

Enabling Deeper Negative Rates by Managing the Side Effects of a Zero Paper Currency Interest Rate

Ruchir Agarwal and Miles Kimball

June 6, 2016

Negative Interest Rate Conference

Hutchins Center at Brookings

Sequel to:

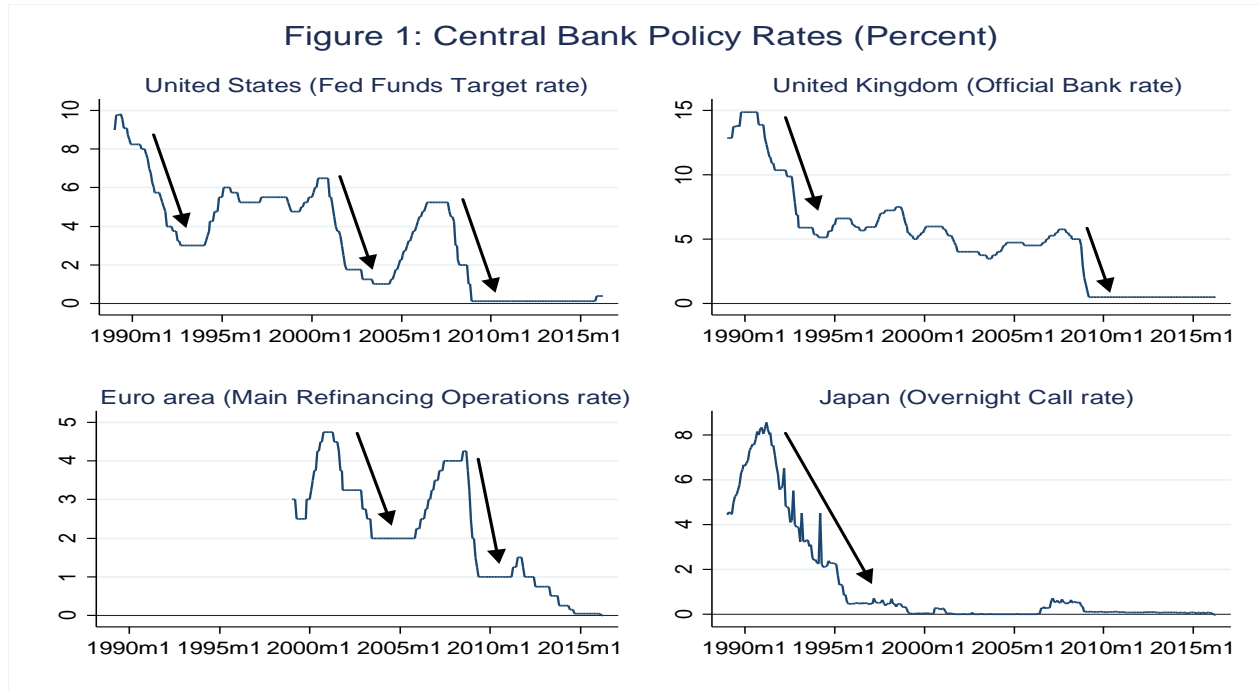
- “Breaking Through the Zero Lower Bound,” Ruchir Agarwal and Miles Kimball, IMF Working Paper 15/224
- “Negative Interest Rate Policy as Conventional Monetary Policy,” Miles Kimball, *National Institute Economic Review*

Both conveniently available--along with much more—
from links in bibliographic blog post

[How and Why to Eliminate the Zero Lower Bound:
A Reader’s Guide](#)

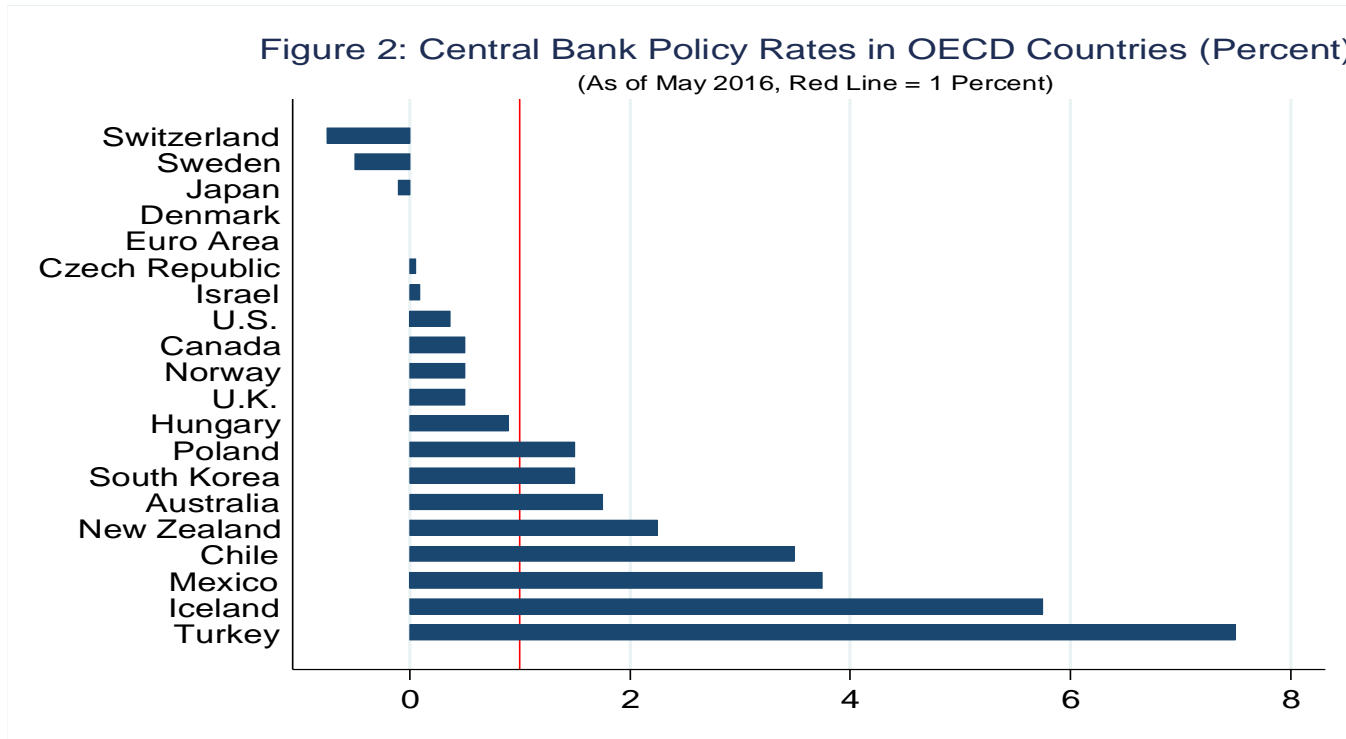
on Miles’s blog “Confessions of a Supply-Side Liberal”

Central banks have cut interest rates by about 5 percent or more in past recessions...

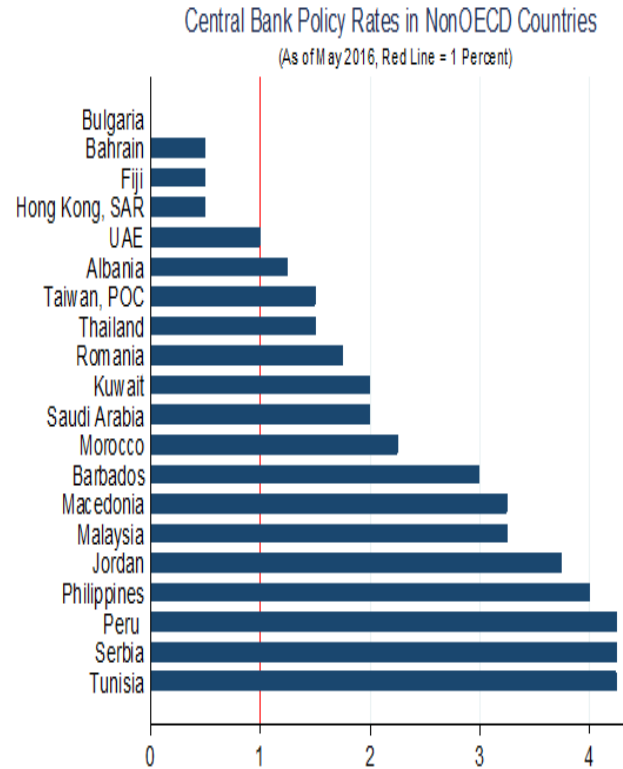


Why this matters: see [“Responding to Joseph Stiglitz on Negative Interest Rates”](#)

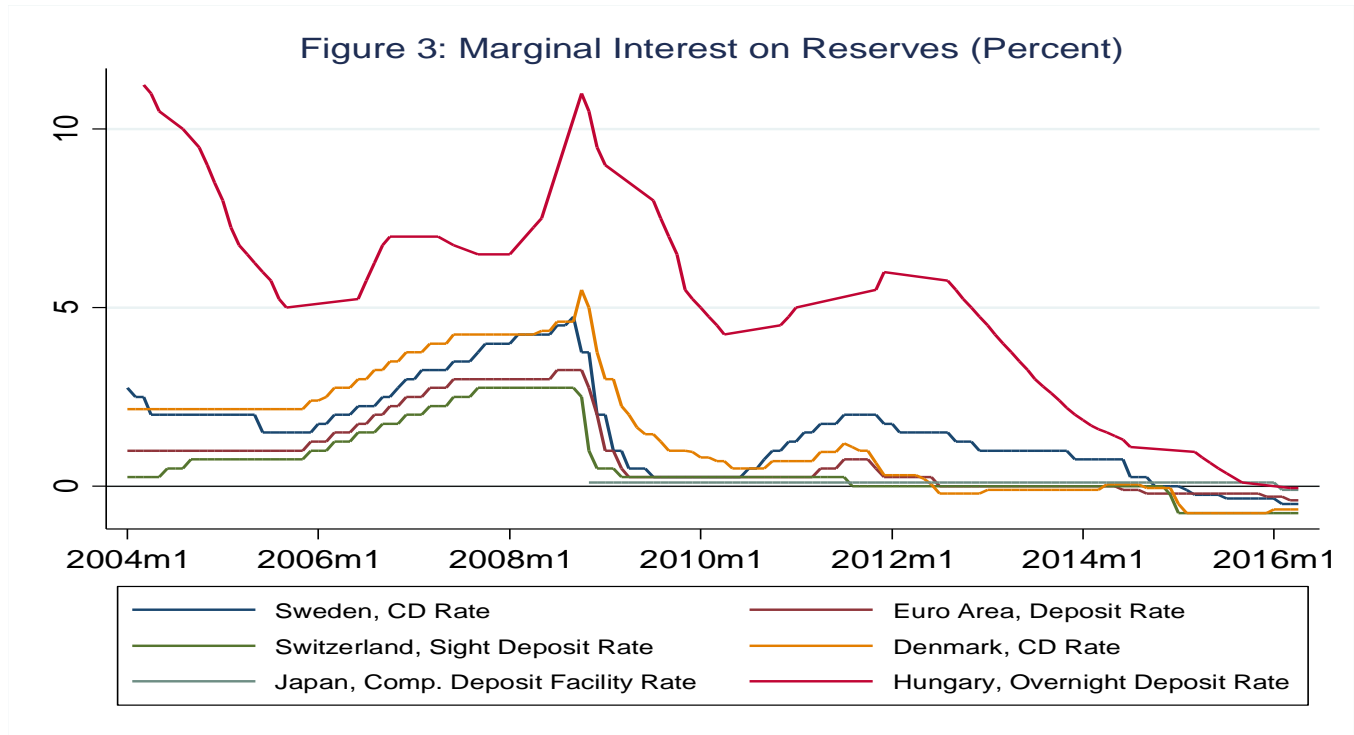
The main policy rate of 12 out of 20 OECD central banks are below 1%



Non-OECD Countries with Low Rates & Some Monetary Policy Independence



Central banks have Negative Marginal Interest on Reserves (MIOR)



Why It Is Worth Having More Than One Approach to Enabling Lower Rates

- A lower bound on interest rates can be a serious obstacle for monetary policy
- It is worth considering new tools
- Politics matters
- Legal issues matter
- Monetary politics and law differ from one nation to another
- Technical approaches can be adapted to the political and legal situation in different nations
- Policies used in one nation provide insight for others

Two Paths to Deep Negative Interest Rates

- Clean Approach: an electronic money system that generates a negative rate of return on paper currency *located anywhere* by a depreciation mechanism, using the central bank's power to determine exchange rates between different forms of money under its jurisdiction.
(See "[How and Why to Eliminate the Zero Lower Bound: A Reader's Guide](#)")
- Dirty Approach: using a variety of regulations to make it difficult to earn anything close to a zero return on any substantial amount of paper currency while maintaining paper currency officially at par relative to electronic money

Monetary systems: history and forecast

- Bimetallic standards (gold and silver)
- Gold standard with periodic suspensions of convertibility (US Coinage Act 1873, ...)
- Fixed exchange rates in the Bretton Woods system (1944 conference, fully in operation in 1958)
- Floating exchange rates among major currencies (Nixon Shock in 1971)
- Negative interest rates with paper currency at par (now)
- Electronic money system (e-\$, e-€, e-¥, e-£, e-₪ as units of account) with paper currency in ancillary role (late 2010's)
- “Cashless economy” (2045?)

What It Takes to Get a Safe Return that Creates an Effective Lower Bound on Interest Rates

- Assuming all government-controlled electronic rates are negative, paper currency really is the issue
 - Private firms don't have the disregard for profits + deep pockets needed to pay an above-market rate on an equilibrium-rate-altering quantity of funds. (See ["How Negative Interest Rates Prevail in Market Equilibrium"](#))
 - Assets whose price can vary freely (including existing debts whose secondary market price can vary freely) cannot create an effective lower bound. (Capital gain then expected depreciation, risk.)

What It Takes to Get a Safe Return that Creates an Effective Lower Bound *Using Paper Currency*

- Modern finance is based primarily on e-money (bank money, numbers in a computer). An arbitrage all starting and ending in e-money is what will interest folks in finance.
- To create an effective lower bound, must
 - withdraw paper currency freely at par
 - store large quantities of paper currency legally & safely
 - **redeposit paper currency freely at par**
 - in decisively equilibrium-rate-altering quantities

Generating a Negative Rate of Return on Paper Currency Using the Depreciation Mechanism

Time-Varying Deposit Fee

- Only between the central bank and private-sector banks. No regulations related to the deposit fee are needed beyond that.
- Must grow over time during the period the target interest rate is negative
- Can shrink when the interest rate is positive.
- Two-way: the other direction is equivalent to getting paper currency at a discount.

Why There is No Arbitrage in the Clean e-Money Approach

	2009	2010	2011	2012	2013	2014	2015
electronic short-term rates	-2%	-2%	0	2%	2%	2%	2%
c-\$ in a short-rate account on Jan. 1	100	98	96	96	98	100	102
p-\$ face value in storage facility	100	100	100	100	100	100	100
paper currency interest rate (PCIR)	-2%	-2%	0	2%	2%	0%	0%
e-\$ per p-\$	1	0.98	0.96	0.96	0.98	1	1
market value (in e-\$) of stored p-\$	100	98	96	96	98	100	100

The Dirty Approach: Managing the Side Effects of Paper Currency at Par

1. Ban Electrification of Paper Currency
2. Use the Interest on Reserves Formula to Subsidize Zero Rates for Small Household Accounts
3. Charge Banks for Excess Paper Currency Withdrawals from the Cash Window, Allowing Them to Impose Restrictions in Turn
4. Retire Large Denomination Notes of Paper Currency
5. Ban Storage of Paper Currency as a Business
6. Put Tight Restrictions on Flows of Paper Currency Out of the Country

Background Assumptions

- Negative target rate (e.g. fed funds or repo rate)
- Negative interest rate on marginal additions to reserves (deposits at the central bank)
 - including vault cash when calculating negative interest on reserves
- Negative lending rate (like current ECB policy)
- Negative between-year rate in the tax system
(See [“However Low Interest Rates Might Go, the IRS Will Never Act Like a Bank”](#))

1. Ban Electrification of Paper Currency

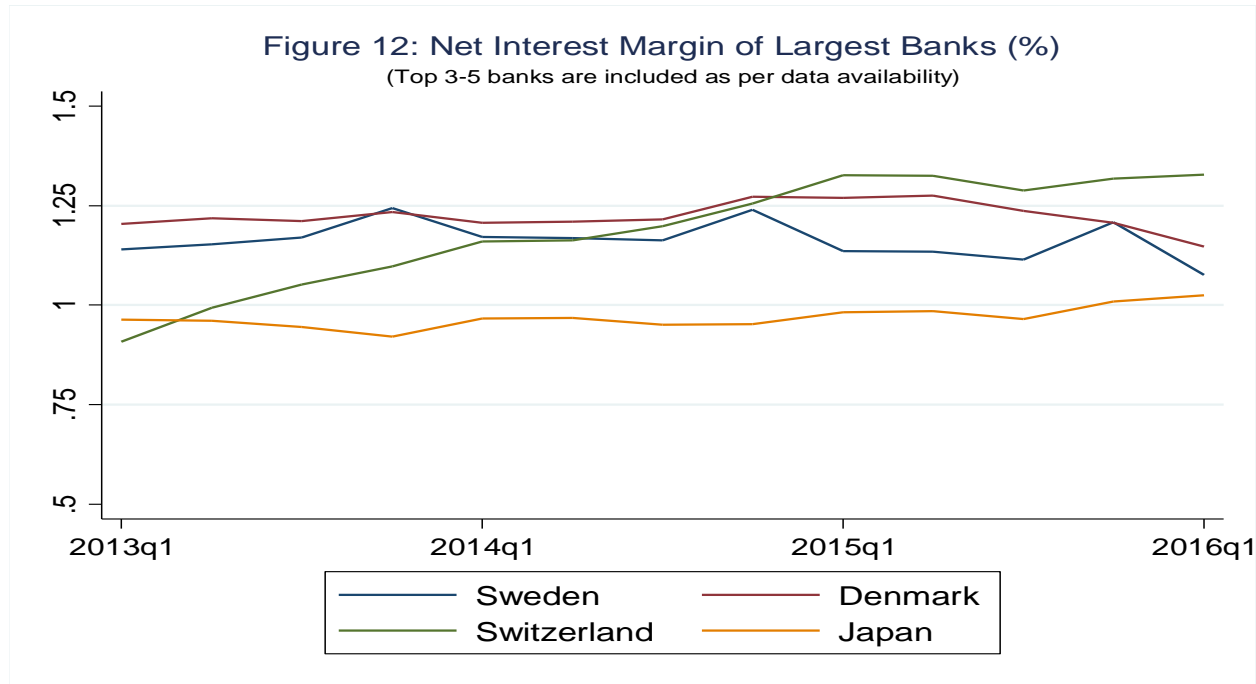
- Prohibit any mutual fund, exchange traded fund, money market fund or any other vehicle providing electronic funds backed by paper currency.

1. Ban Electrification of Paper Currency

- Prohibit any mutual fund, exchange traded fund, money market fund or any other vehicle providing electronic funds backed by paper currency.
- Then the biggest “effective lower bound” issue is a concern about bank profits.

(See [“What is the Effective Lower Bound on Interest Rates Made Of?”](#) + [“Responding to Joseph Stiglitz on Negative Interest Rates”](#))

Don't Exaggerate the Worry about Bank Profits: Net Interest Margins Relatively Unaffected So Far



2. Use the Interest on Reserves Formula to Subsidize Zero Rates for Small Household Accounts

- The formula for interest on reserves can be used to provide an effective subsidy to banks for providing a zero interest rate for the first \$1000 or so per identified individual in average monthly balances in regular bank accounts.
- This means that households with small accounts have no incentive to withdraw paper currency to store the paper currency themselves.

(See [“How to Handle Worries about the Effect of Negative Interest Rates on Bank Profits with Two-Tiered Interest-on-Reserves Policies”](#))

Implementation of Negative Rates and Tiering System (as of June 2016)

Figure 4: Current Implementation of Negative Interest Rate Policy (NIRP)

		Riksbank (Sweden)	ECB (Euro area)	Nationalbanken (Denmark)	SNB (Switzerland)	BoJ (Japan)
Tier system		No Tier System /1	No Tier System	Two Tier System /2	Two Tier System /3	Three Tier System /4
Deposit Rates Faced by Banks	Tier 1	CDs /1 = -0.5% Fine-Tuning Balance = -0.6%	Required Reserves = 0.00% Other Reserves = -0.75%	Current Account = 0.00%	Sight Deposits Below Threshold = 0.00%	Basic Balance = 0.10%
	Tier 2			CDs = -0.65%	Sight Deposits Above Threshold = -0.75%	Macro Add-On = 0.00%
	Tier 3					Policy Rate Balance = -0.10%

/1 Once a week, the Riksbank issues Riksbank CDs at an interest rate that is the same as the repo rate. In addition, the Riksbank carries out daily fine-tuning transactions with the banks if there is an imbalance in the banking system's liquidity in relation to the Riksbank at the end of the day.

/2 The Nationalbank sets the current-account limit with the aim that the counterparties' holdings of certificates of deposits are sufficient to ensure the transmission from Denmark's Nationalbank's interest rates to the money-market rates. The current-account limits are based on the banks' statistics of their activity in the Danish money market, and with a calculation of the banks' need to place funds based on the banks' deposit.

/3 For account holders subject to the reserve requirement, the SNB sets the exemption threshold as 20 times the minimum reserve requirements in reporting period 2014, minus the net increase in cash holdings since then. For others domestic banks not subject to a reserve requirement they use a similar method, while for the rest they set a fixed threshold.

/4 The Basic Balance is calculated as average of the 2015 outstanding current account balance at BoJ minus required reserves. The Macro Add-On is calculated as the minimum required reserves plus balances at current account balances corresponding to outstanding amount of borrowing from the BoJ through special lending facilities. The rest is called the Policy Rate Balance, which is subject to the negative interest rates. Additionally, to prevent significant increase in financial institutions' cash holdings, if cash holdings increase significantly (relative to the benchmark reserve maintenance period), the increased amount will be deducted from the macro add-on balance.

3a. Charge banks for excess paper currency withdrawals from the cash window

- A negative interest rate can be assessed on all paper currency that banks (that have direct access to the central bank's cash window) cumulatively withdraw on net from the cash window of the central bank, after exempting an amount equal to the net withdrawal of paper currency by or on behalf of individuals (who provide an ID number) below defined monthly and cumulative limits set at a level that would not inconvenience most households, but would prevent large-scale withdrawals.
- Could be a fee decoupled from “interest on reserves”)
(See [“The Swiss National Bank and Bank of Japan’s New Tool to Block Massive Paper Currency Storage + Is the Swiss National Bank Ready to Limit Convertibility of Electronic Money to Paper Currency?”](#))

3b. Allow banks to impose restrictions and fees in turn on paper currency withdrawals

Withdrawals of paper currency beyond those limited amounts per identified individual might

- not be allowed
- be charged a one-time fee
- be taken out as a loan of paper currency on which a credit-worthy legal entity guarantees to make payments in line with the negative interest rate on paper currency established for vault cash

4. Retire Large Denomination Notes of Paper Currency

- Increases the storage cost of paper currency
- Ceasing issuance goes a long way toward making massive paper currency storage harder.
- Putting a deadline in redemption goes even further.

5. Ban Storage of Paper Currency as a Business

- No being paid for storing someone else's paper currency
- No collecting up paper currency by buying up paper currency at a price above par
 - May not pay more than \$1.00 in electronic money for \$1.00 in paper currency
 - May not give a cash discount. (Credit/debit discount OK.)
- Note the Gresham's law prediction that use of paper currency in transactions will fall.
- An opportunity to encourage use of e-money (cards)

6. Put Tight Restrictions on Flows of Paper Currency Out of the Country

- This is mostly a failsafe—to avoid big unforeseen things happening with the domestic paper currency abroad
- For example:
 - direct banning of the electrification of one’s paper currency by an offshore mutual fund should be possible, but failsafe if not.
 - blocking an offshore business of storing one’s paper currency should be possible, but failsafe if not.
- Note that people traveling abroad have very little ordinary (non-ZLB related) reason to carry a lot of domestic paper currency abroad, so limiting this shouldn’t cause too much inconvenience. A bank kiosk on the domestic side of the border could accept cash deposits for those who forgot and brought too much cash.

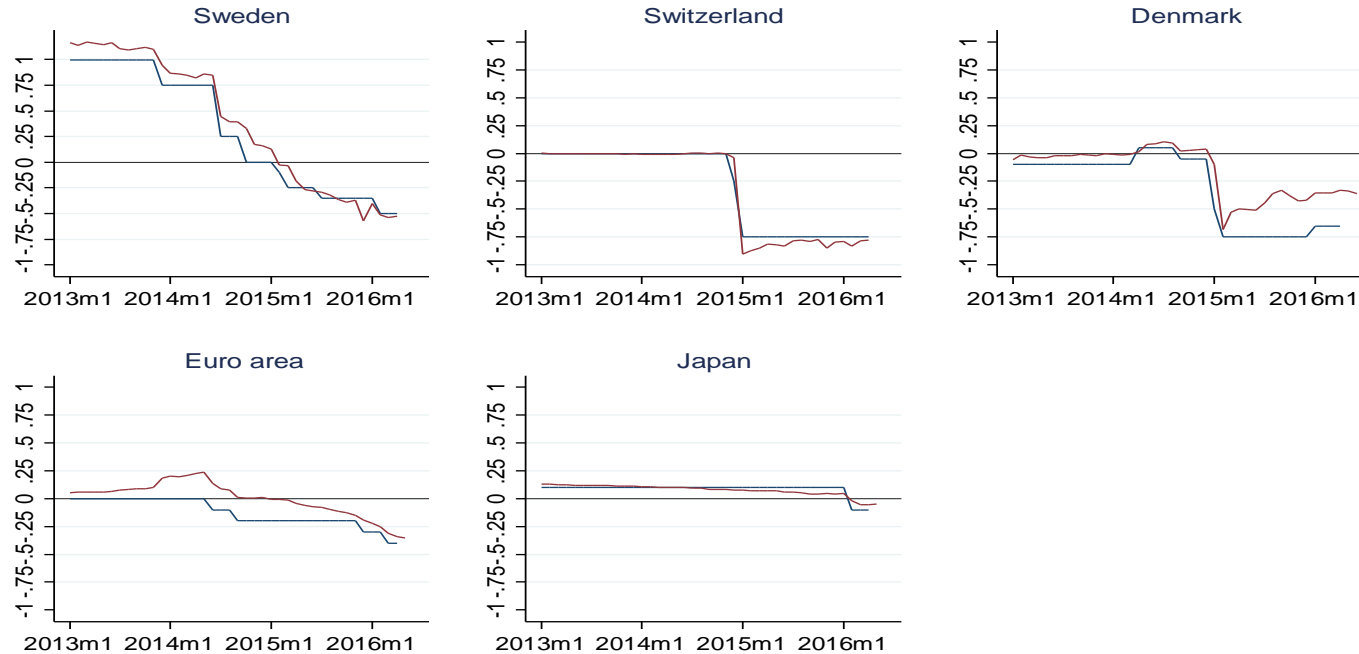
Conclusion

- The Electronic Money Approach is Attractive
- The “Dirty Approach” May Also Work
 1. Ban Electrification of Paper Currency
 2. Subsidize Zero Rates for Small Household Accounts
 3. Charge Banks for Excess Paper Currency Withdrawals
 4. Retire Large Denominations
 5. Ban Storage of Paper Currency as a Business
 6. Restricts Flows of Paper Currency Out of the Country

III. Pass-Through: To Money Market Rates

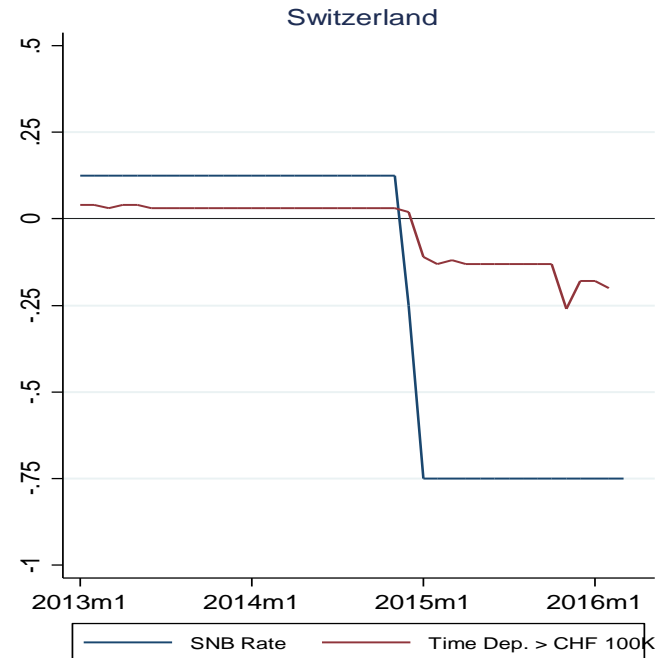
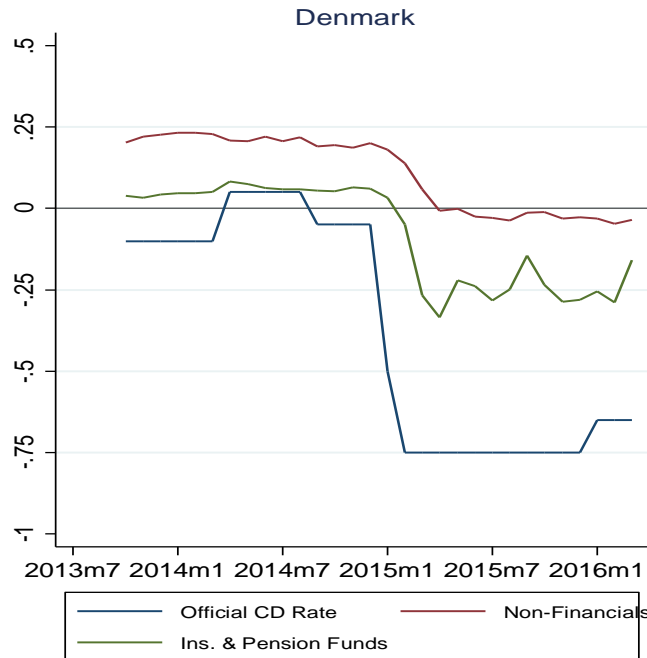
Figure 5: Pass Through of Interest on Reserves to Money Market Rates

(Red = 1 Month Money Market Rate; Blue = Marginal Interest on Reserves)

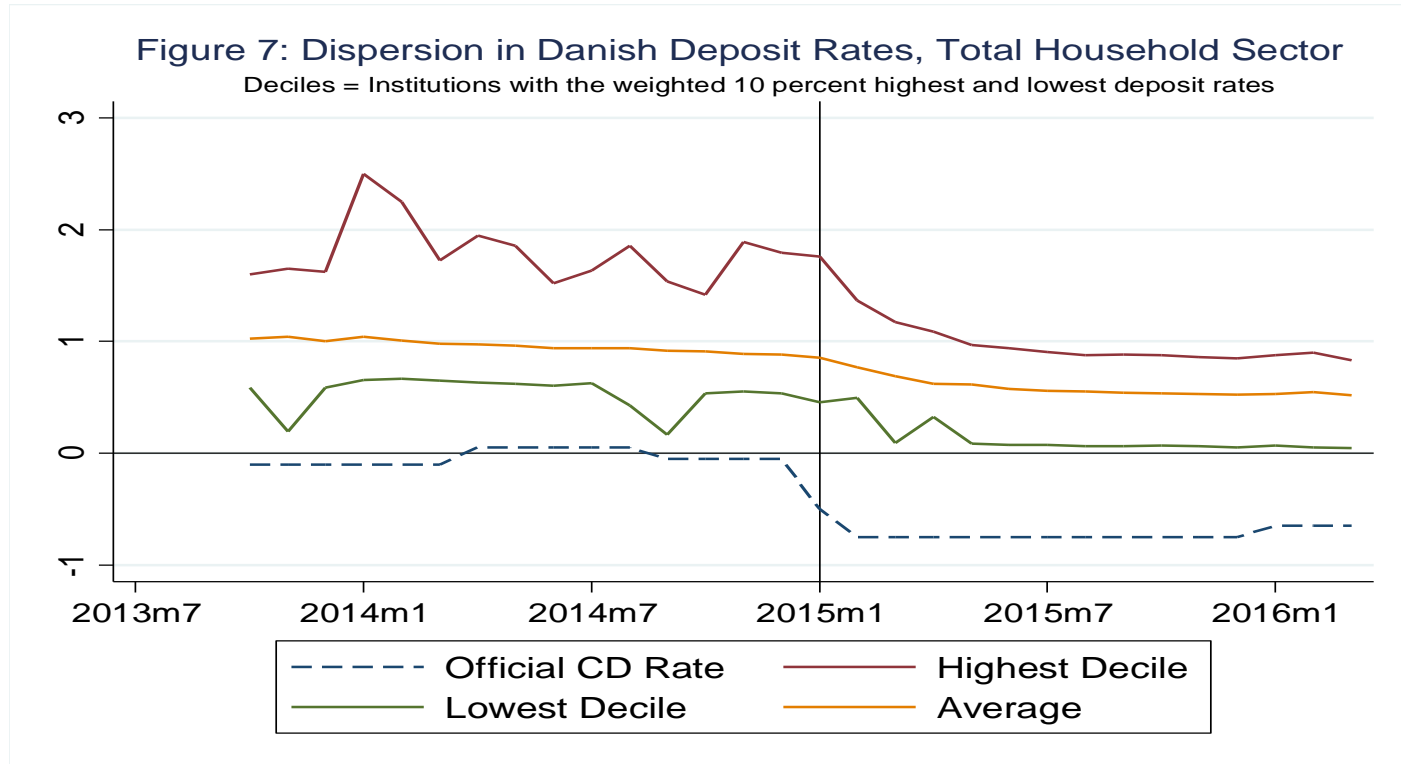


Countries with Deeper Negative Rates have Managed to Pass on Negative Rates to Institutional Depositors

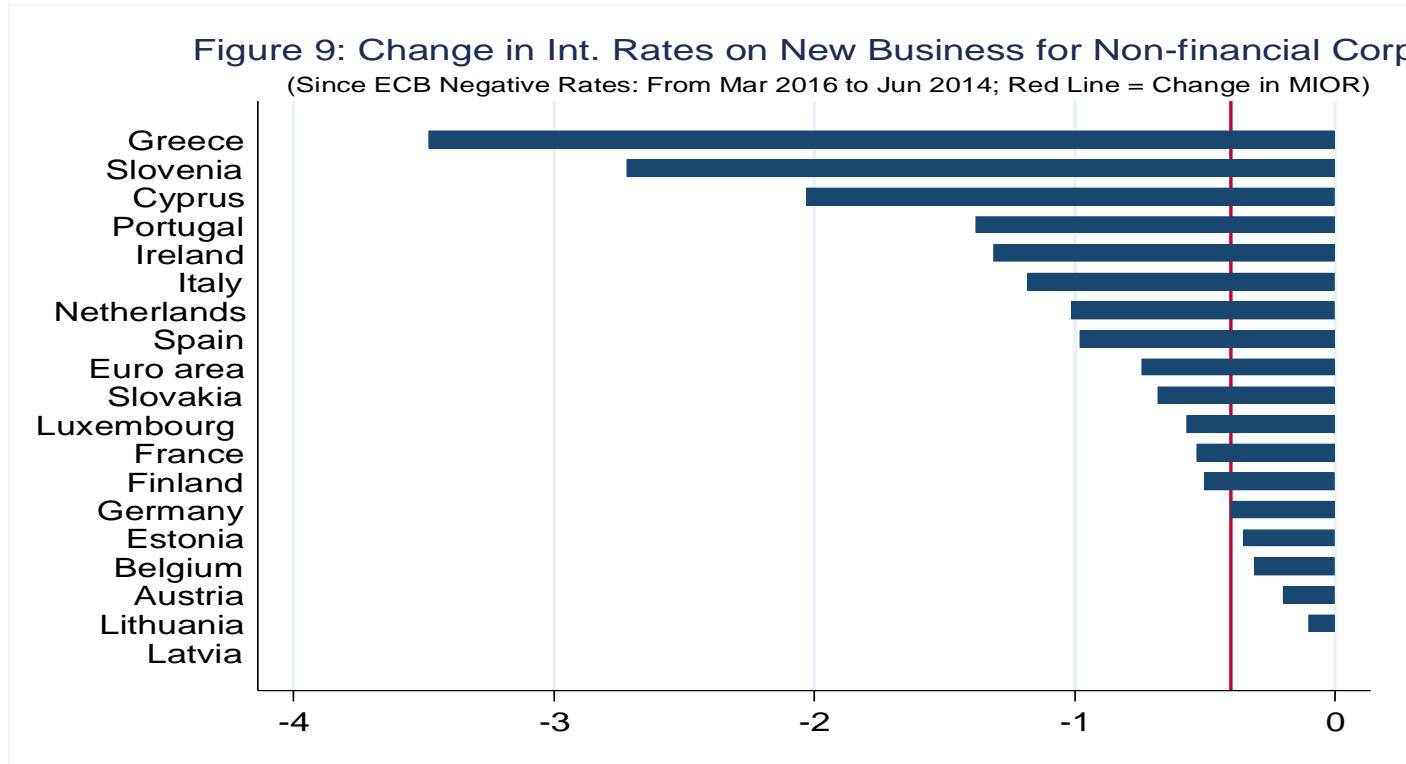
Figure 6: Pass Through of Negative Rates to Institutional Depositors (Percent)



While Pass-Through to Household Deposit Rates is also Present, there Appears to be a Hard ZLB

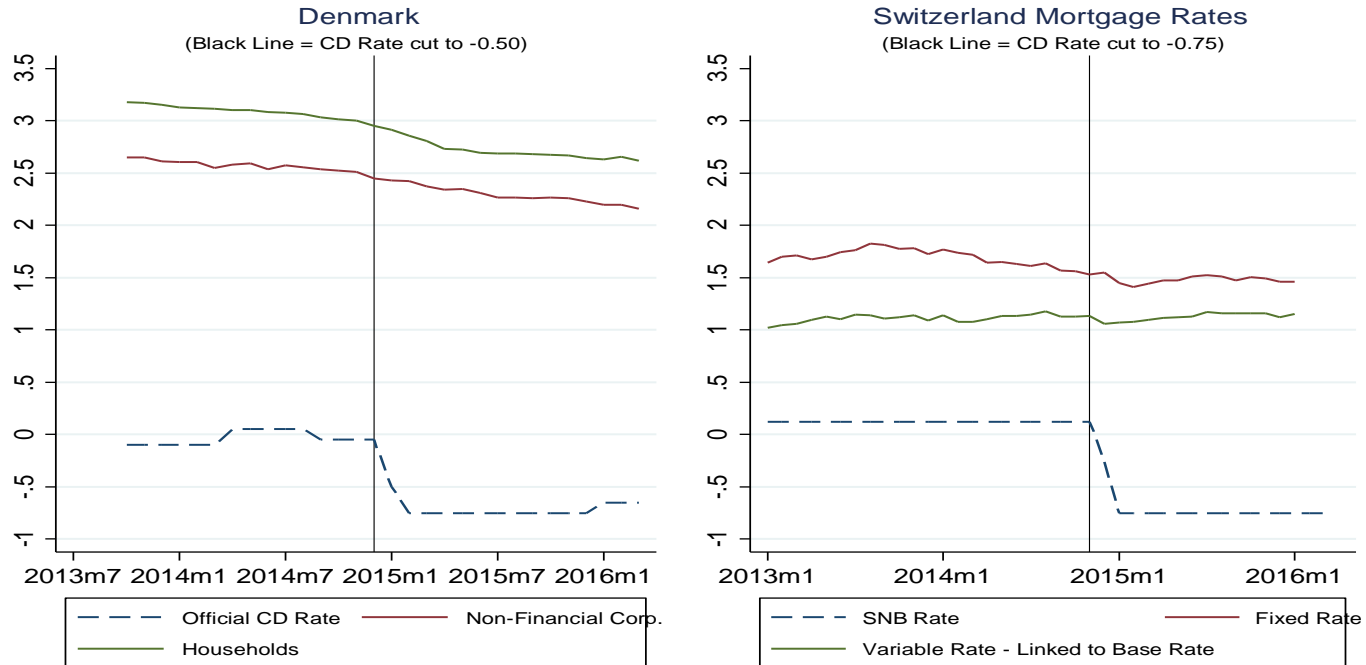


Pass-Through to Lending Rates in Euro Area Varies

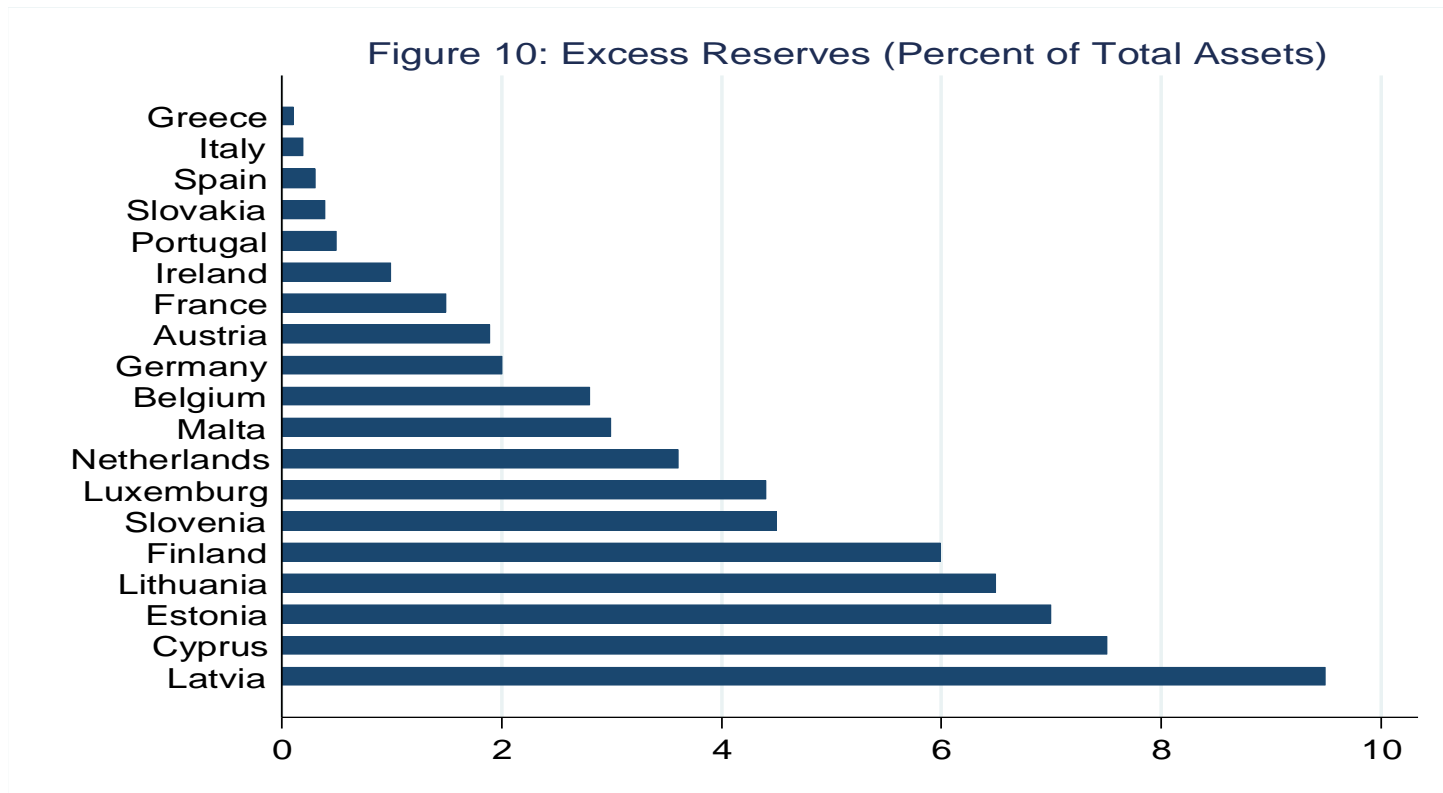


Pass-Through to Lending Rates in Denmark & Switzerland

Figure 8: Pass Through of Negative Rates to Lending Rates (Percent)



The Amount of Excess Reserves Subject to Negative Rates Varies Markedly



IV. The Transmission Mechanism for Negative Interest Rates

Even Central Bankers Need Lessons on the Transmission Mechanism for Negative Interest Rates

Answering

“... when negative rates are implemented in ways that insulate retail customers, shutting off the cash flow and other channels that mainly affect domestic demand, while allowing wholesale rates to adjust, their main effect is through the exchange rate channel.”

--Mark Carney, “Redeeming an unforgiving world.”

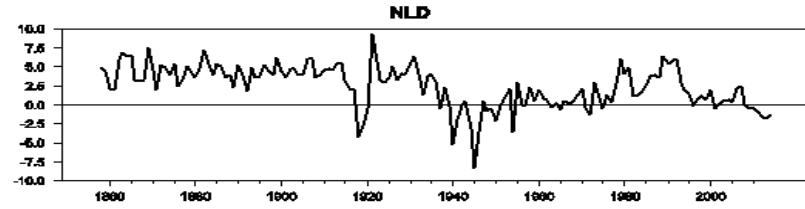
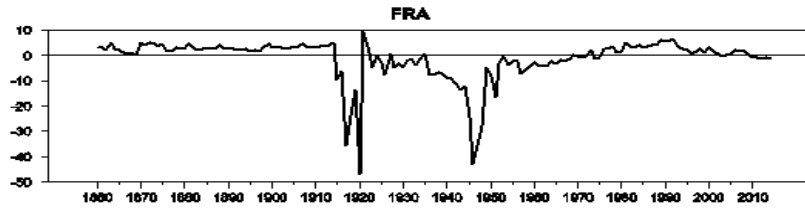
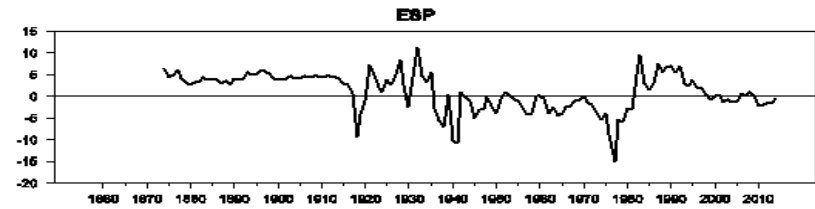
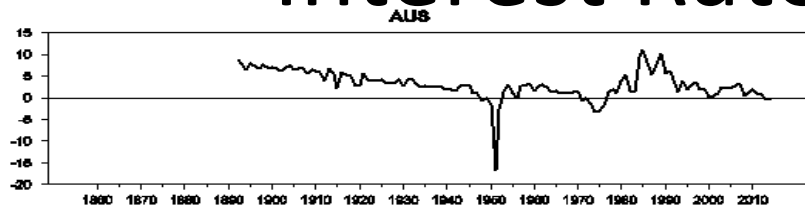
IV. The Transmission Mechanism for Negative Interest Rates

- A. Essentially the same in the negative region as in the positive region: “NIRP as Conventional Monetary Policy”
- B. The Principle of Countervailing Wealth Effects
- C. Differential MPC's
- D. Substitution Effect
- E. Examples of Borrower/Lender Relationships
- F. Multiplier Effects

A. “Negative Interest Rate Policy and Conventional Monetary Policy”

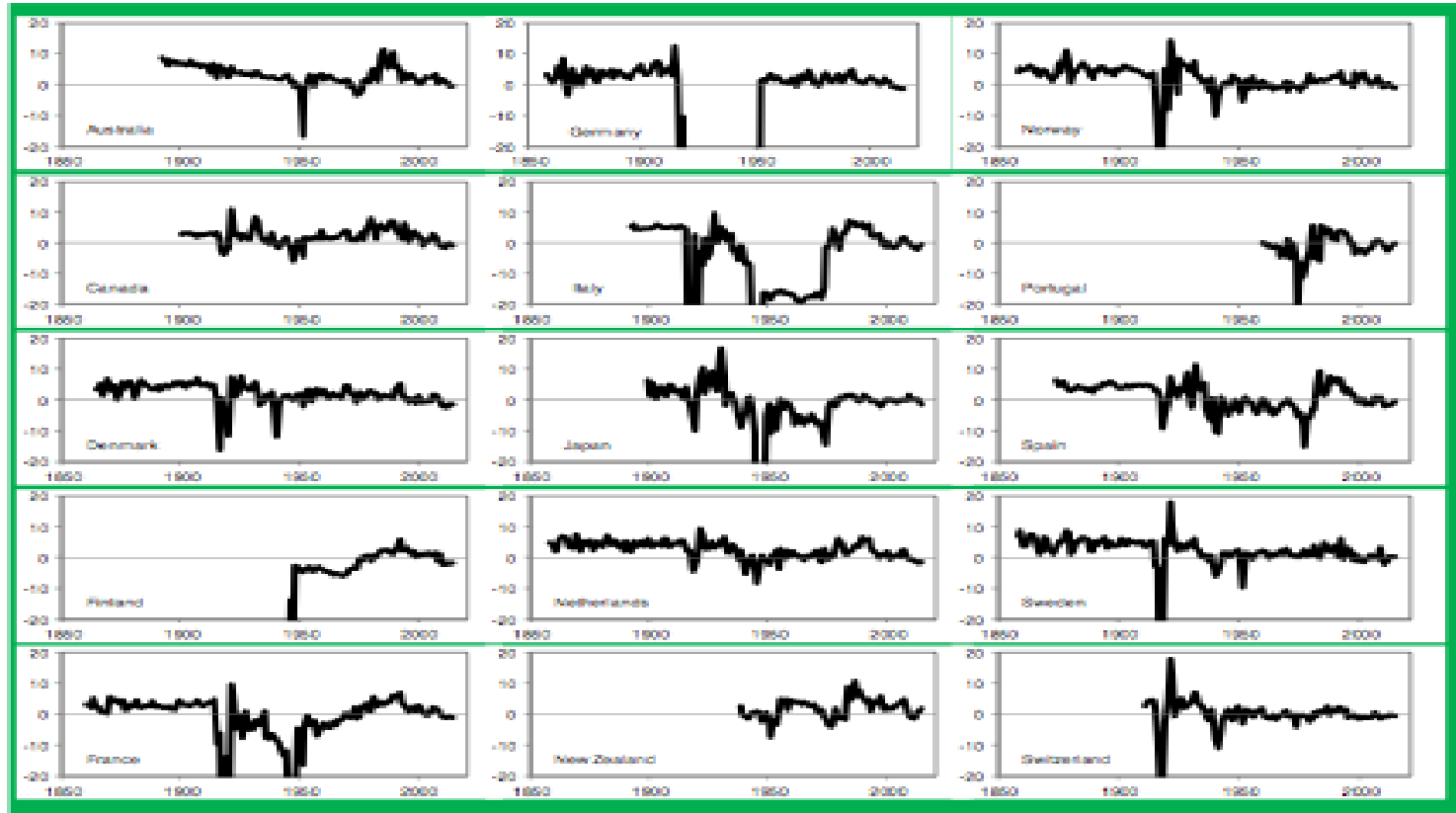
- Ex ante real interest rates are what matter
- The world has a great deal of experience with deep negative ex ante real rates

Hamilton et al. (2015) Ex-ante Real Interest Rates: 1854-2014



Ex-ante Real Interest Rates: 1858-2014

Exhibit 2.6. Ex-ante real interest rate for 15 different countries, annual 1858-2014.



How NIRP Now Might Differ

- Real rate of return on paper currency is now high compared to that experience
- Some behavioral effects of negative rates??
- Negative real rates not associated with inflation

B. The Principle of Countervailing Wealth Effects

“... there is always another side to every borrowing-lending relationship. If the economic actor on one side of the borrowing-lending relationship gets a negative hit to effective wealth, the economic actor on the other side will get a positive boost to effective wealth—again with the exception of the overall expansion of the economy.” --MSK

C. Differential

Marginal Propensities to Consume

- In general, borrowers tend to have higher MPC's than lenders. This makes lower rates stimulative.
 - Being a good spender is part of what makes one a borrower.
 - Being a good saver is part of what makes one a lender.)
- Adrien Auclert quantifies this effect in [“Monetary Policy and the Redistribution Channel”](#)

D. The Substitution Effect

Aside from, or in addition to, wealth effects, there is an incentive to tilt spending toward now rather than later when the interest rate falls.

E. Examples of Borrower-Lender Relationships

- Small household deposits
- Firms with “cash” hoards
- Mortgages
- Car loans
- Venture capital
- Commercial paper
- T-bill holding
- T-bond holding
- Central bank lending

F. Multiplier Effects

To the extent negative rates have a first-round effect on aggregate demand, this can have a positive overall wealth effect and an “accelerator” effect (better business environment for investing)

V. Alternatives to Negative Interest Rates

- Fiscal: effect on debt, not technocratic, delays
- QE: limited to squeezing spreads
- Forward guidance: cost of constraint, credibility
- Nominal GDP level targeting: helpful, but would it be enough?
- Helicopter drops: equivalent at ZLB to rebates

V. Alternatives to Negative Interest Rates (cont.)

- Economy will fix self
- Austerity
- Higher inflation baseline: easier said than done.
& why not have only innocuous inflation (relative to ancillary paper currency when needed) & not bad inflation (relative to the unit of account)?
- Supply-side: effect on investment is tricky theoretically, not so easy politically, delays

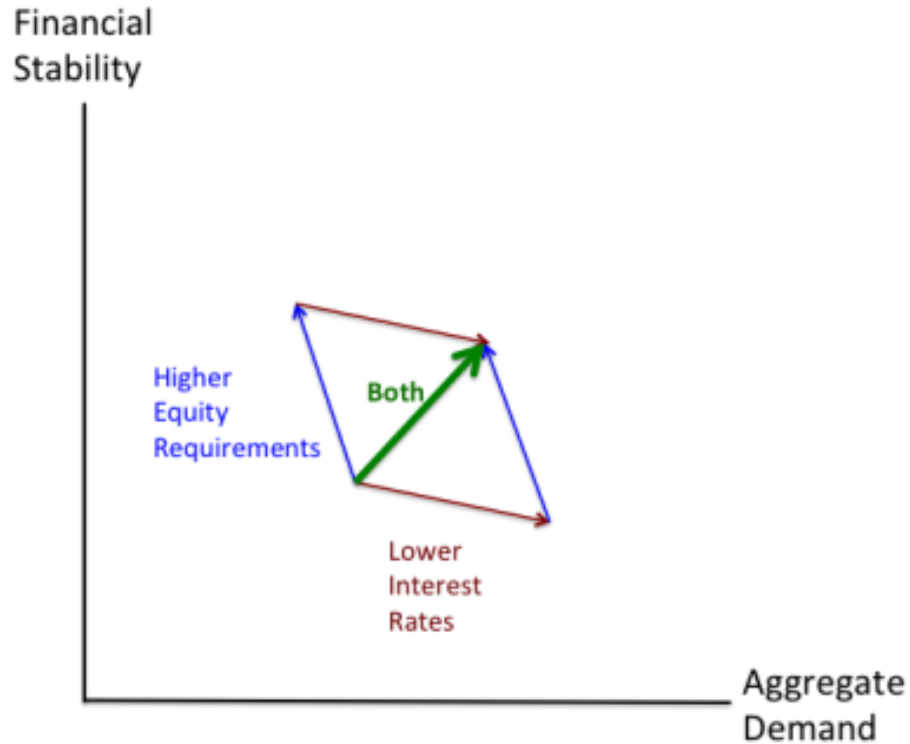
VI. The Complementarity between Demand-Side and Supply-Side Policies

- The knowledge that more demand-side stimulus is needed distracts much more from supply-side reform
- Many supply-side reforms require reallocation of labor and capital—something that typically looks too painful to insist on when unemployment is high and businesses healthy in normal times are failing because of a recession

VI. The Complementarity between Demand-Side and Supply-Side Policies

- Governments that end recessions quickly gain the credibility to implement tough reforms
- Keeping the economy at the natural level of output highlights that natural level of output and the supply-side reforms that would raise it
- Monetary stimulus avoids the increase in national debt that can distract from or directly interfere with supply-side reform (*e.g.* by higher taxes or less scientific research)

VII The Complementarity Between Negative Rates and Higher Capital Requirements



VII The Complementarity Between Negative Rates and Higher Capital Requirements

(See [“Why Financial Stability Concerns Are Not a Reason to Shy Away from a Robust Negative Interest Rate Policy”](#))

- Having the stimulative power of negative interest rates on tap makes it unnecessary to get extra aggregate demand by allowing financial bubbles *a la* Larry Summers.
- It is important to pair negative rates with progressively higher equity (capital) requirements in the form of capital conservation buffers until property rights are crystal clear (that is, enough equity holders signed up to take any hit that there is no chance of a taxpayer bailout)

Other Policies to Boost Financial Stability

- Mortgage reform is also important—for example, Andrew Caplin's shared appreciation mortgages. (Intentional government participation in all realized capital gains and losses for houses might be a substitute.
- A contrarian sovereign wealth fund can also be helpful (even when funded by government borrowing at low rates)

Short-Term vs. Long-Term Rates

- Long-term interest rates arguably matter more for financial stability than short-term interest rates, because long-term interest rates matter most for perceived present values of the largest components of wealth; demonstrating that the zero lower bound has been broken by implementing negative paper currency interest rates is likely to raise the expectations of long-term rates by reassuring markets that the future will not look like Japan's lost decades.

More to come:

18 Misconceptions about Eliminating
the Zero Lower Bound
(and Any Effective Lower Bound
on Interest Rates)

This afternoon!

*Addendum 1: Why things other than paper currency
won't create a lower bound on interest rates*

As long as all other government borrowing rates go negative in tandem, nothing else will stop negative interest rates from going into deep enough negative territory to get economic recovery. Other government borrowing rates:

- Repo rate
- Interest on reserves
- Government bill rate
- Postal savings interest rate

*Addendum: Why things other than paper currency
won't create a lower bound on interest rates*

- Private firms will not offer zero interest rates when market interest rates are deep in negative territory. Only the government has both the deep pockets and the disregard for profit and loss needed to do this.
- Any asset whose price can fluctuate can go up enough in price in the face of negative interest rates to have a return low enough to be consistent with negative safe rates.

Special cases of assets whose price can appreciate enough to drive down their yields

- Preexisting debt contracts
- Old currency redeemable at par (but not available for withdrawal at par)
- Preexisting gift cards redeemable at par (including those redeemable for an electronic refund at par)
- Foreign currency
- Gold

The Case of Forever Postage Stamps

- Have a zero *real* interest rate built in that does not generate a lower bound because they cannot be turned in for a refund in unlimited quantities
- Issuance could cease at any time, making them an asset that could float in price
- Empirically have not created a lower bound of zero on the real interest rate

Addendum 3: Profound Change in the Monetary Policy Toolkit is Possible

(See [“Ezra Klein Interviews Ben Bernanke about Miles Kimball’s Proposal to Eliminate the Zero Lower Bound”](#))

- Something of equivalent magnitude happened in the 20th century: the end of the gold standard
- If one includes the end of Bretton Woods, one could say that monetary systems often last about 50 years

Profound Change in the Monetary Policy Toolkit is Possible

- Quantitative easing was also seen by many as quite radical, but gained traction.
- The politics of eliminating or managing the zero lower bound is different in different countries and different situations. Once one central bank blazes the trail, it is much easier for others to follow.
- International finance reinforces the spread of techniques of monetary stimulus.

Outline

- I. Why Negative Rate Policy is Important
- II. The Clean Approach and the Dirty Approach
- III. Pass-Through to Market Rates
- IV. The Transmission Mechanism from Negative Interest Rates to Aggregate Demand
- V. Alternatives to Negative Interest Rates
- VI. The Complementarity between Demand-Side and Supply-Side Policies
- VII. The Complementarity Between Negative Rates and Higher Capital Requirements