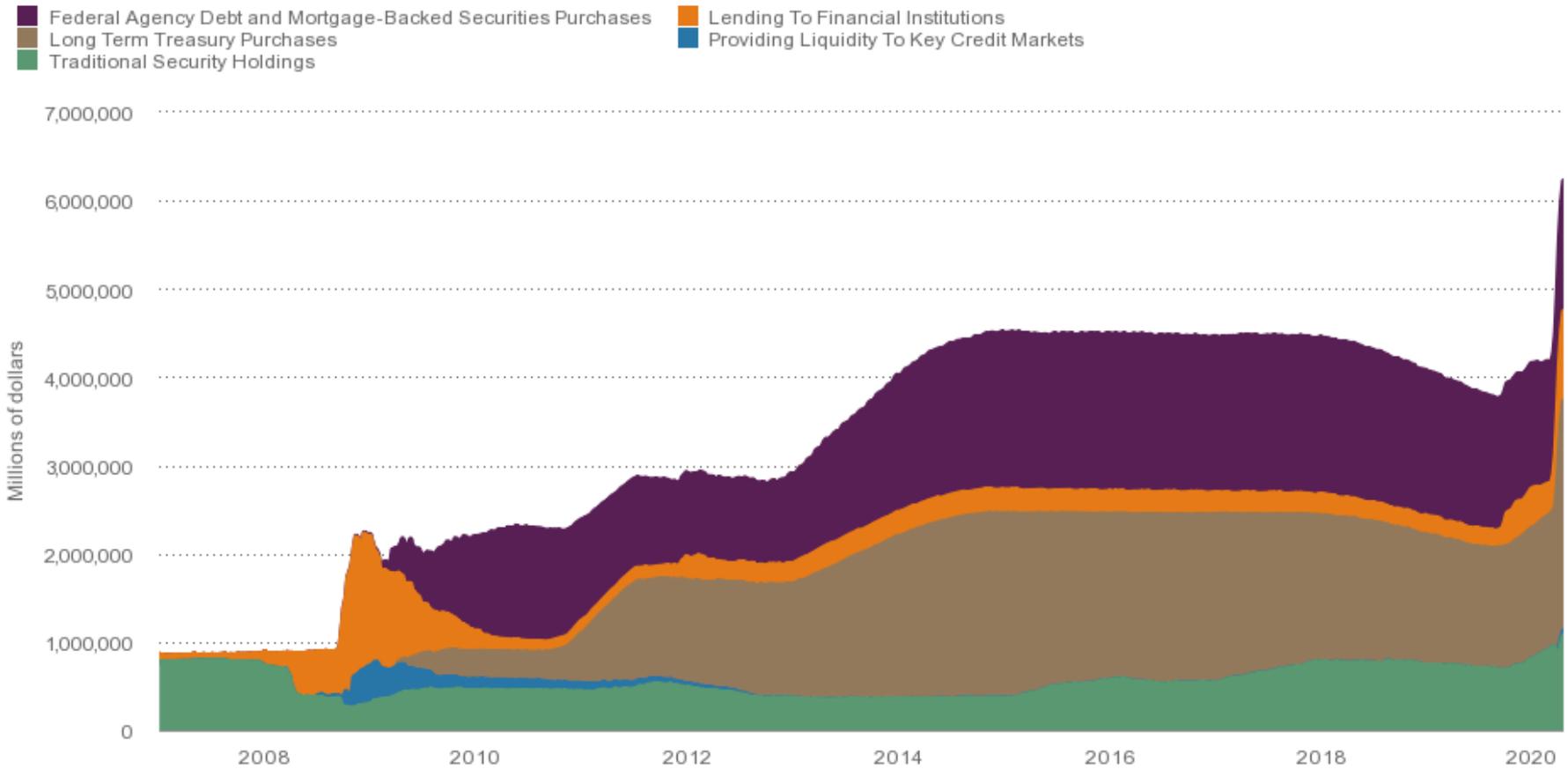
<i>Program</i>	<i>Dates</i>	<i>Assets purchased</i>	<i>Size (billions)</i>	<i>Sterilized?</i>
First LSAP (QE1)	11/2008 to 3/2009	Agency debt Agency MBSs Treasuries	\$200 \$1,250 \$300	No
Second LSAP (QE2)	11/2010 to 6/2011	Longer-dated Treasuries	\$600	No
MEP (“Twist”)	9/2011 to 12/2012	6- to 30-year Treasuries	\$667	Yes
Third LSAP (QE3)	9/2012 to 10/2014 12/2012 to 10/2014	MBSs Longer-dated Treasuries	\$40/month \$45/month	No

Note: Quantitative easing refers to a set of four asset purchase programs: the three Large-Scale Asset Purchases (LSAPs), commonly known as QE1, QE2, and QE3; and the Maturity Extension Program (MEP), also known as the second “Operation Twist.” The table summarizes the key features of these programs. MBSs are mortgage-backed securities.

Kuttner (2018).

Summary View

Click/drag to zoom



Source: Federal Reserve Bank of Cleveland calculations based on data from Federal Reserve Board and Haver Analytics.

Source: Cleveland Fed <https://www.clevelandfed.org/our-research/indicators-and-data/credit-easing.aspx>

Credit Easing

- CE purposely deviates from such *asset neutrality* in order to influence relative prices.
- Exiting from CE probably is also more difficult than unwinding QE.
- Risky assets are generally harder to sell than Treasuries.
 - The central bank may not be able to get rid of them exactly when it wants.
 - Political influences can become important if the Fed is hindered from selling specific assets for fear of raising the costs of a particular class of borrowers.

Estimated Impact (I)

Table 2
Estimated Event-Study Interest Rate Effects

<i>Study</i>	<i>Window (days)</i>	<i>Yield on:</i>	<i>QE1 (basis points)</i>	<i>QE2 (basis points)</i>	<i>MEP (basis points)</i>	<i>QE3 (basis points)</i>
Gagnon, Raskin, Remache, and Sack (2011)	1	T10	-91***			
		Agency	-156***			
		MBS	-113***			
Krishnamurthy and Vissing-Jorgenson (2011)	2	T10	-107*	-30***		
		Agency	-200***	-29***		
		MBS	-88	-13**		
Ehlers (2012)	1	T10		-14	-27***	
	2	T10		-40***	-46***	
Bauer and Neely (2014)	1	T10	-123**	-23		-14

Notes: “T10” refers to the 10-year Treasury, MBS to the 15-year Agency mortgage-backed securities, and “Agency” to the debt issued by Ginnie Mae, Fannie Mae, and/or Freddie Mac. QE1, QE2, and QE3 are three quantitative easing programs. MEP is the Maturity Extension Program. Asterisks indicate the magnitude of the ratio of the observed event-day relative to the standard deviation of the yield changes at the indicated horizon, as reported by the authors:

***denotes ratios greater than 2.58 in absolute value (1 percent tail),

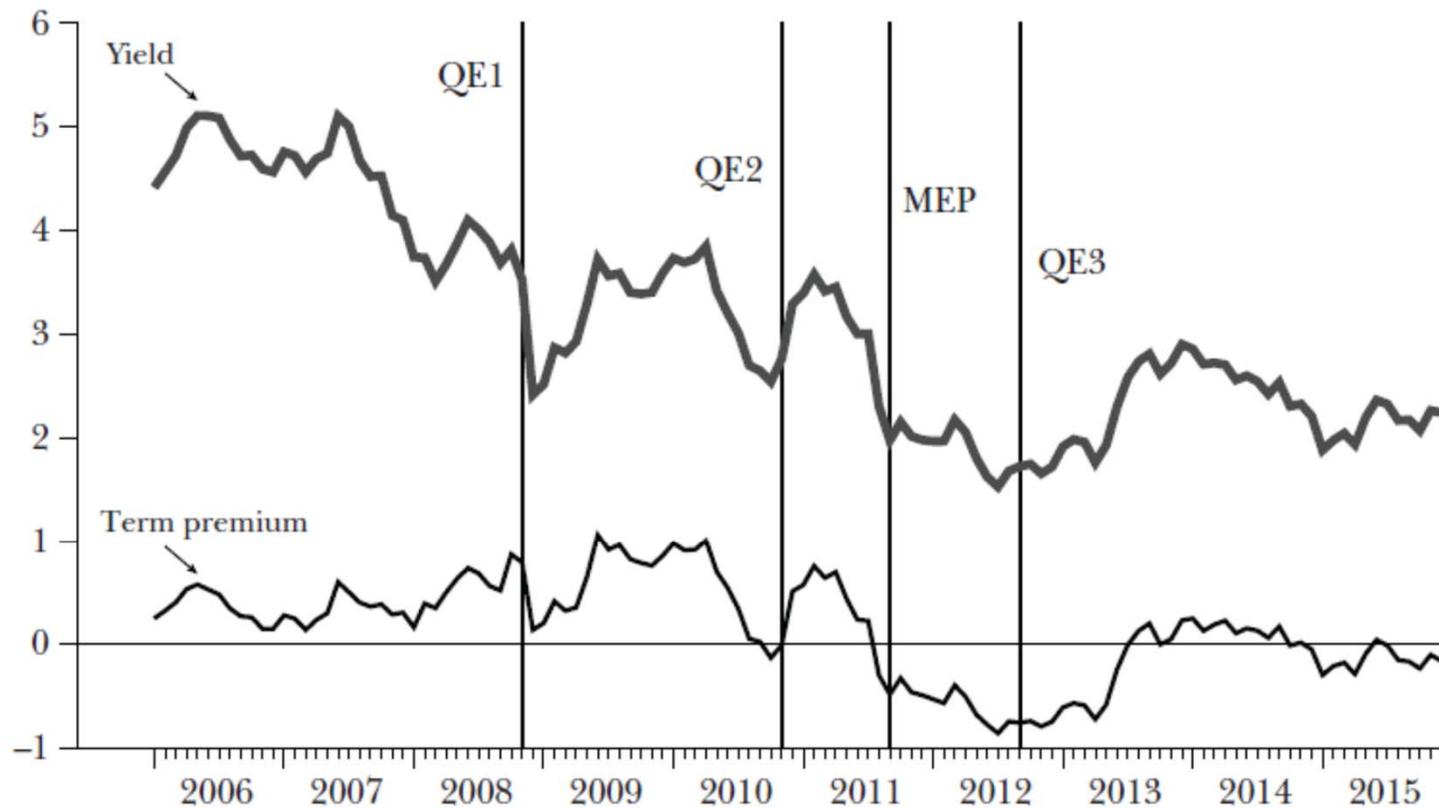
**ratios greater than 1.96 (5 percent tail), and

*greater than 1.69 (10 percent tail).

Estimated Impact (II)

Figure 2

Kim–Wright Estimated 10-year Term Premium and 10-year Treasury Yield
(percent)



Note: QE1, QE2, and QE3 are three quantitative easing programs. MEP is the Maturity Extension Program.

Estimated Impact (II)

Table 3

Estimated Effects of Quantitative Easing on 10-year Term Premiums

(basis points)

<i>Study</i>	<i>QE1</i>	<i>QE2</i>	<i>MEP</i>	<i>QE3</i>
Gagnon, Raskin, Remache & Sack (2011)	-38 ^a			
D'Amico, English, López-Salido & Nelson (2012)	-35	-45		
Ihrig, Klee, Li, Schulte & Wei (2012)	-40	-40	-17	-50 ^b
Hamilton & Wu (2012)			-27 ^c	

Notes: QE1, QE2, and QE3 are three quantitative easing programs. MEP is the Maturity Extension Program.

^a The smallest of the range of estimates reported.

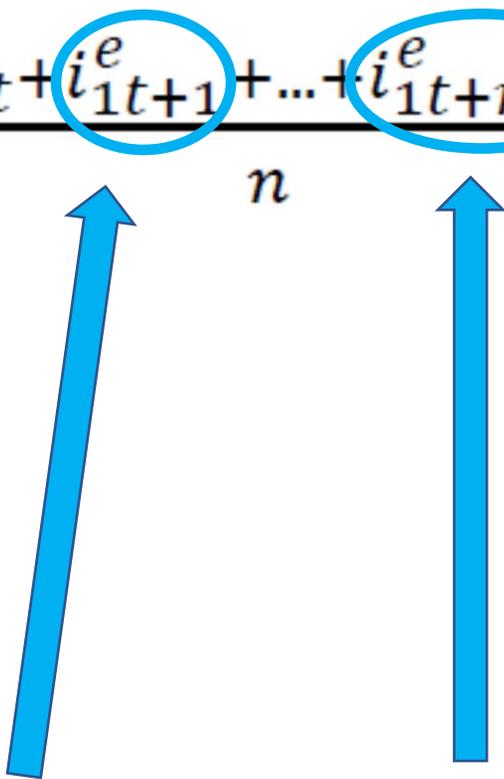
^b Estimated by Engen, Laubach, and Reifschneider (2015) using the Ihrig, Klee, Li, Schulte, and Wei (2012) model.

^c The reported impact of a \$400 billion maturity swap, scaled up to the \$667 billion size of the Maturity Extension Program.

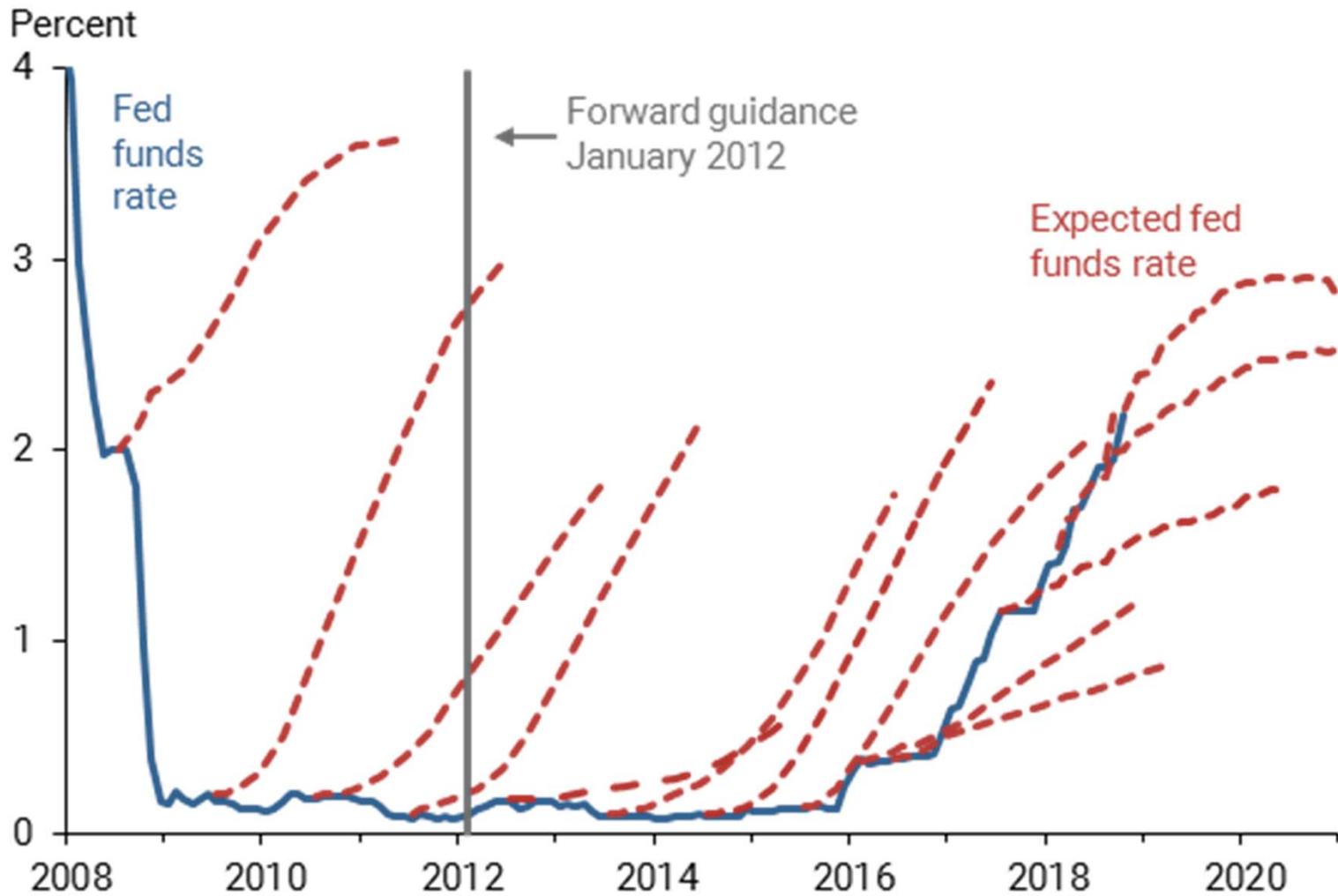
Interpreting Forward Guidance

$$i_{nt} = \frac{\tilde{i}_{1t} + i_{1t+1}^e + \dots + i_{1t+n-1}^e}{n} + t\rho_{nt}$$

Forward guidance



a.k.a. “Policy Duration Commitment”



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