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Preprint

Funders-of-Last-Resort: Legal Issues Involved in Using Central Bank Balance Sheets to Bolster Economic Growth

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Abstract

What role does unconventional monetary policy – and particularly unconventional policies like private asset purchases under a quantitative easing or lender of last resort scheme – play in influencing economic growth directly? Emerging and developing countries' central banks could contribute to GDP growth by following the example of jurisdiction like the US, UK and EU, by buying private sector and specific obligation public sector assets. Such a scheme would like most benefit jurisdictions like Greece, Bulgaria, Ukraine and others. Unsurprisingly, we find a weak relationship between these purchases and investment world-wide for the last 10 years. We also find the existence of a "sloth effect" – a pattern in the data whereby more central bank asset purchases actually coincides with lower investment. We estimate the gains to increasing central bank balance sheet sizes with these assets. We also show how statutory mandate for nominal GDP targeting set the best legal foundations for such asset purchases. We finally describe an internal audit engagement which would collect the specific data needed to verify the results in this study.

Keywords: funder of last resort, unconventional monetary policy, central bank balance sheet, nominal GDP targeting, internal audit, sloth effect.

JEL Codes: E58, E42, K23, O23.

Disclaimer: The material in this paper does not represent formal advice to any institution, and does not reflect any of the positions of any of the institutions to which the authors affiliate. The co-authors have worked on different parts of the paper – and thus may not necessarily agree with all the contents. In this way, we do not need to negotiate or censor particular results appearing in the marketplace of ideas.

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Introduction

Central bank balance sheets in many jurisdictions have expanded since the financial crisis. Such an expansion sometimes results from the use of unconventional monetary policies, which saw these banks hold on to government and private sector securities. Most conducted these policies in spite of their central bank laws, rather than because of them. Moreover, despite the wide-spread use of these policies, we know very little about the effects of these purchases on the investments these securities underpin. Can monetary finance (through whatever the channel) direct money at more productive assets than banks – either during a crisis or in normal times? Can central banks use their balance sheets as an instrument of development policy, rather than simply as a tool for macroeconomic stabilisation and business cycle management? Can we square existing public and administrative law with the need to support demand for certain kinds of productive assets outside the public sector?

Our paper looks at the role central banks play as a "funder of last resort" when purchasing private sector assets. Large-scale central bank asset purchases (particularly of private sector securities) may help to direct credit toward productive assets when banks do not. Such purchases though may represent more than a temporary stabilization measure. These purchases may promote longer-run investment and thus output growth, independent of their effect on broader monetary policy. More worryingly through, they may actually stifle such investments and output growth under many circumstances. We speculate that such a "sloth effect" corresponds to less interest in investment concomitant with more money available to companies. Though we refrain from speculating on the source of this effect, to keep our paper focused. For the countries benefiting (and the times when even harmed countries benefit) from such policies, existing law provides a poor basis for these policies – jeopardizing central banks' ability to use and keep these policies in place. A nominal GDP target – enshrined in law – serves as the most reliable way to ensure a central bank would have the authority to buy these private sector assets.

We organise our paper as follows. The first section documents the expansion of central banks' balance sheets world-wide. We also review the likely effect of such expansion on productive private sector investment directly – effects which most academics analyse through their effects on broader money markets. The second section describes the conditions when such purchases would like help – rather than hurt – investment incentives (and thus growth). Some of these conditions include times of financial distress, when central banks can invest in better assets than ministries of finance can (either through competence or integrity). These purchases keep investment funds in place and represent useful policies for countries with significant market and political failures. The third section estimates the effect of these purchases – independently from their effect on

sector securities purchases likely have the largest effects for a group of countries where-and-when traditional monetary policy has failed, though other circumstances abound. The fourth section describes the lack of an existing legal basis for most central bankers determined to follow the course of private sector securities purchases. We find that most central banks' laws fail to provide a sufficient basis for these purchases – making these laws a potential source of instability rather than growth. We finally describe how to revise these laws in the developing country context – most efficiently done through the adoption of Nominal GDP targeting as a primary objective of central bank policy. The final section concludes. An appendix describes the design of an audit which could test at the microeconomic level the effects we crudely estimate at the macro one.

We should highlight several caveats before we begin. First, we discuss central bank asset purchases – and particularly private sector securities purchases -- as a relatively insubstantial complement to existing monetary policy. As such, we do not discuss the many macroeconomic effects paraded in the canonical models -- like effects on interest rates (one of the key propagation mechanism between monetary policy and growth), expectations, the availability of credit or as a tool of exchange rate policy.[1] To the extent possible, we try to trace the effects from printing press to assembly line. Yet, only a microeconomic study can really achieve this.[2] Second, we only discuss the purchase of government securities in the context (as a comparison with or contrast for) private securities purchases. Private securities represent a fraction of overall central bank purchases. We do not deny the role that public investment can play in growth. We do so in order to focus on our topic (promoting private sector investment). Third, we do not discuss international effects or the multiplier effects of these purchases – in order to focus on the effects of the mostly developing countries we target in this paper.[3] Fourth and finally – we make prescriptive recommendations, as predictions, based on the evidence available. We try to avoid jargon and use simple English, so as to attract a broader range of readers.

Growing Central Bank Balance Sheets and Their Effect on Investment

Central Bank "Purchases" of Private Sector Securities in Perspective

Since the global economic crisis, many countries have considered using central bank purchases of private assets to prop up asset values – in effect making central banks

[1] Literally hundreds of papers address these issues. For a selection of some of the better ones, see Matthieu Paries and Michael Kuhl, The Optimal Conduct of Central Bank Asset Purchases, *ECB Working Paper Series 1973*, 2016, available online. See also Martin Weale and Tomasz Wieladek, What Are the Macroeconomic Effects of Asset Purchases? *Bank of England Monetary Policy Committee Discussion Paper No. 42*, 2014, available online. See also Michael Joyce, David Miles, Andrew Scott and Dimitri Vayanos, Quantitative Easing and Unconventional Monetary Policy – An Introduction, *Economic Journal 122*, 2012, available online.

[2] Appendix II shows the terms of reference of an audit aimed at finding similar results.

[3] For evidence of these spill-overs, see Christopher Neely, Unconventional Monetary Policy Had Large International Effects, *Federal Reserve Bank of St. Louis Working Paper 2010-018G*, July 2010, available online.

funders of last resort.[4] Central banks in Switzerland and Japan have famously bought private sector securities in order to prop up demand for these securities while lowering interest costs.[5] The UK central bank has bought corporate debt so far – with equities purchases on the horizon.[6] Yet, even central banks from emerging markets like Russia took private sector securities as collateral for loans.[7] Sceptics pejoratively refer to these purchases as get rich quick schemes.[8] Yet, they do far more than simply increase demand at the margin for private sector securities. They often make the central bank a funder of last resort - offering liquidity when no one else will.[9] Like any funder, "those funding backstops are vital because market-makers are exposed to the risk of having to hold, and therefore fund, inventory of indeterminate size" – a role historically given to central banks.[10] Like other funders, these central banks keep money flowing and share in the residual risks/rewards of their collateral/assets.[11] Large central bank balance sheets thus turn these banks into funders of last resort.

Such purchases comprise only one element of a broader approach to monetary policy known as unconventional monetary policy (which includes forward guidance and other ways of influencing market expectations as well as the 'quantitative easing' which usually focuses on buying government securities).[12] Figure 1 shows the simplified view of these asset purchases. Ignoring the central bank's role in setting interest rates directly, conventional monetary policy consists of the central bank buying government bonds in an

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[4] For a non-technical overview, see Christopher Whittall, Jon Sindreu and Brian Blackstone, Central Banks Embrace Risk in Era of Low Rates: bankers invest bigger share of growing currency reserves in equities, corporate bonds in effort to wring out higher returns, *Wall Street Journal*, 2017, available online.

[5] These costs decrease as interest rates (namely the 'price' of investment) fall concomitantly with the increase in the amount of capital available for investment. For press overviews of Switzerland's experience, see John Revill, Swiss central bank steps up stock buying spree, *Reuters Aug 30*, 2016, available online. For Japan, see Anna Kitanaka, Yuji Nakamura, and Toshiro Hasegawa, The Bank of Japan's Unstoppable Rise to Shareholder No. 1, *Bloomberg 14 Aug*, 2016, available online.

[6] Gavin Jackson, Bank of England's corporate bond-buying faces uphill climb, *Financial Times Aug 23*, 2016, available online. Tim Wallace, Bank of England plans to accept equities as collateral from banks, UK Telegraph, 13 Jul 2015, available online. See also Sam Goldfarb and Christopher Whittall, New Tool for Central Banks: Buying Corporate Bonds, Aug. 4, 2016, available online.

[7] Jack Farchy, Russia's central bank to help companies refinance debts, *Financial Times December 24*, 2014, available online.

[8] Eshe Nelson, Central banks have hatched a get-rich-quick scheme for companies in an attempt to avoid a slowdown, *Quartz Aug 25*, 2016, available online.

[9] The market-maker of last resort function – such that central banks must carry assets on its books -- make these institutions far more than just lenders. See Laurent Le Maux and Laurence Scialom, Central Banks and Financial Stability: Rediscovering the Lender-of-Last-Resort Practice in a Finance Economy, *Cambridge Journal of Economics 37*(1), 2013, available online.

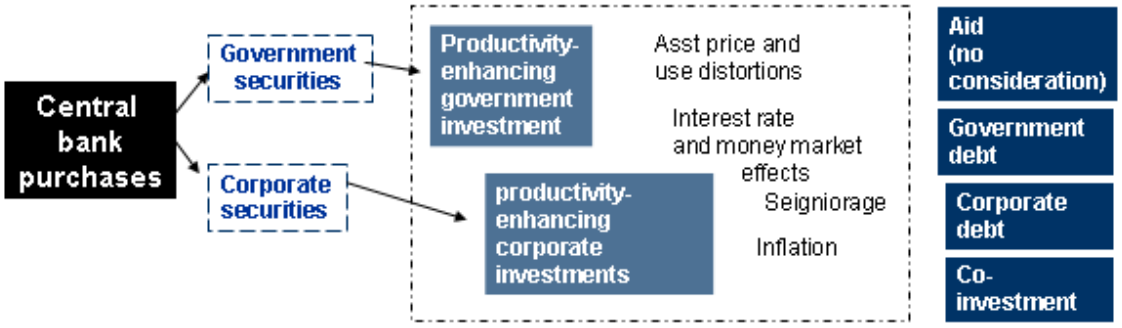
[10] Paul Tucker, The Lender of Last Resort and Modern Central Banking: Principles and Reconstruction, *Bank for International Settlements Paper 79*, available online.

[11] Do Central Bank Policies Since the Crisis Carry Risks to Financial Stability, Chapter 3 in *Global Financial Stability Report 2013*, 2013, available online. See also Angel Ubide, Sovereign Bond Purchases and Risk Sharing Arrangements: Implications for Euro-Area Monetary Policy, *IP/A/ECON/2015-2 June 2015*, available online.

[12] For more on the tools of such unconventional monetary policies and their place in the broader monetary policy firmament, see Karl Habermeier and co-authors, Unconventional Monetary Policies—Recent Experience and Prospects, *IMF Working Paper*, 2013, available online.

effort to influence interest rates or deepen markets for these bonds.[13] The money – in theory – helps finance (among other things) productive government spending (like in research) or public goods used by companies (like roads). We would characterise the central bank's build up of securities just as we characterise other securities holders as funders or investors. **Increasing balance sheet sizes reflect in part a stock of past productive investments which the central bank had to buy as a funder of last resort (otherwise someone else would have bought these assets).**

Figure 1: Central Bank Balance Sheets Without Banking

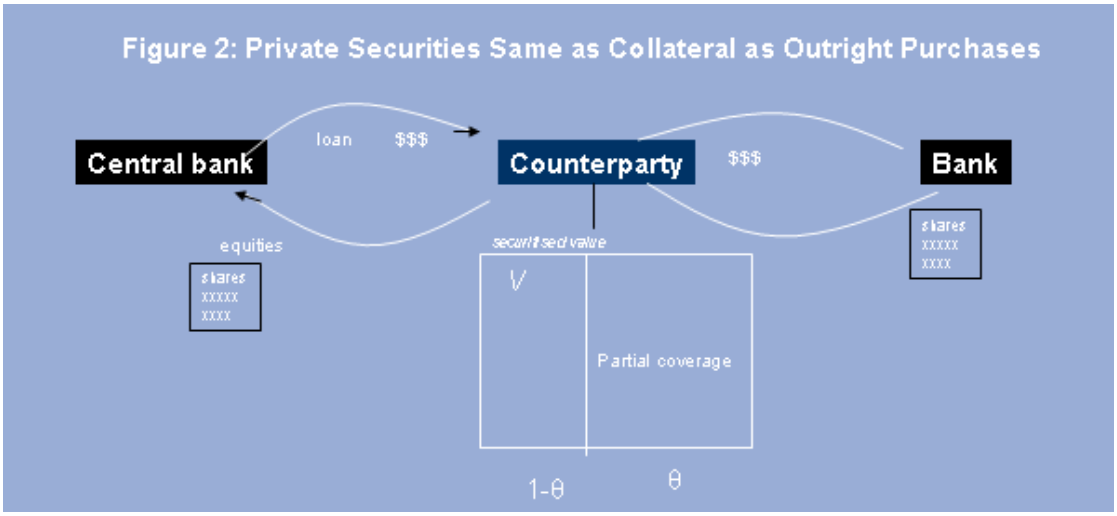


The figure shows a simplified view of the impact of central bank securities purchases. Money from these purchases helps fund productive activity inside and outside the government (as shown in the light blue boxes). Such purchases eventually have broader effects on relative and absolute levels of asset prices, interest rates, seigniorage, inflation and other factors (as shown in the dotted box around these securities). As the central bank makes these purchases, stocks build up of either government debt, corporate debt, "aid" (IOUs which the recipient does not intend to repay under a helicopter money scheme), or property rights in a co-investment as embodied in equities, derivatives or other contracts.

Private securities **"purchases"** have a special meaning in a central bank context. The central bank may receive commercial debt (commercial paper, bonds, IOUs, etc.), equities, asset/debt backed securities, and other derivatives (or even gold and foreign currency) as collateral from loans made to counterparts – usually banks. Most, if not all, bank laws expect the central bank to return this collateral upon repayment of the loan. Thus, the Bank "purchases" the assets in this transaction to the extent it gives money in exchange for ownership rights over the assets – which the bank may keep in full (for no repayment), in part (partial repayment and thus has purchased the asset for the difference between the credit given and cash repaid), or by forfeit (if the asset is worthless and thus the bank purchased a worthless asset). Banks in the broader banking system might also buy private sector securities to release money into the economy as part of "normal" monetary policy – with the aim of selling them when the central wants tighter money. Central banks (especially those merged with development banks at the start of their existence) bought these securities as part of development/fiscal spending. Few banks

[13] We ignore the central bank's role in setting interest rates throughout this paper in order to focus on the direct impact of securities finance while holding other monetary effects constant. We refer to "bonds" as a short-hand for any debt (bills, notes, etc.).

(except maybe Ecuador) still do this.[14] They may also buy these assets as relatively inefficient reserves (inefficient in that the Basel rules make these securities far less valuable as reserve holdings than capital than bonds from sovereign lenders and international financial institutions). Figure 2 provides a graphical view of these transactions and the equivalence between collateralization and the outright purchase of securities and other assets. **Thus, we use the word "purchase" to loosely describe the acquisition of private sector assets – whether bought for capital gains, received "accidently" as collateral, or kept to guarantee money and other liabilities.**



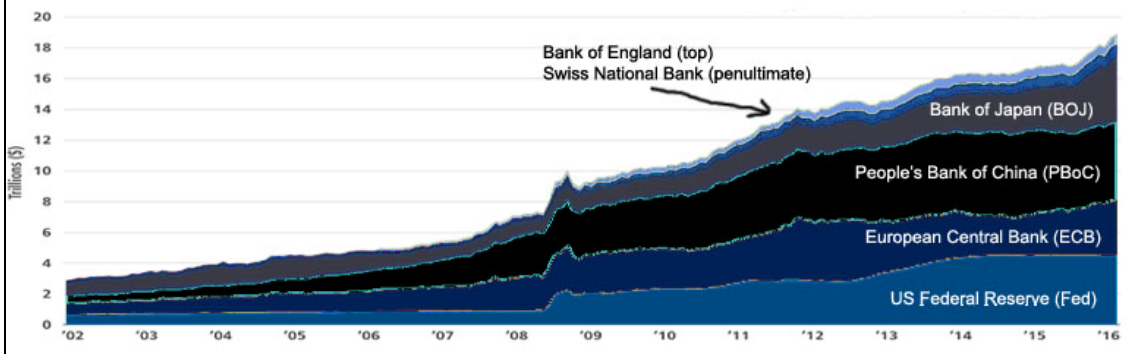
The figure shows the links between a central bank, the bank's release of cash into the economy, and counterparts' securities. The central bank (on the one side) and banks (on the other) may lend money to a private sector counterpart in exchange for part of the securities' value (θ). If the counterparty defaults, the (central) bank may sell these securities for the full value if possible (V) or the expected/appraised value (θ).

Such purchases have grown dramatically in the post-crisis period. Figure 3 shows the growth in central bank balance sheet assets in recent years.[15] The European Central Bank, US Federal Reserve Bank and Bank of Japan have bought up most of these assets (excluding the People's Bank of China which we discuss briefly later). Significant academic interest in Swiss, Japanese and UK private sector asset purchase programmes belie the relatively small sizes of these programmes on a global scale.[16] As also shown, central banks only acquired many of these assets relatively recently – with private sector assets bought only when typical government and bank asset purchases failed to provide enough liquidity to the private sector. As we will see, many of these purchases centred on covered bonds or asset backed securities dealing with real estate assets used by the

[14] We cover some of the history of these central banks' divorce from development banks later in our paper's legal analysis section.
[15] PIMCO, *Global Central Bank Balance Sheets*, 2017, available online.
[16] Rabb and colleagues provide a tabular overview of the main programmes authorising asset purchases by these central banks. See Carolin Raab, Kerstin Bernoth and Philipp Konig, Large-Scale Asset Purchases by Central Banks II: Empirical Evidence, *DIW Roundup Politics in Focus*, April 8, 2015, available online.

private sector, but guaranteed by government entities and/or financial institutions. While not representing solid investments in assets we typically associate with the private sector (ie machines, intellectual property, plant/property and equipment and so forth), they nevertheless represent a vector for bringing funds which are available for investment into these companies. Thus, **until recently, central banks loaded up on assets of government and banking institutions – rather than focusing their liquidity on the private sector entities they sought to reach in the first place**.

Figure 3: Four Central Banks Hold Almost One-Third of the Value of the World's GDP in Securities



The figure shows the value of central bank balance sheets for the jurisdictions shown in the figure on 30 June 2016.
Source: PIMCO (with data from Haver Analytics).

The programmes chosen by the US Federal Reserve Bank and the ECB highlight the different economic actors each central bank targeted. The Fed's private sector related purchases targeted that country's troubled real estate sector in a programme known as the Large-Scale Asset Purchase Program. The Federal Reserve purchased $175 billion in direct obligations of three large government agency intermediaries engaged in real estate lending and guaranteeing loans (known as Fannie Mae, Freddie Mac, and the Federal Home Loan Banks). From January 2009 to August 2010, the Federal Reserve purchased $1.25 trillion in mortgage based securities guaranteed by Fannie Mae, Freddie Mac, and Ginnie Mae.[17] Given inefficiencies in lending to banks, the Fed bought these securities to affect credit conditions directly in the market it wanted to affect -- namely real estate. The only purchase of private sector equities came in the form of quasi-legal purchases of special purpose vehicles the Fed helped set up to buy shares in Bear Stearns and AIG).[18]

Wider economic malaise in the European Union encouraged the European Central Bank to purchase a wider range of asset classes – as authorised by a broader range of regulations. The EU's Expanded Asset Purchase Programme (known by the acronym APP) has consisted of three Covered Bond Purchase Programmes (CBPP), an Asset-Backed Securities Purchase Programme (ABSPP), and a Corporate Sector Purchase

[17] Federal Reserve Board, Open Market Operations, 2017, available online.
[18] Emerson provides a fascinating description of the Fed's machinations aimed at buying failing companies. See Chad Emerson, The Illegal Actions of the Federal Reserve: An Analysis of How the Nation's Central Bank Has Acted Outside the Law in Responding to the Current Financial Crisis, *William & Mary Business Law Review 1*(1), 2010, available online.

Programme (CSPP) – which extends on purchases made under the now-ended Securities Markets Programme (SMP).[19] As of this writing (mid-2017), the European Central Bank system bought about €80 billion per month in assets, up from around €60 billion in 2015 and 2016.[20] Of such growth, private sector assets only comprise about 6% of total assets on the ECB's balance sheet.[21] Why did large economy central banks end up with so few assets from the private sector – the end-sector they wanted to effect the greatest change in?

Throughout the post-crisis period, these large-economy central banks ended up with less – rather than more – assets in the private sector companies they sought to bolster. Figures 4a and 4b shows the relative proportion of private to government assets in central banks' balance sheet assets. [22] In Figure 4a, the US, UK, Japan and the ECB all appear in the upper-right hand quadrant of the figure measuring the extent these burgeoning balance sheets piled up domestic versus foreign, and private versus government, assets. Only Switzerland's central bank seems to have taken on more private sector assets relatively to government ones. Looking specifically at Figure 4b, we see that large-economy central banks have chosen, over the course of the previous decade, to buy government assets instead of assets from their own country's productive enterprises. The Bank of England seems to have made a sharp jerk away from private sector assets, toward domestic bonds. The European Central Bank moved toward increasing the share of European debt on its balance sheet (even if the Bank bought large amount of private sector assets during that time). The US Federal Reserve Bank held increasingly more private sector assets, presumably as the result of political bail-outs rather than as a result of consciously and strategically managing the composition of its balance sheet.[23] Despite large public pronouncements about their private asset purchases, these central banks have shied away from purchasing productive assets. As we will see shortly, other jurisdictions in emerging markets did not follow their lead.

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[19] European Central Bank, Asset purchase programmes, 2017, available online. As with the Fed case, we assume these covered bonds guaranteed payment on real estate or other productive assets used by the private sector.

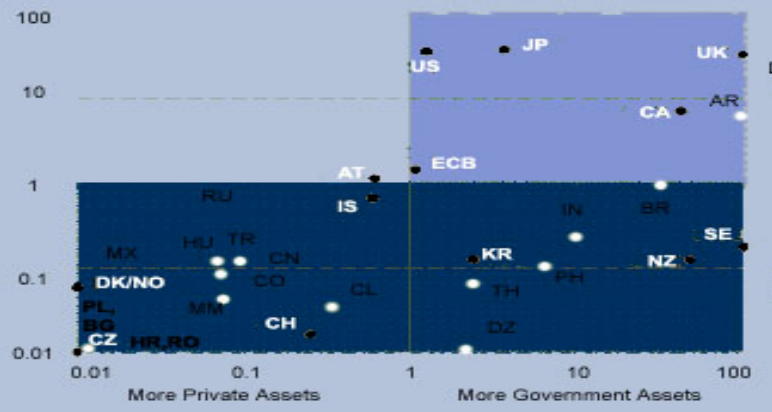
[20] Id.

[21] See Ann-Katrin Petersen, The ECB's exit: First things first, AllianzGI QE Monitor April 2017, available online.

[22] Christiaan Pattipeilohy, A Comparative Analysis of Developments in Central Bank Balance Sheet Composition, *BIS Working Papers No 559*, 2016, available online.

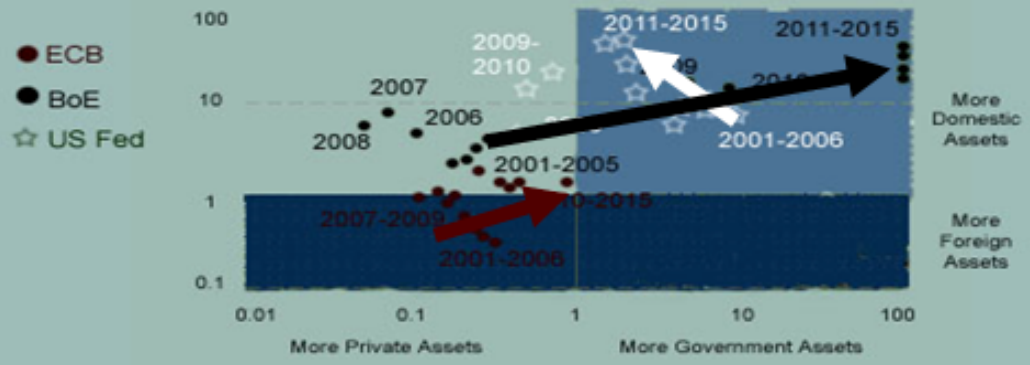
[23] For exact data about the Fed's support to private borrowers, see Elizabeth Warren, AIG Rescue, Its Impact on Markets, and the Government's Exit Strategy, 2010, available online.

Figure 4a: Advanced Economies' Central Banks More Private Sector Asset Friendly



The figure shows the relative composition of central banks' assets in 2015 for advanced economies (black dots with white labels) and emerging markets (white dots with black labels). Asset distributions have been rescaled between 100 and 0.01 on a geometric scale. See original for more details on these scales.
Source: Pattipeilohy (2016).

Figure 4b: Why Didn't the US, EU and UK Just Scale Up Their Balance Sheet's 2001 Compositions?



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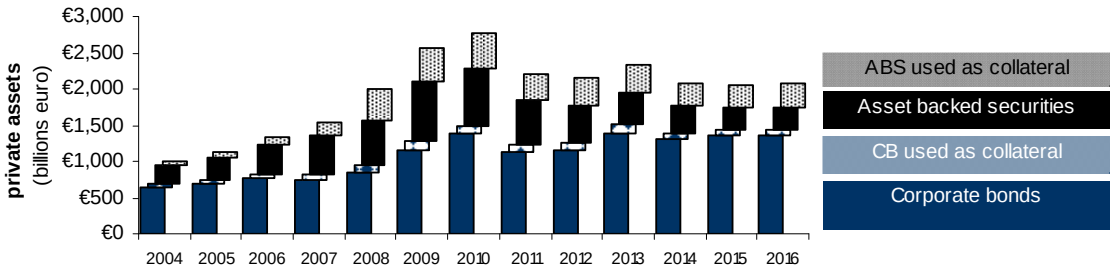
Source: Pattipeilohy (2016).

Why didn't central banks use abundant private securities available to extend more credit to the private sector? Central banks had recourse to large volumes/values of private sector securities available as potential collateral at a time when banks had failed to get central bank money into private sector hands. Figure 5 shows the value of corporate bonds and asset-backed securities in the euro-zone – as well as the value of these securities used as collateral for lending for the last 12 years.[24] The ECB – like most central banks – has accepted as collateral only a fraction of all the collateral available. Yet, the prior hesitance of central banks like the ECB and Federal Reserve to purchase private assets represents the exception rather than the rule in the conduct on much central bank policy world-wide. **Significant emerging market central bank purchases of private sector**

[24] ECB, Eurosystem Collateral Data, 2017, available onkline.

assets make understanding these purchases a priority for academics and policymakers alike.

Figure 5: Why Are Huge Collateral Pools Ignored by the ECB?

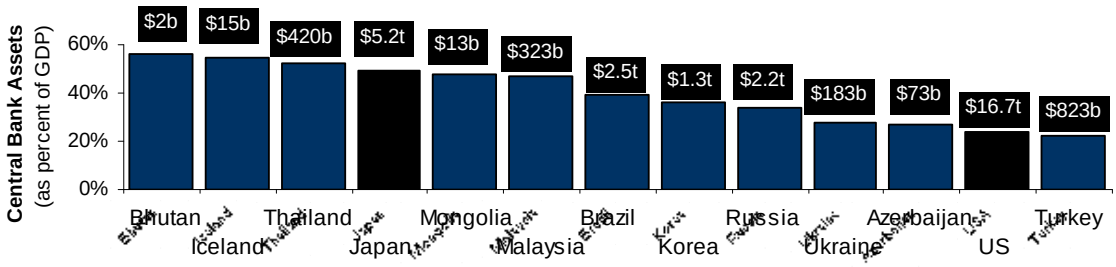


The figure shows the value of securities (namely corporate bonds and asset-backed securities) as solid bars and the values posted with the ECB as collateral for lending in dotted bars. The ECB only hung on to a microscopic part of these securities as collateral for lending. Source: ECB (2017).

Central Bank Funding of Productive Investment in Developing Countries

Developing and emerging markets' central banks' balance sheets have also expanded in the post-crisis period. Figure 6a shows the way that central banks around the world have increasingly bought assets of all kinds in order (in part) to extent money/credit to their business sectors.[25] As a share of their GDP, Bhutan, Iceland, and Thailand have held the largest share of government and private assets as a share of their GDP. At least eight (8) central banks hold the equivalent of 33% of GDP as balance sheets assets. Except in limited cases where countries owe large external debts to multilateral organisations, **if these central banks had been private institutions, they would have represented some of the largest funders in their economies.**

Figure 6a: Central Banks Could Easily Be a Country's Largest Funder

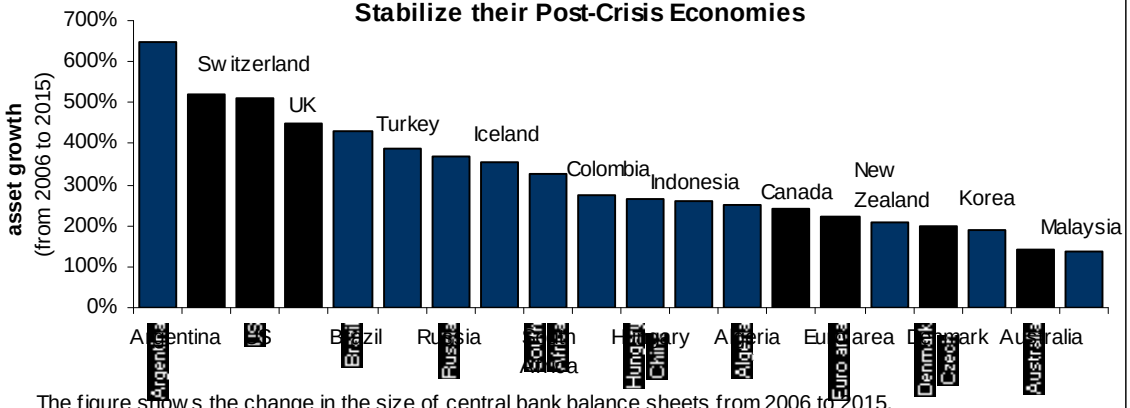


The figure shows the size of central bank balance sheets in 2013 relative to each jurisdiction's GDP. The boxes above each bar show asset values in absolute terms. We highlight Japan and the US for ease of comparison.
Source: Gray and Pongsaparn (2015).

[25] Simon Gray and Runchana Pongsaparn, Issuance of Central Bank Securities: International Experiences and Guidelines, *International Monetary Fund Working Paper 15/106*, 2015, available online.

Other data show the speed of these central banks' asset accumulation. Figure 6b shows the change in asset purchases in the recent decade. Argentina's balance sheets have grown the fastest (by more than 6 times). Malaysia's increased by more than 100%. The US, UK and Switzerland's central banks expanded their assets faster than most of the countries on this list. Yet, from Hungary to Algeria, central bank asset purchases grew very quickly. **Such growth rates clearly show that central banks could (and did) respond quickly to financial issues – making central bank asset purchases a preferred way of dealing with wide-spread investment shocks.**

Figure 6b: Emerging Markets Only Timidly Used Asset Purchases to Stabilize their Post-Crisis Economies

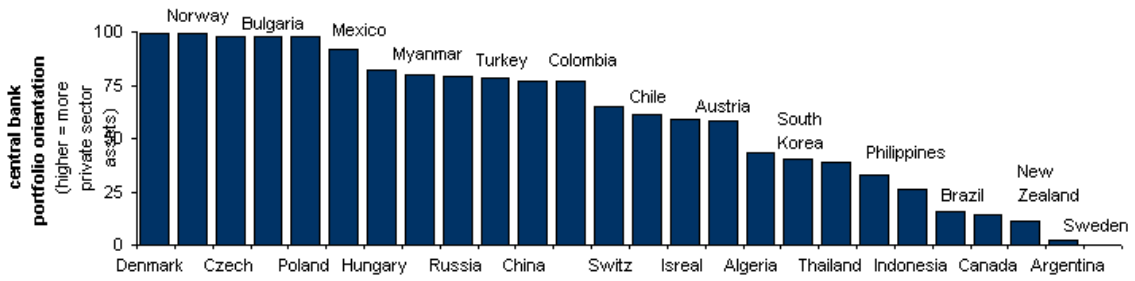


The figure shows the change in the size of central bank balance sheets from 2006 to 2015.
Source: Pattipeilohy (2016).

What about central banks' buying securities from private sector entities themselves? Which central banks responded by buying up comparatively more private than public sector assets? Figure 7 shows that some central banks have stocked up on relatively more private sector assets than government ones. Central banks in Bulgaria, Poland, and Mexico seem to have loaded up on relatively more private sector assets (if we read the original data source correctly). Central banks like Algeria's and Indonesia's preferred investments in government securities. Figure 8 shows the way that the ratio of private assets might have changed in relation to government assets.[26] The figure shows relatively large changes because even relatively small changes in the underlying assets could cause these ratios to change quickly. From the authors' original figure, we took the inverse value of the change in the government to private sector asset holdings (whatever that value actually represents). If these numbers represent the underlying relative change in private sector assets, Malaysia and Switzerland loaded up the most. Argentina and Denmark...the least. No matter the numbers – a key conclusion remains. **Central banks buying relatively more private sector assets potentially contribute far more to their domestic industry than central banks that bought comparatively more government bonds.** Our study should help determine if and how such a contribution actually exists.

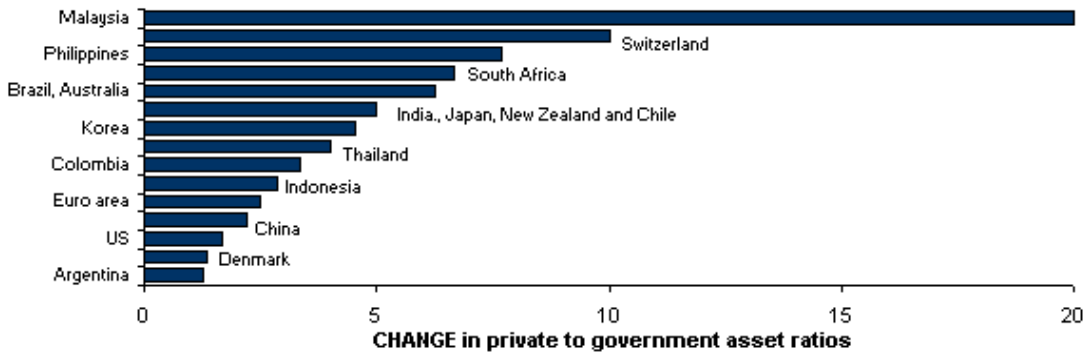
[26] We say "might have" because we might have misinterpreted the relatively hard-to-read underlying figure. That figure though provides one of the few analyses of these data, making citing it necessary for our own study.

Figure 7: Many Developing Countries' Central Banks Far More Private Sector Friendly



The figure shows the extent to which the central banks in jurisdictions shown favoured the purchase of private sector, as opposed to government, assets. We calculated these buy taking their log value governmen-to-private sector asset ratio (from 0.01 to 100 on a log scale), inverting the scale and normalising between 1 to 100. If 0.01 represented a jursidiction with the highest value of private sector assets relative to government assets, our figure shows the inverse (with 100 representing the highest private sector asset ratios).
Source: Pattipeilohy (2016).

Figure 8: Did Some Emerging Markets' Central Banks Like Malaysia and the Philippines Stock Up on Comparatively More Private Sector Assets?

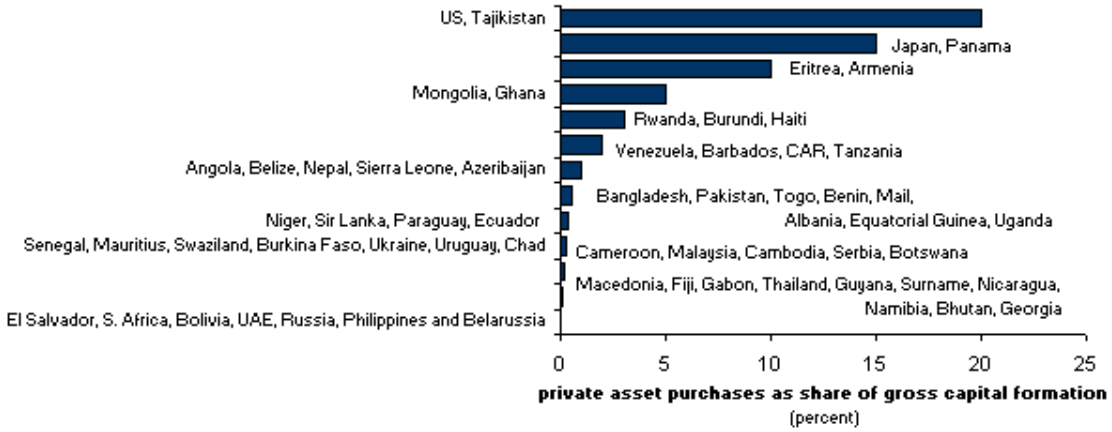


The figure shows the possible change in the proportion of central banks' private asset holdings compared with their government bonds (asset) holdings from 2006 to 2015. We show the inverse of the author's original variable (G/L) in their figure 6 and exclude other variables like deposits. We pose these data in the form of a question - given the difficulty in reading and interpreting the original source.
Source: Pattipeilohy (2016).

The magnitude of these purchases potentially makes these central banks significant funders in/of these private sector securities. Figure 9 shows the magnitude of central banks' private sector asset purchases in relation to investment (or more specifically gross capital formation). As shown, about 60 central banks from countries in our dataset had enough private sector assets to represent more than a fractional amount of investment. In about 6 cases, these assets made up a significant share of investment. Naturally, these data do not tell us about the marginal effect of central bank securities purchases on the production or sale of these securities – namely to what extent the central bank's purchases affect the volume/availability and price of these securities on the margin compared with the situation where the central bank does not participate. Yet, the size of these purchases likely makes the central bank an influencer of private investment, even with very small effects on such investment at the margin. **Even without any knock-on money market effects, central bank securities purchases can have significant direct**

effects on the supply of private sector investment through demand for private securities.

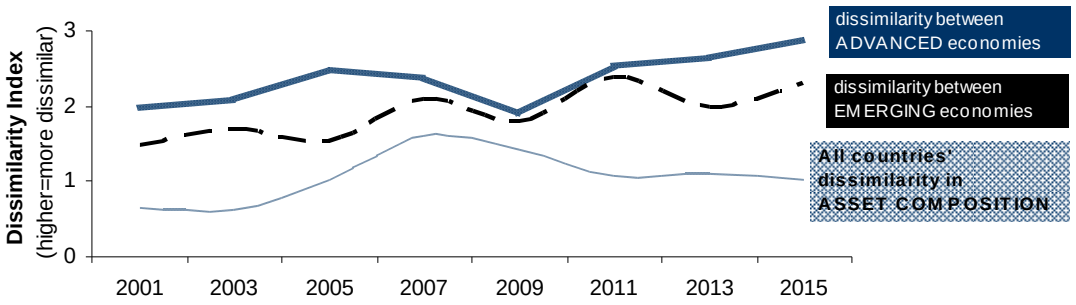
Figure 9: Many Central Banks Buy Enough Private Sector Assets to Comprise Significant Investors in Their Own Right



The figure shows the ratio of central bank purchases of private sector assets (in local currency units) to gross capital formation for the countries shown for 2015 or the latest year available).
Source: IMF (for central bank asset data) and World Bank (for gross capital formation).

Emerging economies' central banks will obviously prefer to buy different types and quantities/values of private sector securities. Figure 8 shows the extent to which the composition of central bank balance sheets varied across countries and over time. Within the advanced economies, we see that Canadian central bankers (for example) had different preferences for holding private (and other types) of assets than US or Norwegian central bankers. These dissimilarities increased over the 2010s – presumably as central bankers purchased assets which best corresponded to the need to their own financial systems and economic responses to monetary policy. Differences in central banks' demand may depend on each bank's own portfolio risks (and desire for diversification), desired effects on liquidity in certain securities markets (and broader effects on credit supply for particular types of investments), effectiveness of banking sectors to channel resources to these investments, and even governments' ability to use spending productively. We describe these factors later in this section. One conclusion follows if these factors help explain central bank demand for "purchases" of private sector securities. **Emerging markets' central banks' differencing preferences for "purchasing" (accepting as collateral) private sector securities should reflect their jurisdictions' differing investment needs and returns.**

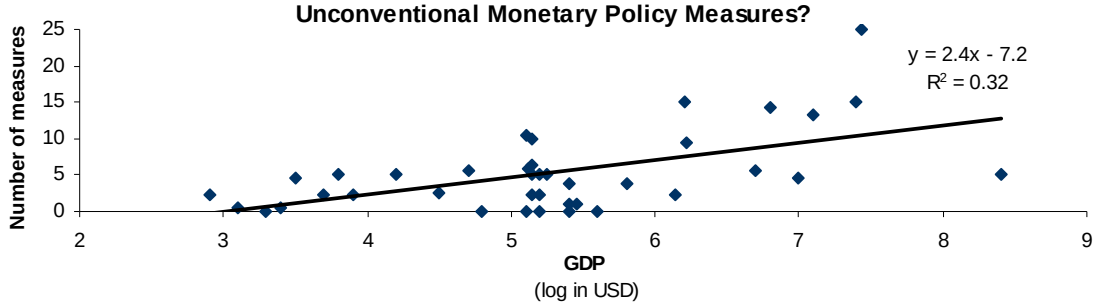
Figure 10: Advanced Economies Drew on a Wider Variety of Asset Purchases to Boost Investment/Consumption



The figure shows the dissimilarity in the types of assets central banks from each of the country groupings shown purchased in the years shown. See original for definitions of the index used and other specifics.
Source: Pattipeilohy (2016).

Other evidence points to different emerging markets' needs for central bank private sector securities purchases to support companies' investments in and out of crisis times. Figure 11 shows the number of unconventional monetary policy measures used by emerging market central banks during the global economic crisis.[27] Bigger emerging market economies' central banks resorted to using more types of unconventional monetary policy – as they sought ways to get money into private hands in the face of relatively poorly functioning mechanisms for banking and government redistribution/support. Central banks – as conservative agencies – use different measures only when needed. Larger economies presumably have larger distortions – making the use of unconventional monetary policy instruments (like outright private securities purchases or the acceptance of such collateral for direct lending) more necessary. **Central banks must be adopting measures like private securities purchases because they potentially work better.** [28]

Figure 11: Larger Developing Countries Needed More Unconventional Monetary Policy Measures?



The figure shows the number of unconvential monetary policy measures adopted by developing countrires during the 2007-8 financial crisis. Please see original for definitions of measures, countries and so forth.
Source: Ishi and collagues (2009) at Figure 1.

[27] Kotaro Ishi, Mark Stone, and Etienne B. Yehoue, Unconventional Central Bank Measures for Emerging Economies, International Monetary Fund Working Paper P/09/226, 2009, available online.
[28] "Work" in this case means they deliver credit into entrepreneurial or managerial hands better than relying on former methods of funding the banks which then allocate this credit.

China's central bank's experience purchasing private sector securities probably offers the most important glimpse at the effectiveness of how emerging market central banks can use these purchases to bolster investment in and out of crisis times. Yet, we know very little about that experience. We know that the PBOC's purchase of commercial assets focuses on longer-term development.[29] We also know the rough magnitude of these purchases – as "the June 2007 survey also indicates that China held $27.6 billion in long-term corporate bonds, another $1.4 billion in short-term corporate bonds, and $28.5 billion in equities. It has since bought $43 billion of corporate bonds and another $11 billion of equities, bringing its total holdings of corporate bonds up to at least $71billion and its holdings of equities up to $40 billion."[30] The extent of the PBOC's private sector asset purchases has even led to fears about a "battle of the central banks" – with the PBOC keen on buying up assets abroad as well as at home.[31] Lack of data prevents academics from assessing their experience. Yet, for good or ill, **the People's Bank of China's direct monetisation of investments across the board has raised interest in central bank purchases of private assets as a means of boosting both crisis and non-crisis investment and thus growth.**

The Effect of Unconventional Central Bank Asset Purchase Programmes

Almost all studies looking at the effects of central bank asset purchases – and particularly private asset purchases – fail to look at the direct link between purchases (including accepting these assets as collateral for loans) and investment. Focusing on the broader effects on monetary policy, traditional studies break up these purchases' effects on portfolio rebalancing (wealth effects and decreased borrowing costs), increased bank reserves, and signalling (effects on expectations and confidence) – with their focus on the final effects on spending and income (rather than investment).[32] **The academic and practitioner literature has ignored the effect of quantitative easing – and particularly central bank private sector asset purchases – on investment supply directly.**[33]

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[29] See Sam Le Cornu, QE China-Style II: The Truth about China, *Macquerie Working Paper*, May 2016, available online. See also Economist, The flawed analogy of Chinese QE: Why China's latest monetary policies should not be called "quantitative easing" *Economist*, 2015, available online.

[30] Brad Setser and Arpana Pandey, China's $1.7 Trillion Bet: China's External Portfolio and Dollar Reserves, *Council on Foreign Relations Working Paper*, 2009, available online. The term "private sector" requires a healthy dose of scepticism in the Chinese context, where the state holds shares and/or significant influence in many corporates.

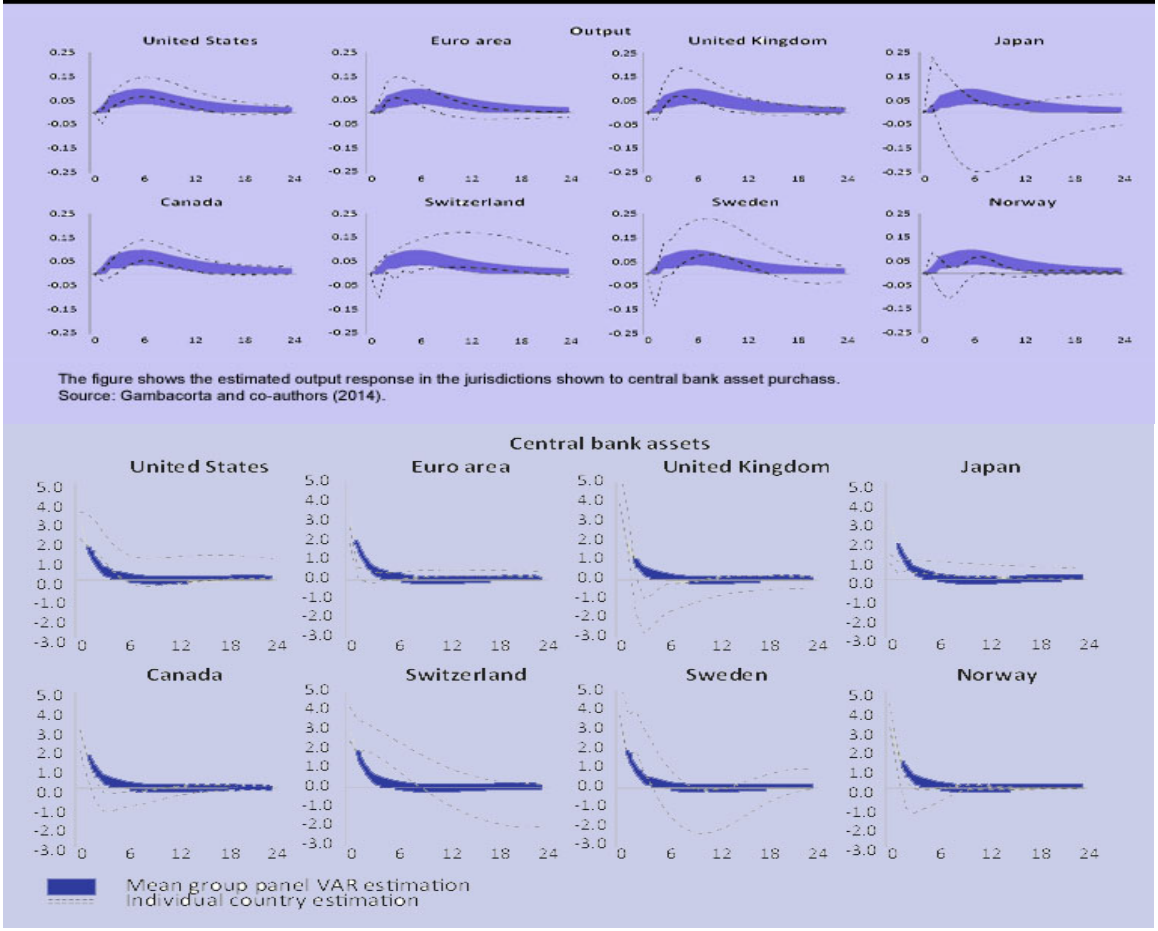
[31] We do not see any "battle of the central banks" with central banks buying – particularly foreign -- corporate shares as a way of exercising some kind of nationalistic influence or scooping up choice assets before other central banks. See Ellen Brown, Buying Up the Planet: Central Banks on a Corporate Buying Spree available online.

[32] Sorry for that sentence, which succinctly summarises the situation. For one example, see Peter Dunne, Mary Everett and Rebecca Stuart, The Expanded Asset Purchase Programme – What, Why and How of Euro Area QE, *Central Bank of Ireland Quarterly Bulletin 03*, July, 2015, at Figure 1, available online.

[33] That being said, some studies have looked at the effect of QE on other countries' investment. See Jamus Jerome Lim, Sanket Mohapatra and Marc Stocker, Tinker, Taper, QE, Bye? The Effect of Quantitative Easing on Financial Flows to Developing Countries, *World Bank Policy Research Working Paper 6820*, 2014, available online.

Many studies looking at central bank asset purchases in general find that such purchases led to increases in output. Figure 12 shows the effects of a shock consisting of a 3% increase in central bank balance sheet assets for several countries.[34] These data predict a relatively large output response for each jurisdiction – and relatively similar responses across jurisdictions (despite their differing asset purchase programmes). Yet, the longer-run effects seem to unwind – as output and assets returns to pre-purchase levels. Like many other studies, this study finds that interest rate changes play a very limited role in affecting the real economy. As such, asset purchases seem to have only very marginal effects on the economy through their effect on interest rates. Instead, the study suggests that shocks to the real economy (including shocks to equity prices and "risk shocks") drive changes in central bank balance sheets far more than changes in balance sheets driving output growth. If true, these data would suggest that balance sheets reflect – rather than drive – investment trends (and thus output growth). Most other studies fail to find such causality.

Figure 12: Estimated Effects of Central Bank Asset Purchases by Jurisdiction

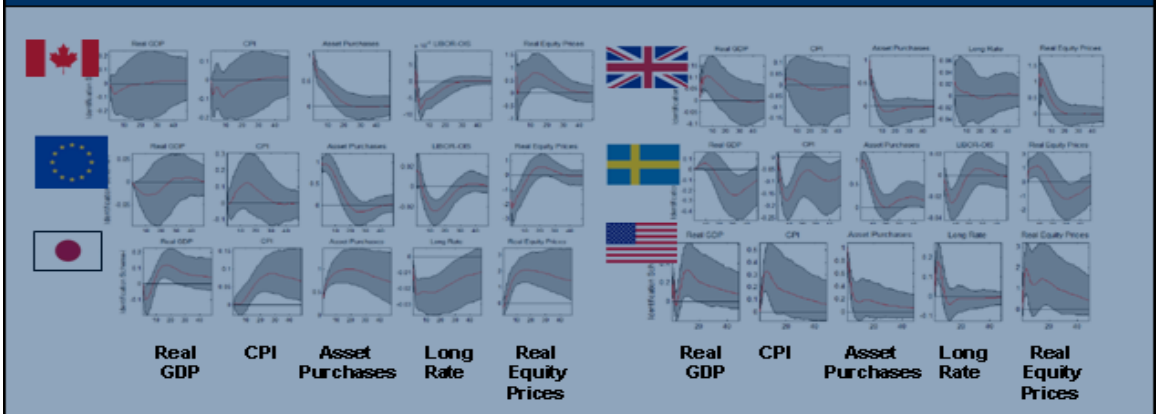


The figure shows the estimated output response in the jurisdictions shown to central bank asset purchass.
Source: Gambacorta and co-authors (2014).

[34] Leonardo Gambacorta, Boris Hofmann and Gert Peersman, The Effectiveness of Unconventional Monetary Policy at the Zero Lower Bound: A Cross-Country Analysis, *Journal of Money, Credit and Banking 46(4)*, 2014, available online.

Yet, this study represents the tip of the iceberg for impulse response studies. Figure 13 shows similar output responses for a larger range of countries, for a larger range of variables.[35] Econometric evidence points to an output response associated with central bank asset purchases. Yet, the wide confidence bands shown (namely the margin of error in these calculations) make these estimates almost worthless. For example, in the Canadian case, real GDP could increase or decrease by about 20% from the start of the asset purchase programme until 40 quarters later). Even in relatively clear-cut cases (like Sweden), no-growth remains a likely outcome for the entire time period (as the error bands continue to include zero during the entire simulated period). In theory, increasing real equity prices should encourage investment. Yet, as shown in cases like the US, the error bands basically cover the entire graph – meaning that we do not know what will happen. As this study broadly shows the results from most studies just like it, **previous studies thus fail to provide an adequate basis for figuring out if investment (and thus output) increase due to central bank asset purchases.**

Figure 13: Bank of England's 'Mother of all Studies' Shows Positive Effects from Asset Purchases



The figure shows the simulated/estimated responses of the variables shown to a 1% change in the central bank's asset purchases. We show only one out the four variations they show on each country's simulation – offering the reader over 120 possible impulse responses (before taking the other parameterizations of their models).
Source: Haldane (2016).

As shown above, studies looking at securities prices reflect another way to assess the effect of central bank asset purchases on investment. Rising investment prices (and related returns/yields) should, in theory, incentivise companies to invest more (and create more securities underlying those investments). Figure 14 shows the estimated effects of recent quantitative easing programmes in the US, UK, Japan and ECB (jurisdictions whose QE programmes had significant purchases of private securities).[36] The Japanese programme – undoubtedly the QE most focused on buying up private sector assets – had

[35] Andrew Haldane, Matt Roberts-Sklar, Tomasz Wieladek and Chris Young, QE: The Story So Far, *Staff Working Paper No. 624*, 2016, available online.
[36] John Rogers, Chiara Scotti, Jonathan Wright, Evaluating Asset-Market Effects of Unconventional Monetary Policy: A Cross-Country Comparison, *Federal Reserve System International Finance Discussion Paper Number 1101*, 2014, available online.

the largest effect on equity returns. The Bank of England's monetary expansion seemed to have no effect on equity prices – which the authors attribute to liquidity trap effects. The ECB's programme affected both equities prices and bond yields. The British quantitative easing programmes supposedly reduced corporate bond yields – which might signal a lack of confidence in the easing or reduced perceived risk lowering prices and thus yields. As we will see, most of the literature finds that **central bank private sector asset purchases reduces perceived risks in/of buying these assets – making them more liquid and expanding demand for them, even if expected profits do not increase.**

Figures 14: The ECB's Private Asset Heavy Quantitative Easing Programme Seems to Have the Largest Effect on Securities Prices (and Their Incentives For Investment)

Figure 13a: Quantitative Easing Pushed Up Equity Returns

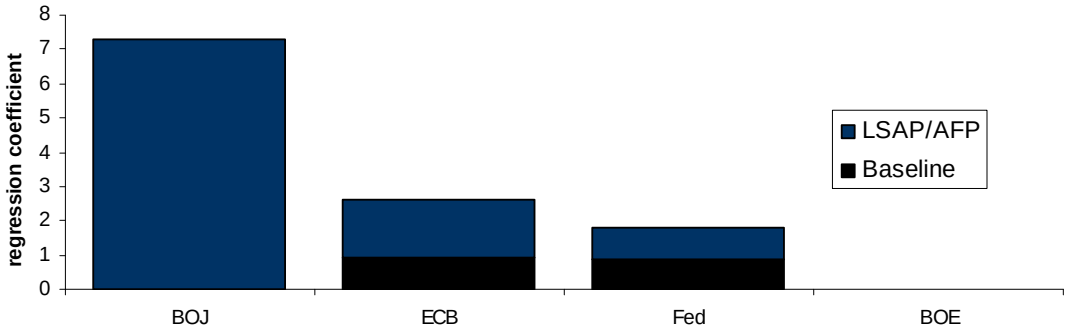
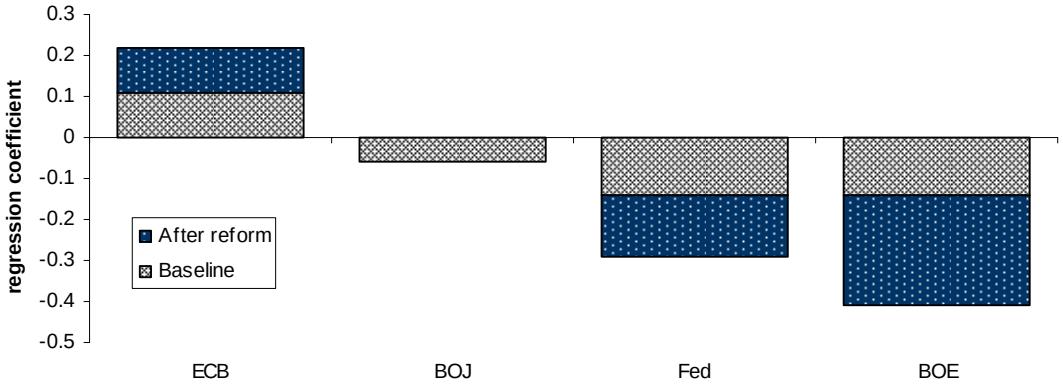


Figure 13b: Effect on Corporate Bond Yields

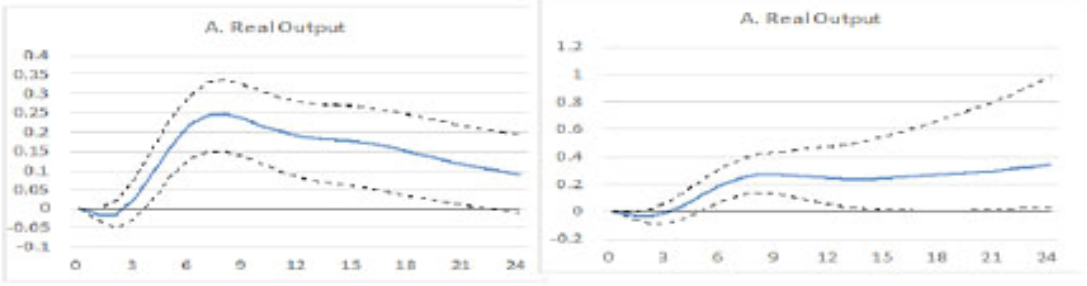


The figure shows the regression coefficients for analyses looking at the effect of quantitative easing on equities prices and corporate bond yields – holding other factors constant. See source for each regression specification.
Source: Rogers et al. (2014).

Yet, for all its successes, few can explain why the Bank of Japan's private asset purchases have not dragged the economy out of stagnation. Figure 15a shows the effect of Japan's QE on output – especially the right panel showing the effect after large-scale private asset purchases.[37] Most agree that QE has "diminishing returns."[38]

Japan holds the key to understanding why central bank private asset purchases can succeed in stoking investment while still seeing lacklustre broader growth.

Figure 15a: Japanese Private Sector Asset Purchases Led to Larger Output Growth

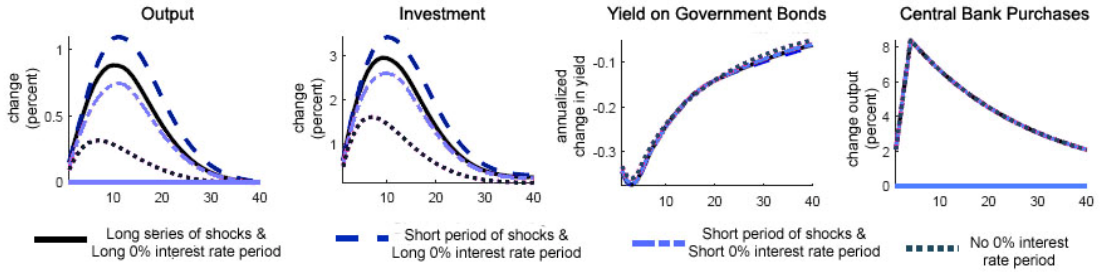


The figure shows the estimated effect on output of the Bank of Japan's quantitative easing policies before the Quantitative and Qualitative Easing phase in 2013.
Source: MIYAO and OKIMOTO (2017)

Unconventional monetary policies (asset purchases) also helped bump up output in the EU. Figure 15b shows the expected change in output from the ECB's monetary policies in the face of various kinds of shocks and interest rate environments.[39] As shown, output rises by about 1% at its zenith for shock shocks and long duration liquidity traps.[40] The smallest effect for such purchases (of around 0.3%) occurs under normal circumstances (i.e. when no 0% interest rate period). While asset purchases cause government yields to fall as purchases rise, they become increasingly neutral over time. Mostly importantly, investment increases by about 3% for short shocks in a situation of liquidity traps and only about 1.5% for normal periods.

[37] Ryuzo MIYAO and Tatsuyoshi OKIMOTO
The Macroeconomic Effects of Japan's Unconventional Monetary Policies, RIETI Discussion Paper Series 17-E-065, 2017, available online.
[38] Claudio Borio and Anna Zabai, Unconventional monetary policies: a re-appraisal, BIS Working Papers No 570, 2016, available online.
[39] Matthieu Paries and Michael Kuhl, The optimal conduct of central bank asset purchases, ECB Working Paper Series No 1973, 2016, available online.
[40] Other econometric work appears to find a very similar output response. See Gert Peersman, Macroeconomic Effects of Unconventional Monetary Policy in the Euro Area, Ecb Working Paper Series NO 1397 / NOVEMBER 2011

Figure 15b: European Central Bank Asset Purchases Estimated to Increase Investment as Well as Output

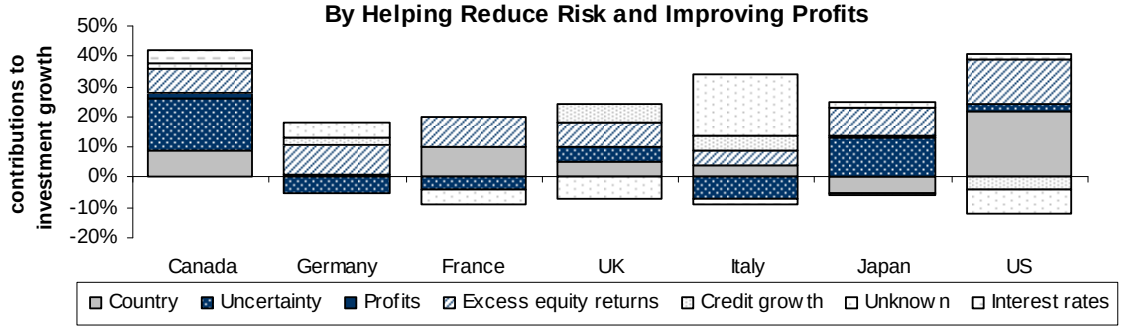


The figure shows the estimated effects of asset purchases by the Central European Bank on economies modelled using a general equilibrium model built from EU member state macroeconomic data.
Source: Paries and Kuhl (2016).

Numerous studies argue that central bank securities purchases promote investment by reducing others' risk of buying securities. Figure 16a shows the factors determining investment in the upper-income jurisdictions shown.[41] The usual monetary policy factors driving investment (credit growth and interest rate changes) clearly held sway in countries like Italy. Yet, for most jurisdictions, factors influenced by direct central bank securities purchases drove investment decisions. Namely, reductions in uncertainty affected Canadian and Japanese investment. Excess equity returns explained much of the change in investment in places like France, Germany, and the US. Such reductions in the risk of holding securities stem from the temporary divorce of securities prices from underlying values based on asset quality.[42] Besides propping up asset values, central bank purchases also make write-downs (offs) less likely – encouraging lending (even when investors know the true and sometimes dubious quality of these assets). Other evidence confirms the effect on risk premia. Figure 16b shows the supposed effect of lower term premia due to quantitative easing.[43] **The central bank can thus keep investment going in the real economy by acquiring enough assets/securities to manage any issues arising from collective action or the temporary losses.**[44]

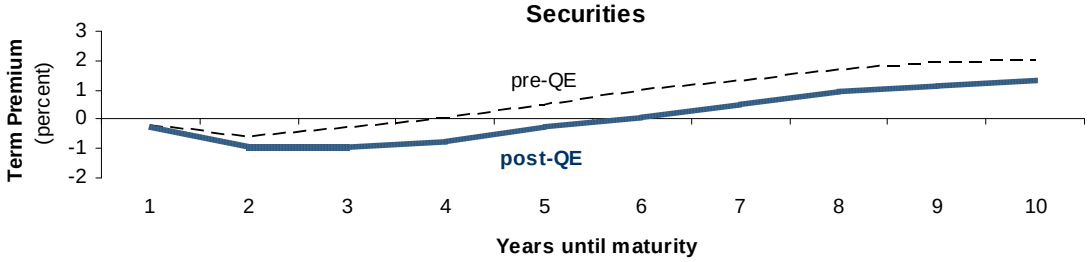
[41] Ryan Banerjee, Jonathan Kearns, and Marco Lombardi, (Why) Is Investment Weak, *BIS Quarterly Review*, March 2015, available online.
[42] Stephen Williamson, Low Real Interest Rates, Collateral Misrepresentation, and Monetary Policy, *Federal Reserve Board of St Louis Working Paper 2014-026B*, 2014, available online.
[43] Brett Fawley and Luciana Juvenal, Quantitative Easing: Lessons We've Learned, St. Louis Federal Reserve Bank's Regional Economist, June, 2012, available online.
[44] The Federal Reserve's *en masse* mortgage purchases represent an obvious example. By buying up so many mortgages, the Fed could reduce mortgage rates – and thus directly lower default rates. See Johannes Stroebel and John Taylor, Estimated Impact of the Federal Reserve's Mortgage-Backed Securities Purchase Program, *International Journal of Central Banking 8*(2), 2012, available online. The Fed could also avoid using capital adequacy and other regulations which would force a private sector investor to sell. See also Craig Merrill, Taylor Nadauld, Rene Stulz, and Shane Sherlund, Why were there fire sales of mortgage-backed securities by financial institutions during the financial crisis?, 2013, available online.

Figure 16a: Private Asset Purchases Could Have Bolstered Investment By Helping Reduce Risk and Improving Profits



The figure shows the contribution of each factor to non-residential investment growth from 2009 to 2014.
Source: Banerjee et al. (2015) at Graph 5.

Figure 16b: US Quantitiative Easing Reduced Risk Premia for All Times (Maturities) of Securities



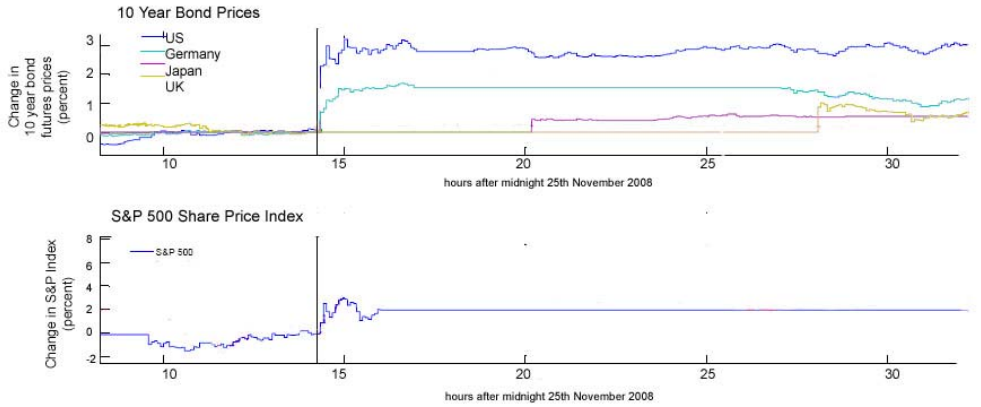
The figure shows the term premiums (premia) for various bonds with a range of maturities. The crisis made holding short-term assets more attractive (with negative premia reflecting their "anti-risk). Risk discounts made investors more willing to hold these short maturity securities. We can interpret longer maturity securities' risk premia declines in the usual way. Source: Fawley and Juvenal (2012).

The evidence from the US Federal Reserve Bank's Large-Scale Asset Purchases Program also shows that quantitative easing programmes increased the prices of both debt and equity – in theory providing incentives for more securities, and thus more investment underpinned by these securities. Figure 17a reproduces one such study – looking at the anticipated effects of the US central bank's large-scale asset purchases. Long-term (10 year) bond prices rose by about 3% in response to the announcement of Fed purchases under the Program. Such a price effect would similarly affect demand for investments underpinned by corporate bonds, if corporate bond prices followed suit. As previously noted, changes in bond prices and yields may come from broader money market (portfolio) effects rather than from direct effects from the central bank's demand for securities.[45] The S&P index rose in their study by 2% -- making new stock issuances yield potentially 2% more capital.[46] Kozicki and her colleagues – in citing the literature on commercial paper yields -- find that unconventional monetary policy in the US lead to roughly a 40 basis point drop in commercial paper rates (and thus increases in prices) and

[45] See Jens Christensen and Signe Krogstrup, A Portfolio Model of Quantitative Easing, *Peterson Institute for International Economics Working Paper 16-72016*, available online.
[46] Christopher Neely, Unconventional Monetary Policy Had Large International Effects, *Federal Reserve Bank of St. Louis Working Paper 2010-018G*, July 2010, available online.

an increase of 2% in GDP.[47] Yet, most of these purchases consisted of mortgage-backed securities – rather than "productive" corporate assets. For its part, Figure 17b reaffirm many of the US results, showing the supposed increase in bond valuations from ECB purchases.[48] Thus, we do not know the impact on actual assets. Yet, irregardless of the impacts on productive assets, **these central banks' private asset purchases show that central bank asset purchases can incentivize further demand – whether those assets are productive or not.**[49]

Figure 17a: Bond and Stock Futures Prices Rose in Reaction to Asset Purchases



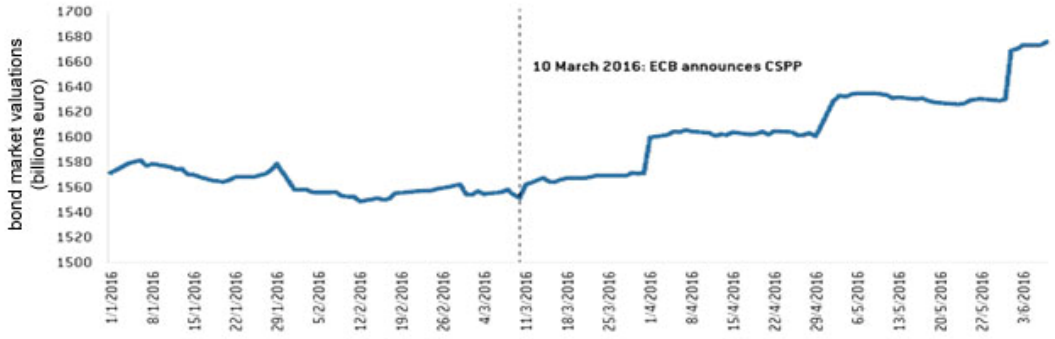
The figure shows the change in prices of 10 year bond futures prices (top panel) and the S&P 500 index (bottom) panel for 30 hours after midnight on the 25th November 2008, one of the days when the US Fed announced large-scale asset purchases asset-periods out. The vertical line represents the time of the Fed's purchase announcement (about 13-14 hours after midnight).
Source: Neely (2010).

[47] Sharon Kozicki, Eric Santor and Lena Suchanek, Unconventional Monetary Policy: The International Experience with Central Bank Asset Purchases, Bank of Canada Review Spring 2011, at Table 1 and 2, available online.

[48] Maria Demertzis and Guntram Wolff, The effectiveness of the European Central Bank's Asset Purchase Programme, Breugel Policy Contribution, 2016, available online.

[49] For evidence about the quality of these assets, see Larry Cordell, Yi-lin Huang and Meredith Williams, Collateral Damage: Sizing and Assessing the Subprime CDO Crisis, *Federal Reserve Bank of Philadelphia Resarch Department Working Paper 11-30/R*, 2012, available online.

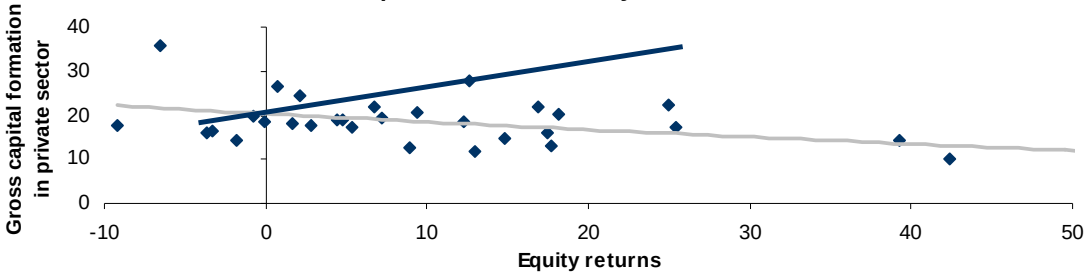
Figure 17b: Did the ECB's Private Securities Purchases Cause Bond Valuations to Rise?



The figure shows the iBoxx market valuation of investment-grade corporate bonds in the Euro asea for the dates shown. Without formal time series or econometric methods, we can not know these jumps come from the ECB's non-conventional monetary policies.
Surce: Demertzis and Wolff (2016) at Figure 20.

Other evidence shows how the way in which central banks affect securities prices helps shape investment. Figure 17c shows the relationship between equity returns and changes in capital formation (namely investment). At first glance, higher equity returns seem to correlate with lower investment – perhaps as investors cash in over-priced investments. Yet, after controlling for outside factors, most of the studies we reviewed above show that higher returns clearly play a key role in deciding the extent of investment – by about the amount shown in the figure. Thus (and stating the obvious), while higher yields/prices do not necessarily imply more/better investment, higher yields/prices certainly encourage investment more than in a falling market.

Figure 17c: Contary to First Impressions, Higher Equities Prices Push Actual Investment Up Across Countries by About Half a Percent



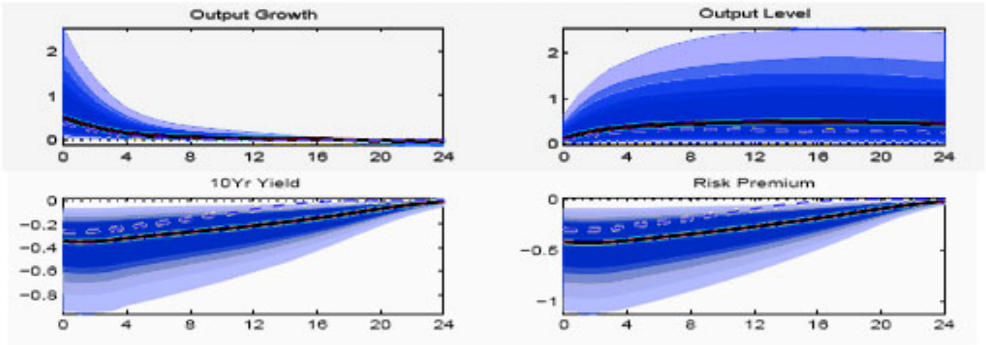
The figure shows the correlation between equity prices on gross capital formation (investment) across countries for the latest year available (usually 2014). After controlling for outside factors, the seemingly negative relationship between these variables turns out positivfe. Source: Authors -- with parameter estimates as described in the text.

What about effects on perceived risks? The effect of central bank purchases on reducing risks represents a key effect on investment. Figure 18 shows the effect of central bank asset purchases on risk premia.[50] Yields fall temporarily as prices fall. Yet, if output grows temporarily due to unconventional central bank asset purchases, risks fall significantly. Effects on risk comprise a main explanatory variable – because interest

[50] Han Chen, Vasco Curdia and Andrea Ferrero, The Macroeconomic Effects of Large-Scale Asset Purchase Programs, *Federal Reserve Bank of New York Staff Report no. 527*, 2011, available online

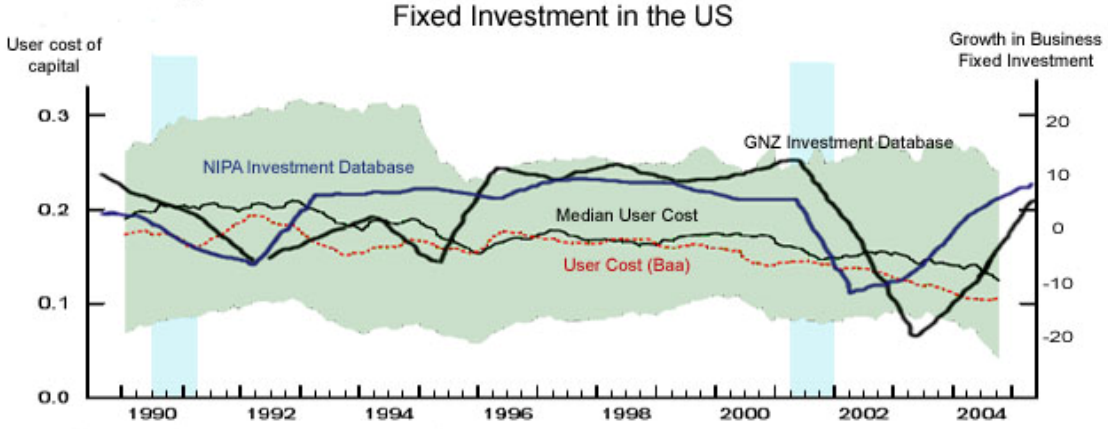
rates seem not to have played a role in pushing output growth.[51] Indeed, as Figure 19 shows, investment seems almost completely unrelated to the cost of capital. If larger expected profits encourage investment, then lower expected costs do not translate into the same investment bump.

Figure 18: Output and Yields Rise While Risk Falls With Longer "Purchase" Periods



The figure shows the simulated effect of a shock to debt market values for securities the central banks holds for 4 years. Source: Chen et al. (2011).

Figure 19: Cost of Capital from Corporate Securities Determined Fixed Investment in the US



The figure shows the evolution of user costs of capital and growth in business fixed investment in the US for the time period shown. The blue vertical bars denote official recessions. See original source for definitions and details about the items in this figure. Source: Gilchrist and co-authors (2006) at Figure 2 and Figure 4.

The effects of central bank purchases on even government bonds can result in significant resource flows to the private sector. For example, take Gagnon and co-authors estimate of Fed bond purchases leading to a 0.5% fall in interest rates on $169 billion in bonds.[52]

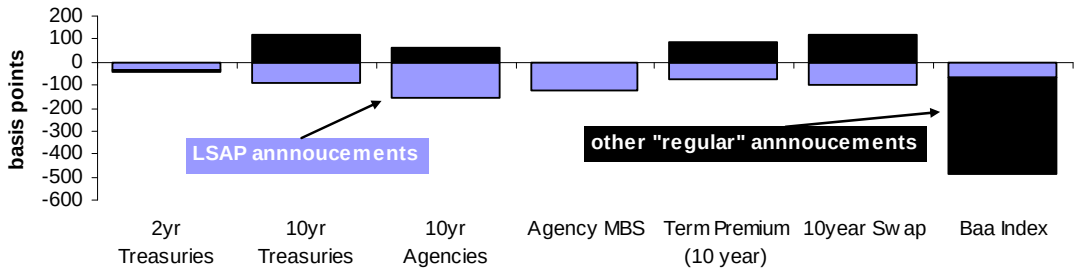
[51] For evidence about the lack of an effect via the usual interest rate effects, see Agnieszka Gehringer and Thomas Mayer, It's the WACC, stupid!, *Flossback von Storch Research Institute Economic Policy Note 13/2017*, available online.

[52] Joseph Gagnon, Matthew Raskin, Julie Remache and Brian Sack, Large-Scale Asset Purchases by the Federal Reserve: Did They Work?, Federal Reserve Bank of New York Staff Report no. 441, 2010, at Table 5b, available online.

Using the standard formula linking interest rates to bond prices, **the private sector should have received an extra $760 million from such central bank support (above the free market payment rate).** In other words, 10 basis points results in $100 million in higher prices. Higher prices lead to more cash (and thus more output depending on the output elasticity of cash). Lower interest rates lead to more investment per dollar (as lower debt serving costs). Such purchases can even push down high interest rates caused by high risk premia – encouraging investment in more speculative investments (and more interest in taking loans for these companies).

Other evidence points to the effect of risk reduction – rather than any money market effects such as affecting the cost of capital (interest rates). Figure 20 shows the change in interest rates and term premia for days when the Fed announced Large-Scale Asset Purchases versus those days it announced regular purchases.[53] The authors show how most of these interest rate changes reflected changes in underlying risk premia. The programme's effects on corporate bonds underline the reason for buying corporate assets directly. In the Fed's programme, they bought mortgage agency and Treasury securities – making them less risky. These purchases still helped alleviate fears about the riskiness of relatively highly rated corporate securities. Yet, the effect on these risk premia would have easily doubled if the Fed targeted these securities directly (at least judging by the effects on Treasuries).

Figure 20: Asset Purchases Could Work in PrivateSector Securities By Reducing Market Risks



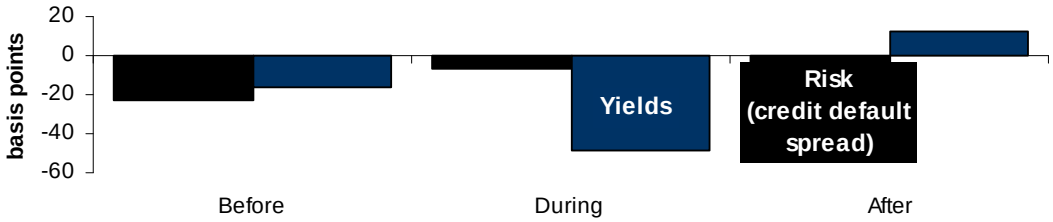
The figure shows the overall (cumulative) change in interest rates (which comprise mostly a risk premium -- as shown by the size of the term premium).
Source: Gagnon and co-authors (2010), at Chart 6.

As if to belabour the point, the effect of risk reduction also appears in the ECB's quantitative easing. When a central bank has the authorisation to buy private sector assets, such an authorisation reduces market risk in dealing with these securities – as the central bank becomes a kind of buyer-of-last resort. [54]

[53] Joseph Gagnon, Matthew Raskin, Julie Remache and Brian Sack, Large-Scale Asset Purchases by the Federal Reserve: Did They Work?, *Federal Reserve Bank of New York Staff Reports No. 441*, March 2010, available online.

[54] Viral Acharya, Diane Pierret, and Sascha Steffen, Lender of Last Resort versus Buyer of Last Resort – The Impact of the European Central Bank Actions on the Bank-Sovereign Nexus, ZEW Discussion Paper No. 16-019, 2016, available online.

Figure 21: Will Private Sector Sector Purchases Lower Risk and Raise Yields Like in the EU?

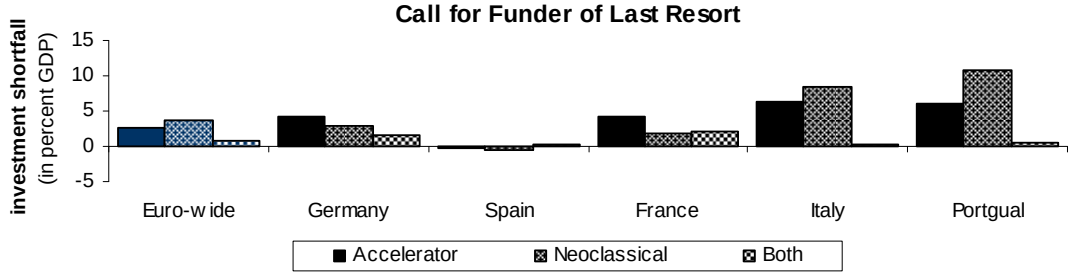


The figure shows the extent to which European Central Bank support helped lower asset risk and raise prices. We show results for the most private sector-like asset in their analysis of sovereign debt held by banks (namely 5 year non-Euro sovereign bonds).
Source: Table 1 from Acharya and co-authors (2016).

How do we know places like the EU actually needed the central bank to goose investment? Maybe the market actually matched the equilibrium real level of investment supply and demand? Figure 22a shows significant investment shortfalls in the EU region – illustrating that investment strayed out of equilibrium during the debt crisis, rather than simply falling due to a smaller economy.[55] As shown, no matter the model used and the EU jurisdiction, significant investment shortfalls remained high enough to express as a percent of GDP. Yet, such investing goosing can cut both ways. Namely, central bank support for private investment – as we will see clearly in the next section – can support or diminish investment from the private and banking sector to the private sector. As shown by Figure 22b, a central bank's asset purchases can crowd-in private investment (positive values) or crowd out (potentially knock-on effects shown as negative bond issuances).[56] Yet, as shown in Figure 22c, regardless of the country, unconventional monetary policy – specifically LSAPS and QE -- has the power to be more effective at bolstering such investment than typical monetary policy (at least if measured by changes in interest rates).[57] In some cases, like in the UK, harder hitting monetary policy can hurt equity prices.

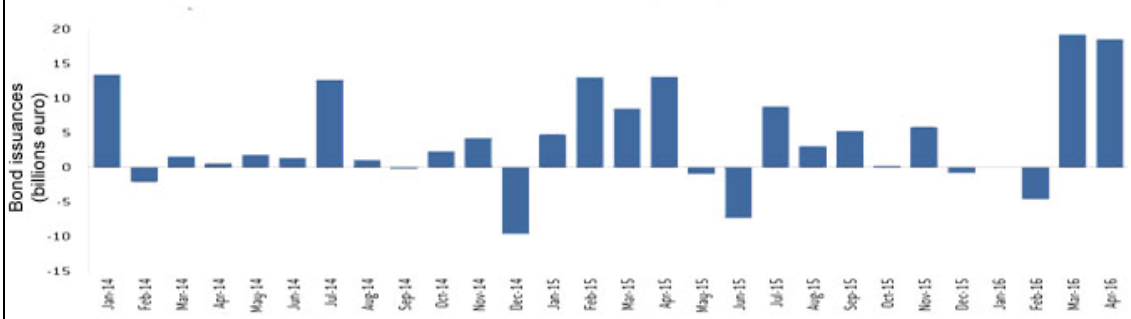
[55] Bergljot Barkbu, S. Pelin Berkmen,Pavel Lukyantsau, Sergejs Saksonovs, and Hanni Schoelermann, Investment in the Euro Area: Why Has It Been Weak? *IMF Working Paper 15/32*, available online.
[56] Maria Demertzis and Guntram Wolff, The effectiveness of the European Central Bank's Asset Purchase Programme, Breugel Policy Contribution, 2016, available online.
[57] We spent the whole article arguing against interest rate management for this type of problem. Yet, as a measure of the effective policy (rather than as a tool of policy), interests can tell us something useful. See Rosa, Carlo, How Unconventional are Large-Scale Asset Purchases? The Impact of Monetary Policy on Asset Prices, *Federal Reserve Bank of New York Staff Report No. 560*, 2012, available online.

Figure 22a: Investment Shortfalls in Some Jurisdictions over 10% of GDP Call for Funder of Last Resort



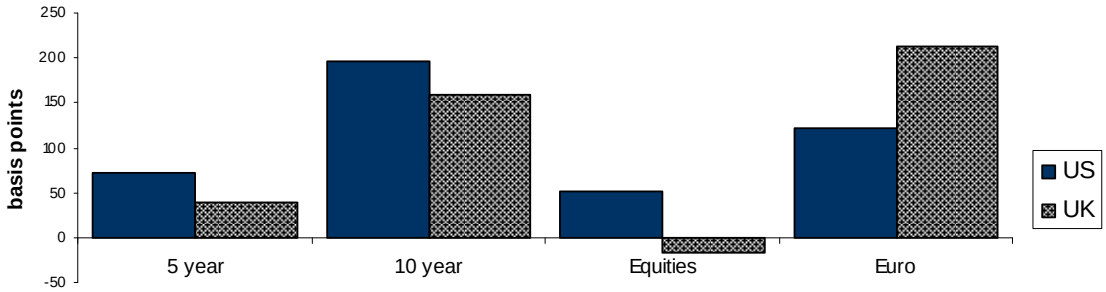
The figure shows the shortfall in investment in the EU and in several EU member states during the debt crisis. See original for the way the authors measured and estimated such shortfalls.
Source: Barkbu (2015).

Figure 22b: Evidence of Crowding-In Private Investment from ECB's Asset Purchasing Programmes



The figure shows the net bond issuances from non-financial corporates for the time period shown. The two bars for March and April supposedly show the large-scale impact of the ECB's securities purchase programme.
Source: Demertizis and Wolff (2016) at Figure 19.

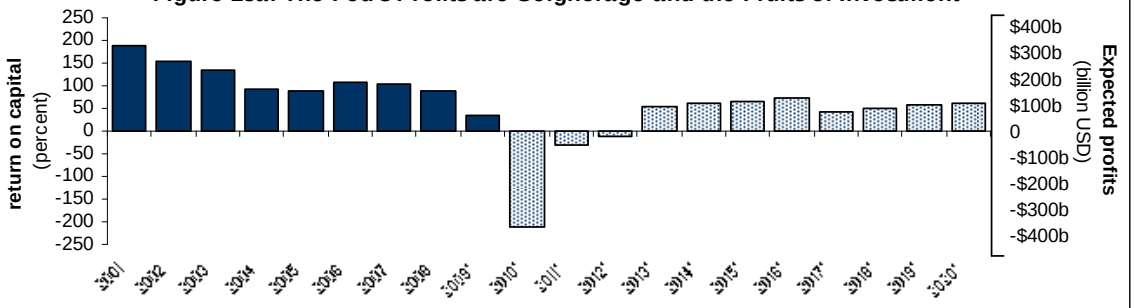
Figure 22c: Unconventional Monetary Policy Hits Harder than Traditional Policy



The figure shows the extra change in basis points of unconventional monetary policy above traditional interest rate management. Thus, central bank asset purchases made traditional monetary policy more effective.
Source: Rosa (2012).

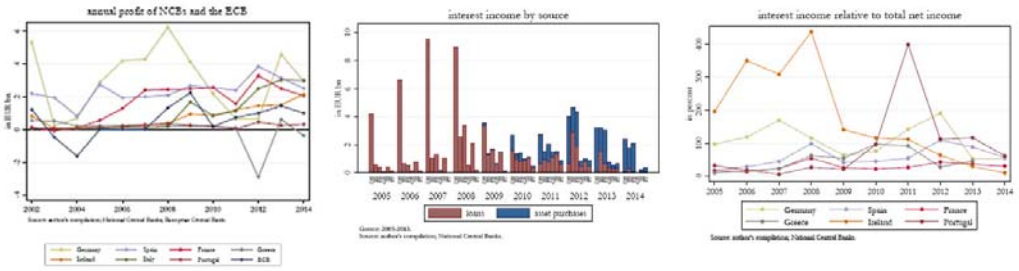
What have we learned so far? Private sector asset purchases can do good and harm for investment in certain circumstances – usually in times of financial market turmoil.[58] We saw that equity prices can rise (in the US) or fall (as in the UK). We saw that risk aversion usually fell. We also saw that the effect on investment depends on whether profits come from increased marginal returns to capital (the return side of the equation) or the cost of capital (the cost side of an investment's profits). Such purchases can encourage private investors to crowd-in or crowd-out. As shown by Figure 23a, these purchases have resulted in very large returns for the Fed (and expected to continue to do so despite a few years of losses).[59] Figure 23b shows the European equivalent of these data – also showing that central bank support does not necessarily represent a losing business.[60] These data strongly suggest that a central bank gets value for its money – and high returns to its capital. Yet, the conclusion still remains -- **economists and policymakers need to understand much better the conditions under which such asset purchases help vs. hurt investment.** We turn to that subject in the next section.

Figure 23a: The Fed's Profits are Seignorage and the Fruits of Investment



The figure shows the historical returns on the Federal Reserve Banks' capital and the expected profits from reform scenarios dealing with the way thte Fed manages balance sheet assets.
Source: Stella (2009)

Figure 23b: European Central Banks Also Make Money From Supporting Crisis Economies



[58] In their sweep of the literature, Quint and Rabanal argue against making asset purchases a conventional tool of monetary policy because of its impotence in the face of shifting tastes and technologies. See Dominic Quint and Pau Rabanal, Should Unconventional Monetary Policies Become Conventional? IMF Working Paper No. 17/85, 2017, available online.

[59] Peter Stella,The Federal Reserve System Balance Sheet: What Happened and Why it Matters, *IMF Working Paper 09/120*, 2009, available online.

[60] Jakob Eberl, The Collateral Framework of the Eurosystem and Its Fiscal Implications, Ifo Institut Working Paper 69, 2016, available online.

When Should Central Banks Engage in Private Sector Securities Purchases?

Dysfunctional Financial Markets and Funders of Last Resort

Most accept the role of a lender of last resort as a matter of course for any banking/ financial system when these systems break down. To varying degrees, the unconventional monetary policy and private asset purchases carried out by the Fed, ECB and BoJ represent credit allocation decisions (even if tangentially). Central bank demand for a firm's securities pays back original investors who gave money in the first place (even if the bank does not participate in primary markets). Some jurisdictions have gone all the way toward nationalizing banks – in effect using a public agency to make credit allocation decisions.[61] Yet, few agree on exactly what situation calls for more pronounced and prolonged central bank funding. In the US, the Federal Reserve Act defines these occasions as "unusual and exigent circumstances" (though no one has yet provided a legally precise definition of these circumstances).[62] Banks represent the most obvious beneficiary of such support. However, such support must ultimately reach the productive business that they lend to – in order to prevent a "spiral of doom."[63] Thus, while central banks may pose as lenders of last resort to banks, **central banks ultimately serve as funders-of-last-resort to the productive enterprises these banks lend to.**

Experience from several jurisdictions furthermore shows the willingness/ability of central banks to offer funding during these break downs. The Swedish case shows how the central bank can lend to the private sector.[64] Figure 24 shows Swedish central bank funding for assets of various kinds over the last 25 years. The Swedish central bank has not been shy about providing such funding on a regular basis – including funding for domestic securities. Initial econometric analysis weakly supports these purchases – showing that such a funder of last resort ends up saving productive enterprise.[65] Figure 25 shows a similar picture in the US's recent history. [66] The Fed ended up picking up asset backed paper funding equipment and small business expenses – funding which no

---

[61] Most academics of all stripes and backgrounds would accept state (central bank) lending during a financial crisis. Yet, the role of the central bank as longer-term funder of investment projects across the economy during these times remains very much in dispute. For a discussion and historical experience of two jurisdictions dealing with lending far beyond resolving short-term bank insolvency, see Martin Jes-Iversen and Hans Sjögren, The State as Last Resort in two Scandinavian Banking Crises: A comparative case study of Denmark and Sweden, available online.

[62] We review US law in this area more fully in a later section. In recent years, the interpretation of these circumstances has focused more on firms posing a systemic risk to the broader financial system. See Alexander Mehra, Legal Authority in Unusual and Exigent Circumstances: The Federal Reserve and the Financial Crisis, *University of Pennsylvania Journal of Business Law 13*(1), 2010. Available online.

[63] Larry Li, Malick Sy, Adela McMurray, Insights into the IMF bailout debate: A review and research agenda, Journal of Policy Modeling 37(6), 2015, available online.

[64] Christoph Bertsch and Johan Molin, Revisiting the Role of Central Banks as Liquidity Providers – Old and New Challenges, *Swedish Central Bank Economic Review 2/2016*, 2016, available online.

[65] In the US context, regressions point to the Troubled Assets Relief Program's statistically significant effect on job creation and diminished probability of bankruptcy. See Allen Berger and Raluca Roman, Did Saving Wall Street Really Save Main Street? The Real Effects of TARP on Local Economic Conditions, 2012, available online.

[66] Adam Ashcraft, Allan Malz, and Zoltan Pozsar, The Federal Reserve's Term Asset-Backed Securities Loan Facility, Federal Reserve Board of New York Economic Policy Review, 2012, available online.

other funder would almost certainly provide. Most of the funding went to banks, mortgage providers and investment funds, the $623 billion they provided to 972 recipients.[67] Yet, no clear rules guided the Fed in deciding whose portfolios of real, operating companies would starve – and which could continue operating. [68] Without firm controls, such funding may do more harm than good.[69]

Figure 24: The Swedish Central Bank Extended the Value of 10% of GDP in Private Sector Lending

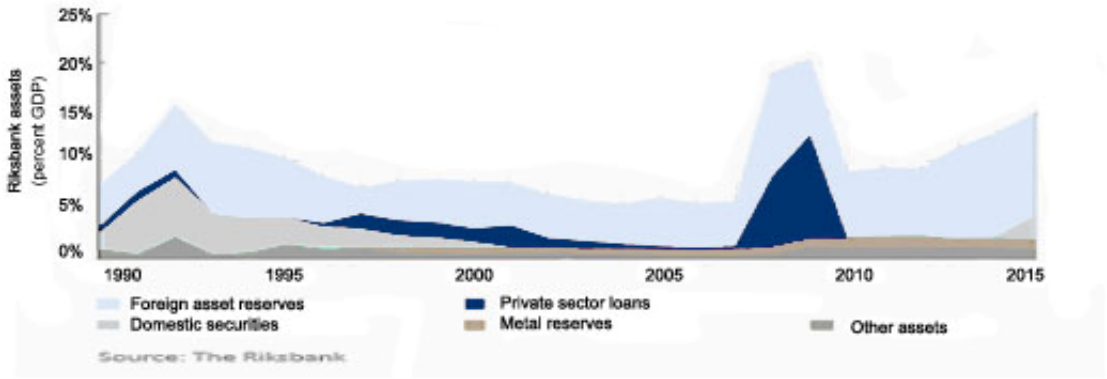
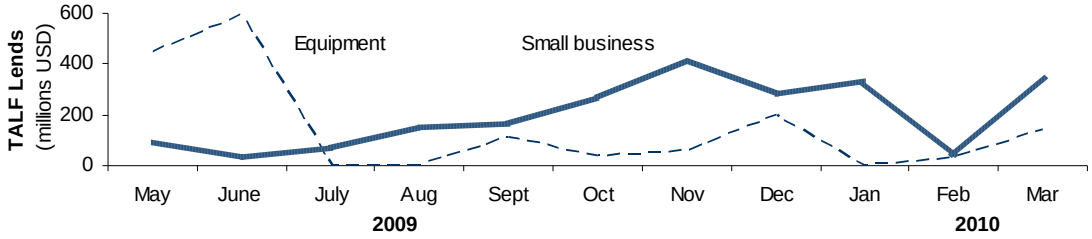


Figure 25: The US Fed Served as a Funder of Last Resort to the Private Sector by Extending Loans that Would Not Have Rolled Over Otherwise



The figure shows the lending support provided by the US Term Asset-Backed Securities Loan Facility for the time period and specific asset-backed securities shown. Presumably the Fed would not have supposed asset purchases other entities would have made in the Fed's place -- thus making the Fed the funder of last resort for the assets under-written by these securities. Source: Ashcraft and others (2012).

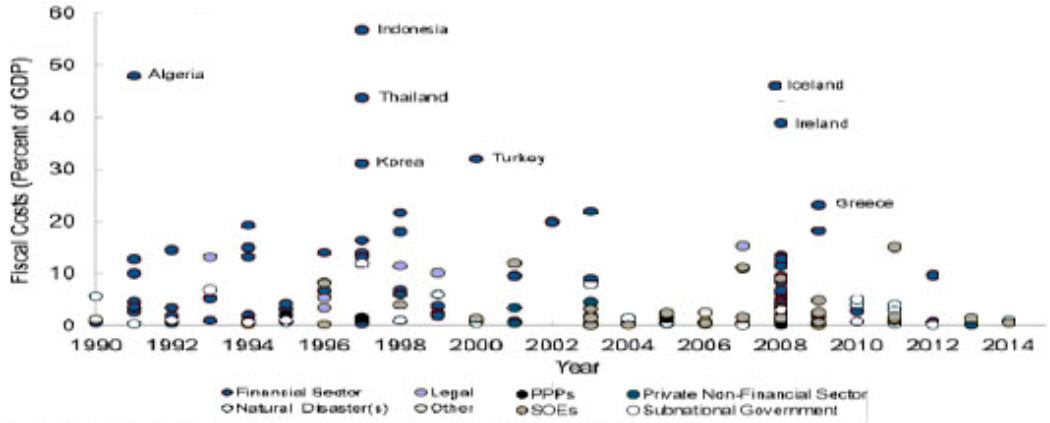
Many central bank laws originally conceived of the central bank serving as a development bank as well as banker to banks and provider of the national currency. Especially in Latin America, Bolivia, Brazil, and Uruguay's central banks started life either as a combination central/development bank, or had development banks hived off from them.[70] Even if one rejects the past link between central banks and development

[67] ProPublica, Bailout Recipients, 2017, available online.
[68] Burcu Duygan-Bump, Patrick Parkinson, Eric Rosengren, and Gustavo Suarez, How Effective Were the Federal Reserve Emergency Liquidity Facilities? Evidence from the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility, The Journal of Finance, 68, 2013, available online.
[69] Gine and Kanz show an example from India where the usual moral hazard problems made such funding destructive. See Xavier Gine and Martin Kanz, The Economic Effects of a Borrower Bailout Evidence from an Emerging Market, World Bank Policy Research Working Paper 7109, 2014, available online.
[70] See Anand Chandavarkar, Central Banking in Developing Countries: Developmental Role (Chapter 6), 1996. See also Forrest Capie, Charles Goodhart and Nobert Schnadt (Eds), *The Future of*

banks, few can deny the increasing calls for a joint role for these two organisations.[71] Epstein says it best, "Throughout the early and recent history of central banking in the U.S., England, Europe, and elsewhere, financing governments, managing exchange rates, and supporting economic sectors by using 'direct methods' of intervention have been among the most important tasks of central banking and, indeed, in many cases, were among the reasons for their existence. The neoliberal central policy package, then, is drastically out of step with the history and dominant practice of central banking throughout most of its history."[72] **Thus, history contradicts the Anglo-American admonitions for strict limits on central bank funding of productive enterprise.**

The history of large-scale bailouts shows the necessity of such a funder. Figure 26 shows the cost of bailing out various types of enterprises.[73] The need for such finance pops up often, and in a range of countries. While some of these bail-outs went to financial services firms, others went to productive non-financial enterprises. While fiscal policy can fund such bail-outs, the politics involved makes a technocratic decision preferable. In cases where the cost of failure would amount to 30% or even 50% of GDP, the case for a funder of last resort becomes even clearer. **A role clearly exists for a funder able/willing to temporarily occur succour for <u>unpredictable</u> shocks on a less permanent basis than a development bank or official government investment.**

Figure 26: Central Bank Should Play Role in Temporary "Productive" Bail-Outs



The figure shows the frequency and magnitude of bail-outs around the world.
Source: Bova et al. (2016).

Central Banking: The Tercentenary Symposium of the Bank of England, Cambridge University Press, 1994, at Appendix, available online.

[71] Florence Dafe and Ulrich Volz, Financing Global Development: The Role of Central Banks, *German Development Institute Briefing Paper 8/2015*, 2015, available online.

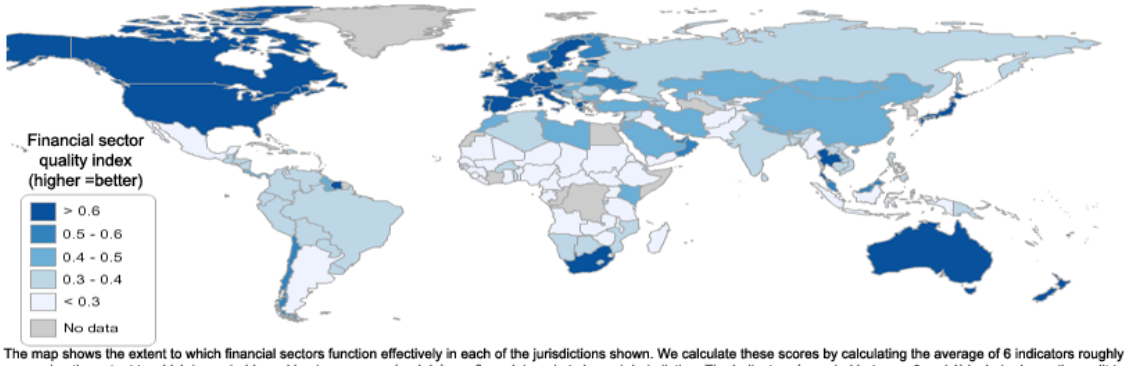
[72] Gerald Epstein, Central Banks as Agents of Economic Development, *University of Massachusetts at Amherst Political Economy Research Institute Working Paper 104*, 2005, available online.

[73] Elva Bova, Marta Ruiz-Arranz, Frederik Toscani, and Elif Ture, The Fiscal Costs of Contingent Liabilities: A New Dataset, *IMF Working Paper 16/14*, 2016, available online.

Central successfully served (and continue to serve) such a bail-out role. Traditionally, central banks have provided funding to financial institutions – and let them deal with the real economy.[74] However, as representative of the wider literature, Oganesyan finds that central banks took on several competencies roughly making them a funder of last resort – including lending to the whole market, lending to illiquid but solvent firms, accepting a wider range of collateral, support to insolvent institutions, market maker of last resort, and buyer of last resort.[75] **As such, most accept that central banks probably have a much larger role to play as a funder of last resort to specific firms when financial markets fail to allocate money either temporarily or structurally.[76]**

Which countries would likely most benefit from rules which would allow these central banks to fund specific enterprises un/under-served by local financial markets? One could rightly claim that a central bank funding to any firm without access to bank or other capital serves as a lender of last resort. Figure 27 shows the extent to which financial/capital markets provide funding to domestic firms. Financial markets clearly operate sub-optimally when large proportions of firms without loans or foreign finance (and citing the lack of such funding a serious impediment to growth). As shown, financial markets in the US and Western EU tend to provide extensive finance to businesses. Yet, most emerging markets have private sectors without sufficient recourse to external funding. Firms clearly benefit when/if these countries' central banks can extend lending/funding to productive enterprises. **Thus, for most of the world, central banks could usefully serve as a second-best funder of last resort in markets without fully functioning financial markets.**

Figure 27: Does a Structurally Dysfunctional Financial Sector Require a Central Bank to Act as a Continuous Funder of Last Resort ?



The map shows the extent to which financial sectors function effectively in each of the jurisdictions shown. We calculate these scores by calculating the average of 6 indicators roughly measuring the extent to which households and businesses can (and do) use financial markets in each jurisdiction. The indicators (rescaled between 0 and 1) include domestic credit to private sector (as % of GDP), Bank accounts per 1,000 adults, Bank deposits to GDP, Firms NOT identifying access to finance as a major constraint, the percent of firms using finance and investments financed by banks, equity or other means.
Source: data from World Bank (2017).

[74] Dietrich Domanski, Richhild Moessner, and William Nelson, Central Banks as Lender of Last Resort: Experiences During the 2007-2010 Crisis and Lessons for the Future, *Federal Reserve Board Finance and Economics Working Paper 2014-110*, 2014, available online.
[75] Gayane Oganesyan, The Changed Role of the Lender of Last Resort: Crisis Responses of the Federal Reserve, European Central Bank and Bank of England, *Institute for International Political Economy Berlin Working Paper, No. 19/2013*, 2013, available online.
[76] See Stephen G. Cecchetti and Piti Disyatat, Central Bank Tools and Liquidity Shortages, FRBNY Economic Policy Review / August 2010, available online.

Central Bank Purchases Support Productive Investment

To understand why central banks need to fund productive investments – rather than broad based consumption for instance – we must look at the likely effects of helicopter drops. Nothing forbids the central bank from buying assets which the government, companies or even households never expect to repay. Numerous famous economists and politicians have come out in public calling for such monetary policies disseminating "helicopter money."[77] Back of the envelope calculations estimate that give every person would have received around £28,000 pounds per person (or approximately $37,000 US dollars) if the Bank of England had simply given its quantitative easing money away – rather than buying up debt which funds government benefits to these same people.[78] Other benefits of such asset "purchases" include the better allocation of funds that that technocratic central banks can achieve versus politicised and highly bureaucratic government agencies.[79] Helicopter money policies beat typical quantitative easing because they distribute money directly to their intended beneficiaries, without adding to the countries overall debt stocks.[80] Thus, central bank asset purchases look at first glance like a way to stoke economic supply and demand without adding debt and without exposing either lenders or borrowers to interest-rate related losses as the economy improves.[81]

Private asset purchases also can affect the broader effectiveness of more traditional monetary policy. Analysts like Woolcock note that giving the Fed power to buy assets increases the credibility of its nominal GDP targeting (and thus changes expectations) – rather than simply announcing targets.[82] Purchases would also compromise credible signals of policy (or policy change), much more than just speeches and words.[83] Such balance sheet purchases work moreover even when banks still can channel funds more effectively than the Fed. [84] Direct central bank purchases can even help reduce incentive problems bedevilling mortgage and other markets.[85] Such purchases work better for

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[77] We assume readers have a passing familiarity with the term, as Milton Friedman originally coined it. See Mark Blyth, Eric Lonergan and Simon Wren-Lewis, Now the Bank of England needs to deliver QE for the people, 21 May Guardian 2015, available online. See also Neil Irwin, Helicopter Money: Why Some Economists Are Talking About Dropping Money From the Sky, July 28, New York Times, 2016, available online.

[78] Nugee, Felix and Jonathon Hazell, Helicopter Money – a Proposal for Macroeconomic Reform, Wilberforce Society Working Paper, at p. 15, available online.

[79] Id.

[80] Alberto Gallo, The Silver Bullet : Helicopter money (that's what I want), Algebris Investments Brief, available online.

[81] Typically, interest rates rise during an economic recovery. Such rises make bond prices fall, as well as sometimes stifle equity investments. In contrast, savers earn more interest income... making the recovery more profitable for those who forwent the investment and consumption which could have added to the recovery.

[82] Michael Woodford, Methods of Policy Accommodation at the Interest-Rate Lower Bound, Federal Reserve Bank of Kansas City Symposium on The Changing Policy Landscape, Jackson Hole, Wyoming, August 2012, p. 85, available online.

[83] Id.

[84] Mark Gertler and Peter Karadi, QE 1 vs. 2 vs. 3... A Framework for Analyzing Large-Scale Asset Purchases as a Monetary Policy Tool, *International Journal of Central Banking* 9(81), 2013, available online.

[85] See Stephen Williamson, Central Bank Purchases of Private Assets, 2013, available online.

private sector than public sector (unsurprisingly). Such policies "mop up" demand for assets which has temporarily fallen – without increasing public sector debt.[86]

Yet, many downsides exist. Many argue that the downsides of helicopter money include inflation, prolonged excessively low interest rates, broader macroeconomic distortions and even its destructiveness to the conduct of monetary policy as we know it.[87] Yet in theory, conditions always exist under which central banks should pursue such helicopter financing – namely when stoking nominal demand.[88]

Most worryingly, unconventional monetary policies already undertaken may have made central bank asset purchases a core and omni-present part of monetary policy in the future.[89] As Adair, in one of the longest run-on sentences around, notes:

> But it is at least possible that if we truly do face some variant of secular stagnation, in which the balance of ex-ante desired savings and investments produces an equilibrium real long-term interest rate which is and will remain for a long time significantly negative, then we may face an unavoidable choice between (i) keeping short-term interest rates at the ZLB continuously (ii) abolishing paper money and moving to significantly negative nominal interest rates (iii) running debt financed fiscal deficits which, as in Japan, mean that public debt levels as percent of GDP either rise continuously or only stabilise at a high level which are only sustainable if interest rates remain very low for ever (iv) using money to finance some part of a fiscal deficit not just on a one-off basis but year after year. I hope that is not the case, but if it is we may need to consider a policy regime, such as Irving Fisher, Henry Simons, and Milton Friedman considered, in which money finance is used not only as an emergency measure but as a normal year by year policy tool. And if so, it would be better to place its use within the constraints of a set of rules and responsibilities defined clearly in advance."

Fortunately, the law requires money for consideration (securities or hard assets). One reason US and other laws only let the central bank "swap" assets with government institutions and international organisations, is that they will not create inflation from default. Figure 28 illustrates the reason why central bank funding will only result in inflation if such funding does not "pay-off." Using the simplest monetarist formula of the economy (only to illustrate the broader principle), increases in monetary supply exceeding increases in the value of output must pass through to higher prices. As empirical studies from places like Canada and Japan show, monetary finance does not

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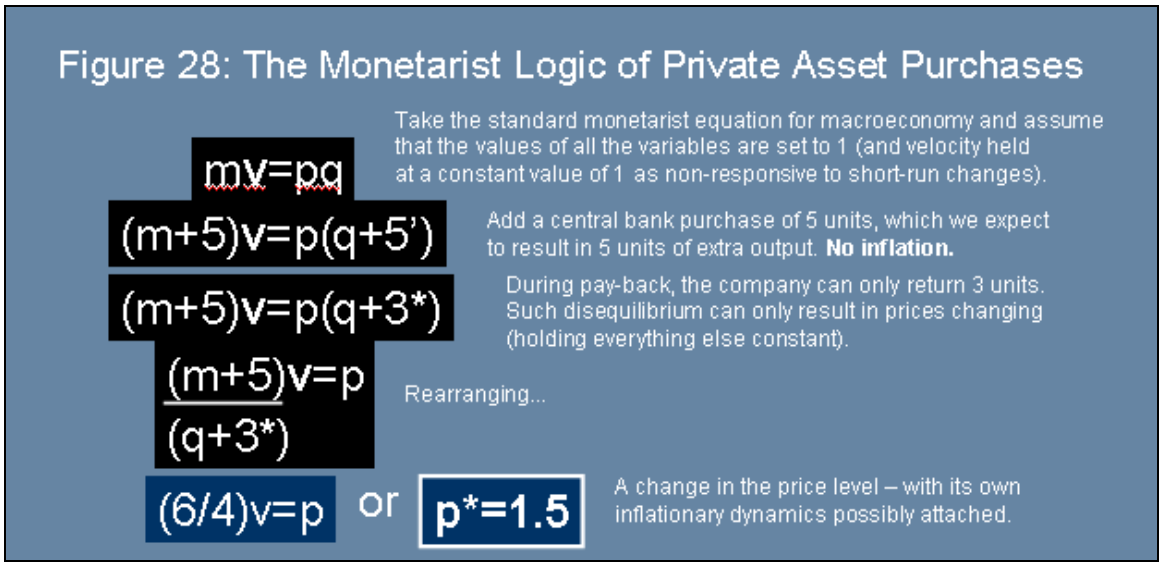
[86] Most analysts of such helicopter funding see going around increases in government debt as one of the big advantages of such financing (in addition to keeping interest rates low). For a readable synthesis of this viewpoint, see Biagio Bossone, Thomas Fazi, Richard Wood, Helicopter money: The best policy to address high public debt and deflation, *Vox 1 October*, 2014, available online.

[87] Claudio Borio, Piti Disyatat, Anna Zabai, Helicopter money: The illusion of a free lunch, *Vox Brief*, 24 May, 2016, available online.

[88] We talk about putting such nominal demand at the centre of any legal approach later in our paper. See Adair Turner, The Case for Monetary Finance – An Essentially Political Issue, *Paper presented at the 16th Jacques Polak Annual Research Conference*, 2015, available online.

[89] The Federal Reserve: Supersize me, May 17 Economist, 2014, available online.
See also Brian Sack, Managing the Federal Reserve's balance sheet, 2010 Chartered Financial Analyst (CFA) Institute Fixed Income Management Conference, Newport Beach, California, 4 October, 2010, available online.

need to cause inflation.[90] Non-inflationary monetary policy differs from fiscal policy mainly in its differing effects the distribution of income – but that's it.[91] **Tax revenue must fund losses from monetary finance in the same way it funds non-productive fiscal policy.**[92]

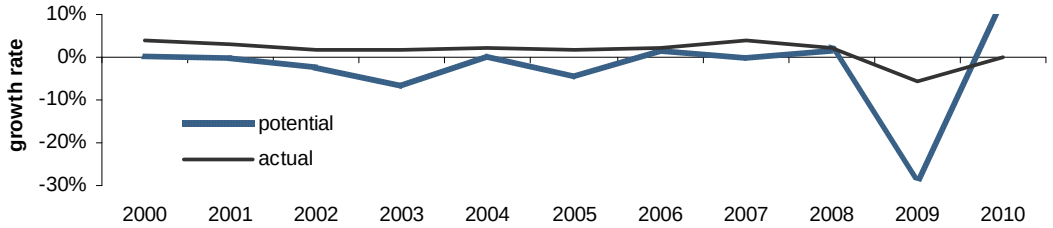


Central banks like the Federal Reserve Bank engaging in quantitative easing just exchange cash for bonds (or other securities). Yet, in the case when the central bank demands or expects no pay-back – that bank causes monetisation (not a bad thing in itself for many developing countries).[93] Most analysts argue that such funding increases GDP mostly through its effects on consumption; when consumers actually value more cash in the economy.[94] Unlike typical monetary policy, funding private assets may invoke a special "seigniorage effect" – whereby money has a larger effect on output/ investment/ employment – because the money goes to production and not consumption. Yet, all these models assume (without describing how) production rises to meet increased demand (usually through soaking up excess capacity). Except for the Chinese case, we found no studies of such supposed excess capacity, except in the automotive sector and related industries like steel (capacity caused by shifting tastes and technologies rather than insufficient effective demand).[95] Figure 29 also shows evidence contracting the claim

[90] Josh Ryan-Collins, Is Monetary Financing Inflationary? A Case Study of the Canadian Economy, 1935–75, *Levy Economic Institute Working Paper No. 848*, 2015, available online. See also Laurence Ball, Fiscal Remedies for Japan's Slump, *NBER Working Paper No. 11374*, 2005, available online.
[91] Athanasios Orphanides, Fiscal Implications of Central Bank Balance Sheet Policies, Institute for Monetary and Financial Stability Working Paper 105, 2016, available online.
[92] For a brief outline of the issues, see Hall, R and R Reis (2015), "Maintaining Central-Bank Solvency Under New-Style Central Banking", NBER Working Paper No. 21173. For a brief version, see online.
[93] Many developing economies do not have enough money in circulation to engage in the optimal level of financial transactions and investments. See Cameron McLoughlin and Noriaki Kinoshita, Monetization in Low- and Middle-Income Countries, *IMF Working Paper No. 12/160*, 2012, available online.
[94] WIlliam English, Christopher Erceg, and David Lopez-Salido, Money-Financed Fiscal Programs: A Cautionary Tale, *Bookings Institute Hutchins Center Working Paper 31*, 2017, available online.
[95] See David Haugh, Annabelle Mourougane and Olivier Chatal, The Automobile Industry In and Beyond the Crisis, *OECD Economics Department Working Papers No. 745*, 2010, available online.

that money fuelled consumption helped grow the EU economy.[96] Actual growth has exceeded capacity (or potential growth) for a long time. These authors to not state or model the obvious – such finance must increase investment if such finance hopes to do more than temporarily goose the economy.

Figure 29: EU Firms Would Have Soaked Up Any Spare Capacity over the Previous Decade



The figure dispels the notion that nonconventional monetary policy in the EU only helped to increase consumption and thereby absorb excess capacity arising from the financial crisis. The growth of potential output (as measured by a question to EU businessmen about their capacity utilization) has remained below actual growth - suggesting either over-heating (which is true) or bad businesspersons' perceptions (as Malgarini thinks and as also probably true). Source: Malgarini (2011).

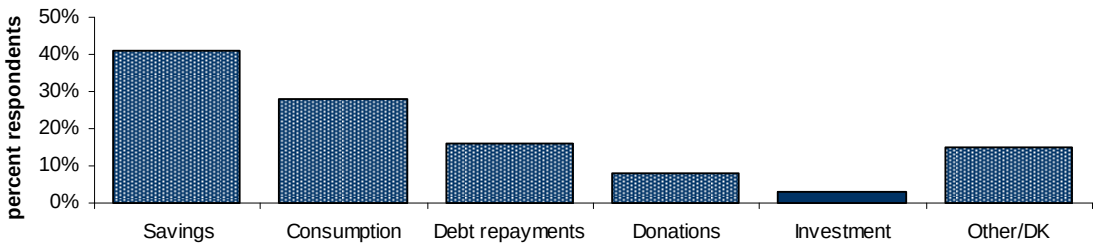
Any asset purchases (whether repaid or not and whether from the central bank or not) only help promote economic growth if productively invested.[97] Only investment in productive activities would reduce the harmful effects of permanently lower interest rates and higher inflation rates of such "free" helicopter money. [98] More traditional quantitative easing, such "money-financed fiscal programs" as former Fed chairman Ben Bernanke calls mass government bond purchases, would thus consist of mainly infrastructure investment and other longer-term, output-raising government investments.[99] **Helicopter money trying to raise GDP by raising consumption – rather than investment – will probably fail – if it works at all.**[100]

Yet, much data suggests that individuals and companies – if they received free cash (whether in the form of helicopter money or in return for securities) – would only spend it, rather than save it.[101] Figure 30 provides one illustration of numerous studies looking at

[96] Marco Malgarini, Industrial Production and Confidence After the Crisis: What's Going On? *Presentation at the Fifth Joint EU-OECD Workshop on International Developments of Business and Consumer Tendency Surveys*, 2012, available online.
[97] In the US context, see Jeffrey Manns, Building Better Bailouts: The Case for a Long-Term Investment Approach, *Florida Law Review 63*, 2011, available online. .
[98] Andrew Watt, Quantitative easing with bite: a proposal for conditional overt monetary financing of public investment, Macroeconomic Policy Institute Working Paper 148, March 2015, available online.
[99] Ben S. Bernanke, What tools does the Fed have left? Part 3: Helicopter money, *Brookings Institute*, available online.
[100] We would not like to give the impression that a consensus exists on the use or effectiveness of helicopter money.
[101] We cite a Dutch study only for illustrative purposes. Numerous other studies point to the same conclusions. For evidence from the EU, see Ian Bright, Senne Janssen, Helicopter money: Loved, not spent, Vox, 13 January 2017, available online.

the propensity to invest – rather than spend in other ways – central bank largesse.[102] Savings, consumption (and presumably savings for later consumption) represent the most popular use of central bank money. Investment represents the least attractive option.[103] If households' members' preference reflect those of the governments and businesses they work in, **an external actor seems necessary to promote investment beyond typical fiscal channels.**[104]

Figure 30: Personally, They Would Rather Save it Than Invest It



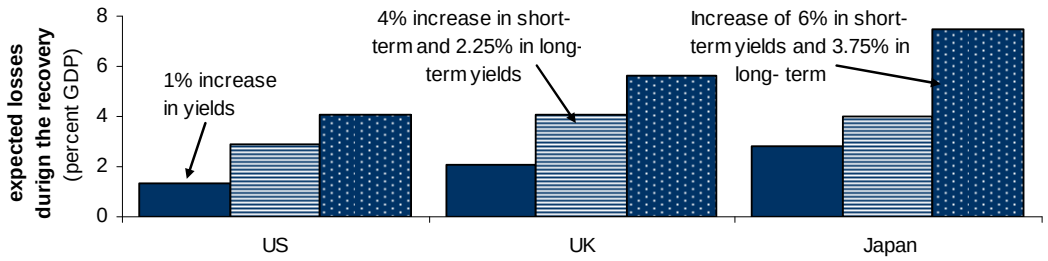
The figure shows the percent of 1,122 Dutch respondents' intended actions if they receive 2000 from the European Central Bank in helicopter money. DK means don't know.
Source: van Rooij and de Haan (2016).

Significant securities price falls make central bank ownership of these assets particularly attractive politically. When stock and bond prices fall during the recover, the central bank should experience paper losses.[105] Yet, given the central bank's ability to print money, such balance sheet losses and gains have little meaning for the institution.[106] Figure 31 shows the estimated size of the losses which private investors avoid by having the central bank buy up government bonds.[107] As interest rates rise in the US for example, the Federal Reserve Bank could lose up to 4% of GDP on its bond purchases if short-term rates increase by 6% and long-term rates increase by 3.75%. Even for modest 1% interest rate rises, the US, UK and Japanese central banks can expect to lose more than 1% of the

[102] See Maarten van Rooij and Jakob de Haan, Will helicopter money be spent? New evidence, Netherlands National Bank Working Paper No. 538 / December 2016, available online. See also
[103] A US study looking at the effects of economic stimulus payments on consumption find that (with the exception of transportation), helicopter-style cash gifts did not increase spending on durables (the closest equivalent to investment in their study). See Jonathan Parker, Nicholas Souleles, David Johnson, Robert McClelland, Consumer Spending and the Economic Stimulus Payments of 2008, NBER Working Paper No. 16684, 2011, available online.
[104] For data on companies propensity to invest, see Atanas Kolev, Philipp Brutscher, and Christoph Weiss, Investment and Investment Finance in Europe: Financing Productivity Growth, 2016, at Figure 2, available online.
[105] For background and discussion of the ramifications, see Norbert Michel, Quantitative Easing, The Fed's Balance Sheet, and Central Bank Insolvency, Heritage Foundation Policy Brief, 2014, available online.
[106] See Robert Lenzner, The Federal Reserve Will Lose Billions But It Just Doesn't Matter, June 8, Forbes, 2013, available online.
[107] Tommaso Mancini-Griffoli, Jiaqian Chen, Simon Gray, Tomas Mondino, Tahsin Saadi Sedik, Hideyuki Tanimoto, Nico Valckx Andrea Pescatori, and Silvia Sgherri. Unconventional Monetary Policies—Recent Experience and Prospects—Background Paper, 2013, At figure 1, available online.

value of GDP on their asset (bond) holdings. **Central banks can thus socialise the risks and losses of investment in a way other institutions can not.**

Figure 31: Central Banks Rather Than You and I Could Eat Losses of Up to 7% of GDP on their Balance Sheets



The figure shows the expected losses from asset purchases due to falling bond prices during an eventual economic recovery for each of the three jurisdictions shown and under each the three assumptions about future interest rate rises.
Source: Mancini-Griffoli and colleagues (2013).

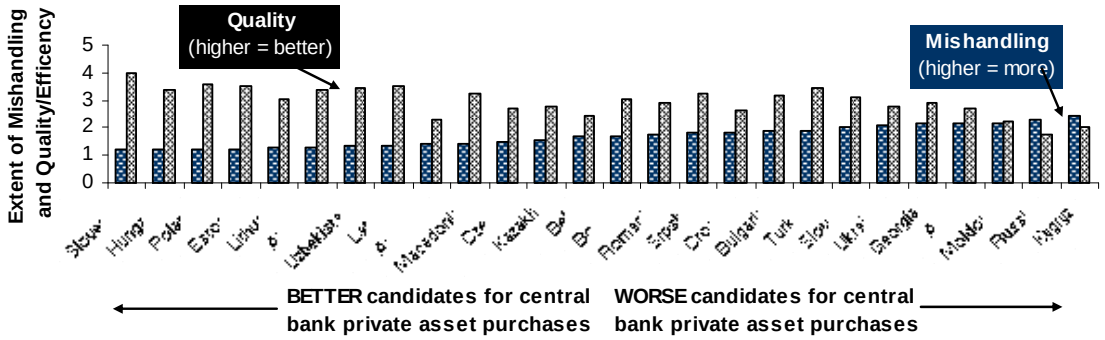
Central Bank Corruption/Ineptitude Less than Government's

Behind calls for central banks to serve as funders of last resort lies the implicit assumption that technocratically-run central banks can allocate resources better than corrupt and incompetent governments. Yet, we have very little idea about corruption in the world's central banks. Only a few studies have attempted to grapple with the question directly.[108] Researchers' sluggishness to collect these data reflects both the opacity and the general view of central banks as technocratic and insulated from corrupt incentives.[109] Even a recent report by an "anti-corruption watchdog" targeting the ECB failed to unearth any wrongdoing serious enough for study.[110] Figure 32 shows estimates for corruption in central banks in Central Europe and the Former Soviet Union (monikers hardly appropriate today). As belies this categorisation of countries, these data are almost 20 years old by now. Figure 33 shows much more recent estimates of administrative corruption in public administrations (both as for the rules giving rise to such corruption as well as actual practice).[111] While some scores seem implausible (like Colombia's), data

[108] Besides the World Bank data we cite later and derivate publications from that data, see Ahmad Jafari-Samimi, Corruption and Central Bank Independence: Evidence from Developing Countries, *Journal of Humanities 8*(4), 2001, available online. See also Tony Cavoli and John Wilson, Corruption, Central Bank Independence and Optimal Monetary Policy in a Simple Model, *Centre for Regulation and Market Analysis Working Paper 2009-02*, available online.
[109] Of course, thousands of newspaper articles report such corruption around the world. Yet, Schnike's doctoral dissertation remains one of the view long studies on the subject. See Michael Schinke, Corruption and Central Banks Dissertation, Doctoral degree in the Economics Faculty of the University of Passau, 2005, available online.
[110] A German newspaper recently reported that an "Anti-Corruption Watchdog Targets ECB", referring to Transparency International's recent report. In that "anti-corruption" report on the European Central Bank, Transparency International's authors could only criticise political decisions and internal rules – with little actual touch to bribery issues. See Frank Drost and Jan Mallien, NGO Report: Anti-Corruption Watchdog Targets ECB, Handelsblatt Global, 6 July 2017, available online. See also Benjamin Braun, Two Sides of the Same Coin? Independence and Accountability of the European Central Bank, 2017, available online.
[111] Global Integrity, Global Integrity Reports: Data, Global Integrity Report 2011, available online.

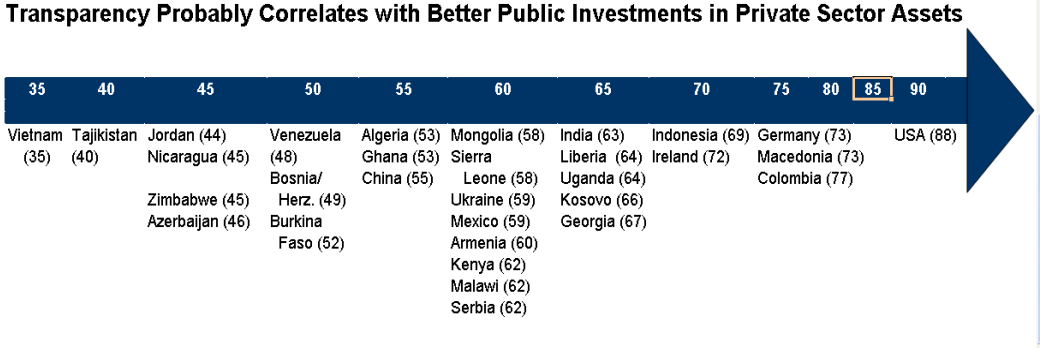
like this clearly show that some countries' executive agencies have better incentives to invest in profit-making sustainable companies more than others. **In some sense, the decision about where to spend money from to support private business boils down to weighing the corruption and efficiency of the government (ministry of finance) and the central bank.**

Fgure 32: Incompetence and Corruption Among Eastern European and Eurasian Central Banks



The figure shows rather old estimates of the extent of corruption (as proxied by the perception of the mishandling of funds and the perceived quality and efficiency of the central bank in the countries shown. Countries closer to the right side of the graph generally have more perceived mishandling and lower quality -- thus making less than ideal investors in private sector assets.
Source: Schinke (2005).

Figure 33: Fewer Conflicts of Interest and More Budgetary Transparency Probably Correlates with Better Public Investments in Private Sector Assets



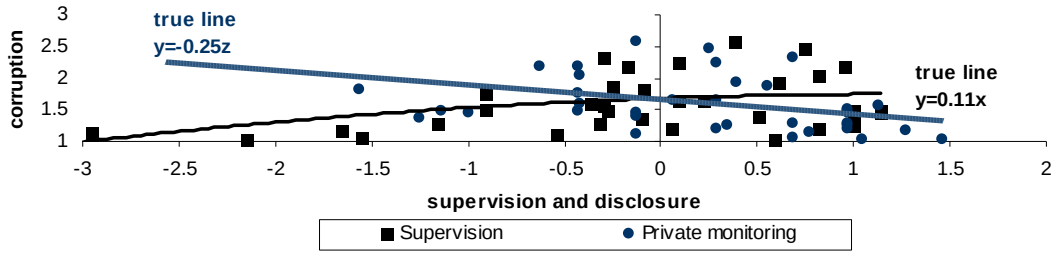
The figure shows the average of scores in four categories dealing with the rules and practices influencing public administrative corruption. These scores range from 0 to 100 (100 is best). The categories we averaged consist Government Conflicts of Interest Safeguards & Checks and Balances, Conflicts of Interest Safeguards & Checks and Balances: Executive Branch, Budget Process Oversight & Transparency and Civil Service: Conflicts of Interest Safeguards and Political Independence.
Source: Global Integrity (2017).

Corruption in a central bank can reverberate across the financial system – imperilling making banks' lending decisions. When central banks regulate the broader banking sector, corruption in the central bank can incentivize banks to misallocate resources for corrupt motives.[112] Figure 34 shows estimates of central bank corruption and the extent of

[112] Laurent Weill, How Corruption Affects Bank Lending in Russia, Economic Systems 35(2), 2011, available online.

supervision versus private monitoring.[113] In theory, corrupt central banks should want opaque banks through which they and other bankers can seek rents or engage in other types of misuse of commercial/public power. Yet, the data used by these authors shows the opposite of the true result when we control for factors that might interfere with this relationship. As shown in the figure, corruption falls with more supervision and private monitoring. Unconventional monetary policy in a corrupt environment would almost certainly led to more corruption – as money sloshes into public procurements, risky lending, and the rising inequality which encourages bank employees and businessmen to engage in corruption to raise their income through bribe-seeking.[114] If corruption among banks exceeds corruption in the central bank, the central bank seems to represent a better lender to the private sector (after taking information costs into account).[115] While these results remain tentative – the broader conclusion remains. **Corruption would undoubtedly stifle a central bank's ability to use unconventional monetary policy.**

Figure 34: More Powerful Central Banks Regulate More Corrupt Banks



The figure shows the relationship between banking regulators' supervisory authority, the extent of private monitoring of these banks and businesspersons' experiences with corruption in their banks. We show the "true" change in corruption in the equations after controlling for inflation, growth, privatisation, GDP per capita, banking freedom, state ownership, legal rights and other factors. See source for definitions.
Source: Beck and co-authors (2004).

The relationship between corruption and excessively easy monetary policy – and thus inflation – appears almost self-evident.[116] All the studies we analysed unanimously found a positive association between corruption and inflation (with inflation supposedly being caused by excessive monetary easing).[117] Corrupt officials take money from the public coffers, leaving the central bank to fund public expenditure through monetising

[113] Thorsten Beck, Asli Demirguc-Kunt, and Ross Levine, Bank Supervision and Corruption in Lending, *NBER Working Paper 11498*, 2004, available online.
[114] White does not paint so bleak a picture. Yet, these effects almost certainly follow from the "unintended consequences" the author warns about. See William White, Ultra Easy Monetary Policy and the Law of Unintended Consequences, *Federal Reserve Bank of Dallas Globalization and Monetary Policy Institute Working Paper No. 126*, 2012, available online.
[115]
[116] Not everyone might agree. In Braun and Di Tella's stylized rendition, corrupt capitalists pad the cost (price) of investment projects, raising both inflation and the variability of inflation. As such, the central bank is innocent. See Miguel Braun and Rafael Di Tella, Inflation, Inflation Variability and Corruption, *Economics and Politics 16*(1), 2004, available online.
[117] Mohamed Sami Ben Ali and Seifallah Sassi, The Corruption-Inflation Nexus: Evidence from Developed and Developing Countries, *BE Journal of Macroeconomics 16*(1), 2016, available online.

government debt.[118] Yet, in many countries, one can not easily say that corruption touches the central bank or government less – both institutions suffer from high levels of corruption. Higher quality executive institutions often correlate with more independent and competent central banks.[119]
Only in cases where a high correlation between countries' corrupt and incompetent central banks and executive agency public officials (mostly low income countries), vesting such a private securities purchase scheme we discuss impractical.

Even with an independent central bank, corruption may cause the central bank to "purchase" far more sour investments than optimal. Few have found a direct link between independence and corruption (and thus the likelihood that a central bank could invest in private securities better than the executive). Figure 35 shows the results of one study which does claim to find such a link.[120] Contrary to theory, higher levels of independence might actually result in the increased monetisation of government debt (the preferred security of central banks everywhere).[121] More worryingly, the central bank might actually act honestly because the government wants to monopolize corruption rents.[122] Some authors go so far as to claim that with a pegged exchange rate, the opportunity of corrupt money printing shrinks – helping to reduce overall corruption in the country.[123] Yet, one robust conclusion remains. **Without a firm focus on real output and prices, even independent central banks will find themselves under pressure to use their balance sheets to conduct fiscal policy**.[124]

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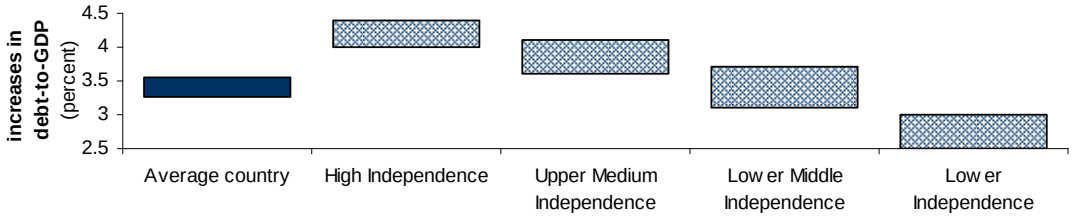
[118] See Keith Blackburn and Jonathan Powell, Corruption, Inflation and Growth, *Economics Letters 113*(3): 2011.
[119] Barbara Pistoresi, Maddalena Cavicchioli, and Giulio Brevini, Central Bank Independence, financial instability and politics: New evidence for OECD and Non-OECD Countries, *DEMB Working Paper Series 112*, 2017, available online.
[120] See Ourania Dimakou, Central Bank Independence, Bureaucratic Corruption and Fiscal Responses - Empirical Evidence, *Birkbeck Working Papers in Economics & Finance BWPEF 1012*, 2010, available online.
[121] For one of these theoretical models which supposes a link between corruption and central bank non-independence, see Tony Cavoli and .John Wilson, Corruption, Central Bank (In)dependence and Optimal Monetary Policy in a Simple Model, *Journal of Policy Modeling 37*(3), 2015, available online.
[122] Frank Bohn, Inflation and Grand Corruption: Still More on the Time-Inconsistency of Monetary Policy, *Nijmegen Center for Economics Working Paper 10-105*, 2010, available online.
[123] Carsten Hefeker, Taxation, Corruption and the Exchange Rate Regime, *CESIFO Working Paper 2561*, 2009, available online.
[124] For a warning from the ECB, see Peter Praet, Have Unconventional Policies Overstretched Central Bank Independence? Challenges for accountability and transparency in the wake of the crisis, Symposium on Building the Financial System of the 21st Century: An Agenda for Europe and the United States, Frankfurt am Main, 29 March 2017, available online.

Figure 35: More Independence Makes Central Banks More Corrupt Funders of Last Resort?

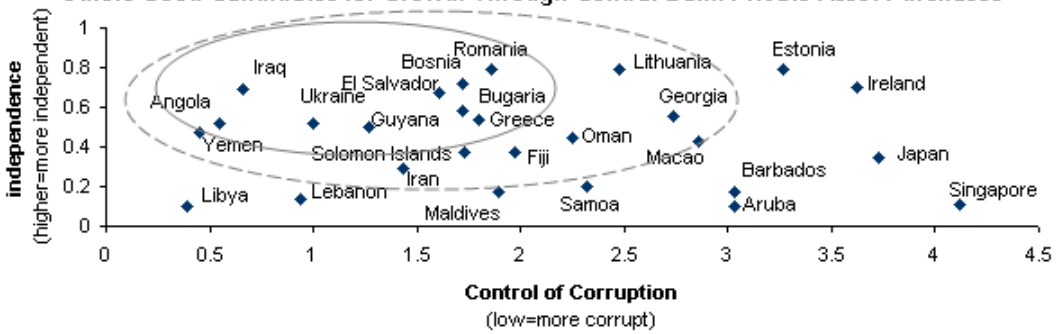


The figure shows the change in debt-to-GDP ratios corresponding with varying levels of central bank independence. Each bar specifically shows the range in the estimated regression parameters across the author's various regression specificatiions --- after controlling for factors like GDP growth, debt levels, whether the country has undergone a crisis, and so forth. Their use of Transparency International's Corruption Perceptions Index for corruption though puts the entire study in doubt. Source: Dimakou (2010).

Which countries' central banks might benefit most from mass private sector purchases? Yet, roughly speaking, countries which have low GDP growth, inflation and interest rates as well as high government/public debt represent ideal candidates (and we describe the exact macroeconomic screening methodology used in Appendix I). Two other non-macroeconomic criteria also probably play a role. Growth promoting central bank private asset purchases also likely benefit a country when the government can not use public funds effectively (due to incompetence or corruption) and when central banks have the technocratic skill and independence needed to spend better than the government. Figure 36 shows the central bank independence ratings and likely government misappropriation of public funds (as proxied by corruption) for the countries meeting the macroeconomic eligibility for such private asset purchases. Namely (as we describe in the next section), these countries should have low inflation, growth, interest rates and high levels of government debt). The countries in the gray circle represent particularly good candidates. These countries possibly have high enough corruption levels to make bypassing standard fiscal policy government procurements and purchases worthwhile – and the central bank independence needed to ensure that one corrupt spender does not simply replace another. **China will probably provide a pivotal test case, as its central bank balance sheet serves explicit government growth and stabilization objectives while operating in a highly corrupt environment.**[125]

[125] While brought up in 2002, the issues identified remain as valid today. See Guonan Ma and Ben Fung, China's asset management corporations, *BIS Working Papers No 115*, 2002, available online.

Figure 36: Bulgaria, Greece, Ukraine Georgia, Macao, Romania. Lithuania and Nine Others Good Candidates for Growth Through Central Bank Private Asset Purchases



The figure shows the countries meeting the four conditions for growth promoting central bank asset purchases at least once in the previous 10 years (low inflation, low growth, low interest rates and high public debt levels). The first circe shows countries with high government corruption (as a proxy for propensity for government misspending) and high central bank independence for the latest years available. We used central bank transparency when we could not find independence data. The dotted circle uses a slightly looser criteria. Other countries meeting these criteria (but for which we could not obtain central bank independence data) include Burundi, Congo Rep., Guniea-Bissau, Montenegro, Seychelles, Sierra Leone, Brunei, Central African Republic, Chad, Cyprus, Dominicana, Samoa, St. Kitts, St. Lucia, St. Vincent, Vanuatu, West Bank/Gaza, Liberia, Afghanistan, Angola, Antigua, Nicaragua, Niger, Tonga, Grenada, Madagascar, Surinam, Togo, Equatorial Guinea, and Zimbabwe.

Sources: World Bank (for data on 4 criteria and control of corruption) and Dincer and Eichengreen (for independence data).

Structural Macro Disequilibria

A role for the central bank's purchases of positive discounted value private sector securities probably exists when the country faces severe structural problems (whether occurring as the result of an acute crisis or chronic under-development). US Federal Chairman Ben Bernanke himself favoured helicopter cash under the conditions of the "underutilization of resources and very low inflation (or even deflation) that would justify such an approach."[126] At the very least, other evidence points to the role of asset purchases to create markets for securities (and thus potentially investments) which markets do not incentivize.[127] In his theoretical treatise, Woolcock notes that central bank purchases of some assets can crowd-in demand in missing or distorted markets with sub-optimal demand.[128] Woolcock's other study of commercial paper markets supports this view. In any event, such support to net positive discounted value firms should be better than bankruptcy.[129]

[126] Ben Bernanke, What tools does the Fed have left? Part 3: Helicopter money, Brookings Institute, available online.
Monday, April 11, 2016
[127] Marco Di Maggio, Amir Kermani, Christopher Palmer, How Quantitative Easing Works: Evidence on the Refinancing Channel, Harvard Business School Working Paper 2016-08,available online.
[128] Michael Woodford, Methods of Policy Accommodation at the Interest-Rate Lower Bound, September 16, 2012 Woolcock at p. 67, available online.
[129] For a US perspective, see Miron, Jeffrey A. 2009. Bailout or bankruptcy? A libertarian perspective on the financial crisis. Cato Journal 29(1), available online.

The use of monetary policy as a motor of economic development has enjoyed a slight renaissance since the 2007-9 global financial crisis. Most of the claims repeat old nostrums for using government money to fund government banks and companies, provide capital/liquidity to banks, and monetize government deficits in order to fund social programmes. Figure 37 shows some of the issues involved in recent discussions around using unconventional monetary policy (and specifically securities/asset purchases from the private sector) to help overcome structural problems in a country's macroeconomic supply and demand. The old arguments continue – shifting bad debt onto the tax payer, go around dysfunctional banks, and so forth. Newer arguments include the use of central bank investments for "green" and other investments which private banks have no incentive to make. Yet, as described in the previous section, **the consensus view revolves around low interest rates, growth rates, inflation rates and high levels of government debt, plus low central bank corruption.**

Figure 37: Central Banking as a Cure for What Ails an Under-Developed Economy?	
Direct goals	Some uses for central bank asset purchases include employment creation (Epstein, 2018) Green QE (Volz, 2017) and credit allocation for social goals like SME funding thresholds (Reuters, 2016).[130]
Financial systems	Reduce interest rates and banks' debts, encourage lending and encourage investors to buy more risky assets (Chandler, 2015).[131] Help replace shadow banks which profit from getting around red tape (Moe, 2012).[132]
Drawbacks	Asset bubbles, liquidity traps, "nationalisation" of lending, lower investment returns due to overinvestment, income redistribution, lower real wages (Hoffmann and Gunther Schnabl, 2016).[133] Purchases can rarely be high enough.[134] Administrative reasons also make such policies undesirable.[135]

[130] Gerald Epstein, Central banks as agents of employment creation, *DESA Working Paper No. 38* ST/ESA/2007/DWP/38, 2007, available online. See also Ulrich Volz, On The Role of Central Banks in Enhancing Green Finance, The UN Environment Inquiry, 2017, available online. See also Reuters, Egyptian central bank outlines plan to help small firms, *Reuters Market News Jan 10*, 2016, available online.

[131] See also Marc Chandler, What Would 'Unconventional Monetary Policy' from the PBOC Look Like?, *Economy Watch April 29*, 2015, available online.

[132] See Thorvald Moe, Shadow Banking and the Limits of Central Bank Liquidity Support: How to Achieve a Better Balance between Global and Official Liquidity, *Levy Economics Institute Working Paper 712*, 2012, available online.

[133] Andreas Hoffmann and Gunther Schnabl, Adverse Effects of Unconventional Monetary Policy, *Cato Journal 36*(3), 2016, available online.

[134] See Gauti Eggertsson and Kevin Proulx, Bernanke's No-Arbitrage Argument Revisited: Can Open Market Operations in Real Assets Eliminate the Liquidity Trap?, In Elias Albagli, Diego Saravia, and Michael Woodford, *Monetary Policy through Asset Markets: Lessons from Unconventional Measures and Implications for an Integrated World*, 2016, available online.

[135] Stone and his colleagues make irrefutable claims about the macroeconomic distortions and public sector distortions such purchases would cause. We purposely ignore monetary policy issues and political issues to focus our analysis on an under-researched part of the debate. Central bankers and legislators in doubt such heed their advice. See Mark Stone, Kenji Fujita, and Kotaro Ishi, Should Unconventional Balance Sheet

China's experience will provide the most fruitful lessons for this kind of securities finance. With the exception of perhaps China, central banks do not hold large amounts of assets in the longer-run.[136] Ultimately, governments still hold the bag when a central bank goes broke – so all monetary policy is in some sense fiscal policy.[137] Yet, when the People's Bank of China (PBOC) provides credit to banks and directs these banks to loan to particular enterprises, such an arrangement is the same as if the central bank lent directly.[138] For example, under the PBOC's Pledged Supplementary Lending Scheme, the China Development Bank (the only institution eligible for the Scheme) received 1 trillion RBM from the central bank for urban development lending.[139] The lower interest rate paid by the recipient companies corresponds to a lower fixed resale price to the original companies taking the PBOC's money.[140] As the authors of the BBVA report note, "In this sense, it looks more like stealth lending of the central bank rather than a monetary policy tool in common sense."[141]

What Effect Would Funder-of-Last Resort Rules Likely Have?

A Model of Direct Central Bank Private Securities Purchases

We must return to basics to understand how central bank direct purchases of private securities might boost investment (and thus hopefully growth). Figure 38 shows the model we use in this paper to figure out how central bank "purchases" (as we have defined them previously) might incentivize private sector investment. We can not assess the effect of central bank government securities purchases on such investment. Hopefully, experimental methods like we suggest in the appendix will allow researchers to trace the effects of specific obligation bonds on the capital they fund. Moreover, firms naturally use mostly bank finance – meaning we must control for such finance in order to gauge the direct effect of central bank private asset purchases on their investment decisions. We must also control for the monetisation of government spending that increases demand (or the production of government goods) which go into firms' profits. We must also control for the effects of credit expansion to banks –who lend in turn to companies. The figure also shows the various channels that monetary policy can affect investment – and thus the channels we must control in order to measure the direct effect of central bank private asset purchases on investment. The equation at the bottom of the figure roughly shows

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Policies be Added to the Central Bank Toolkit? A Review of the Experience So Far, *IMF WP/11/145*, 2011, available online.

[136] We do not see any "battle of the central banks" with central banks buying – particularly foreign -- corporate shares. See Ellen Brown, Buying Up the Planet: Central Banks on a Corporate Buying Spree, *HuffPost 25 June*, 2014, available online.

[137] Willem Buiter, Can Central Banks Go Broke? POLICY INSIGHT No. 24, 2008, available online.

[138] David Daokui Li, The Unconventional Chinese Monetary Policy in the Global Context, Paper Presented at the Kansas Federal Reserve Bank Symposium, 2013, available online.

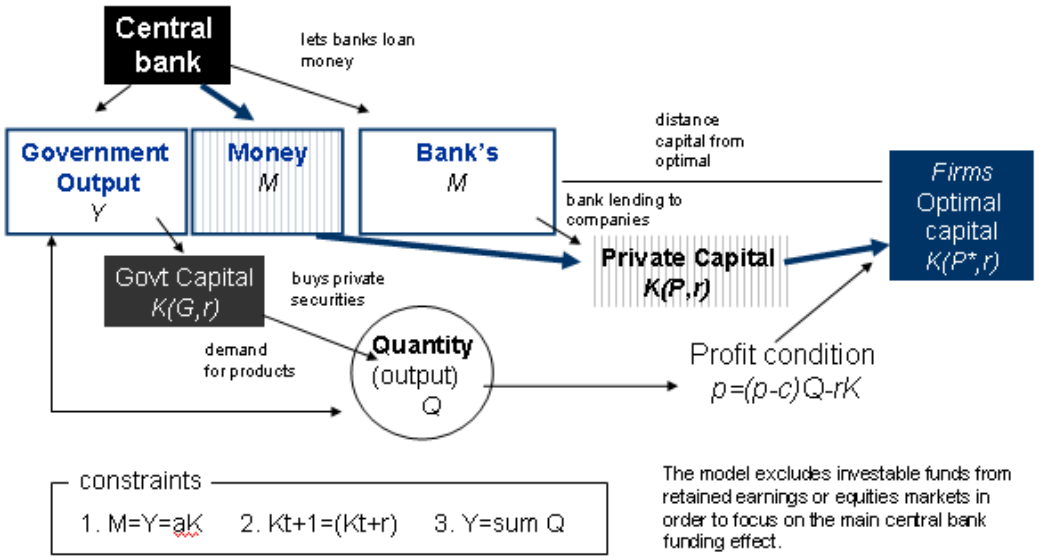
[139] Le Xia, Jinyue Dong, Carlos Casanova and Betty Huang, China Economic Outlook Third Quarter 2014, at Box 1. China's unconventional monetary policies, available online.

[140] One can see a loan as the purchase of rights over an asset/investment in exchange for a promise to receive the price paid and a premium (with the premium labelled as interest payments and paid over time).

[141] Id.

the factors we take combinations of in order to conduct our preliminary statistical analysis

Figure 38: Model of Central Bank Private Securities Purchases



Factor 1. banks as unable or unwilling to provide positive risk-adjusted net present value funding
Impact of CB funding: positive
Factor 2: safety/stability of banks (z-scores)
Impact of CB funding: positive

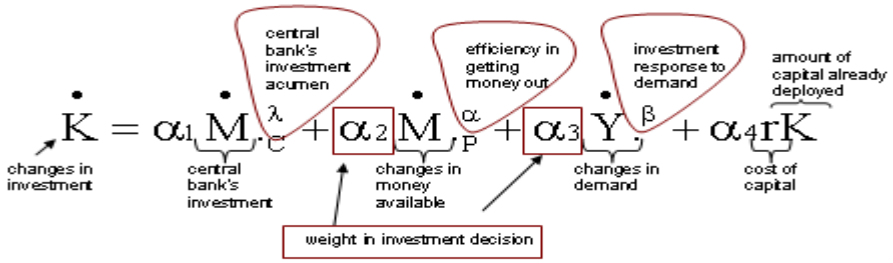
Factor 3: Lending interest rates too high
Impact of CB funding: positive

Factor 3: Inflation
Impact of CB funding: positive to reduce inflationary expectations

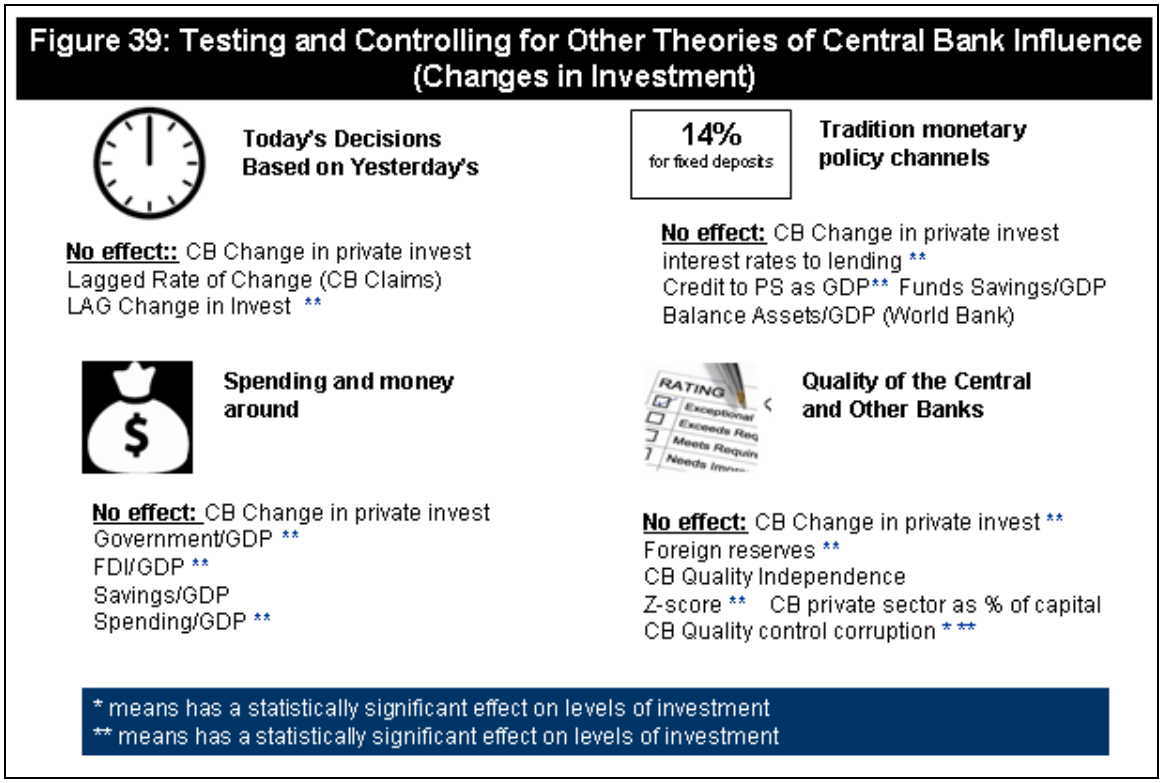
Factor 4: Credit to private sector to GDP
Impact: could crowd out such credit
Factor 5: Foreign reserves
Impact: more money to spend

Factor 6: Central Bank Independence
Impact: Could increase profitability and effectiveness of such purchases

Factor 7: Control of corruption
Impact: corruption outside central bank makes such CB investments better
Factor 8: Gross savings to GDP
Impact: more funds available – and so less need for CB funding
Factor 9: Government consumption
Impact: Higher local demand means more potential for retained earnings and investable funds
Factor 10: Higher FDI to GDP
Less need for central bank finance
Factor 11: Gross national expenditure to GDP
More demand increases demand for investment



Central banks may influence investment in four major ways – none of them very relevant globally. Figure 39 shows each of these methods of influence – and the effect on investment growth found for multiple regression. Current investment has little statistically significant relationship with past changes or changes in central bank private asset purchases. Monetary policy has surprisingly little influence over changes to investment (likely because of its diffuse nature). The overall size of available funds through foreign direct investment, consumer spending and government spending similarly has a relatively little effect. Finally, more independent central banks operating in less corruption jurisdictions seem to mediate little in central bank support for investment.

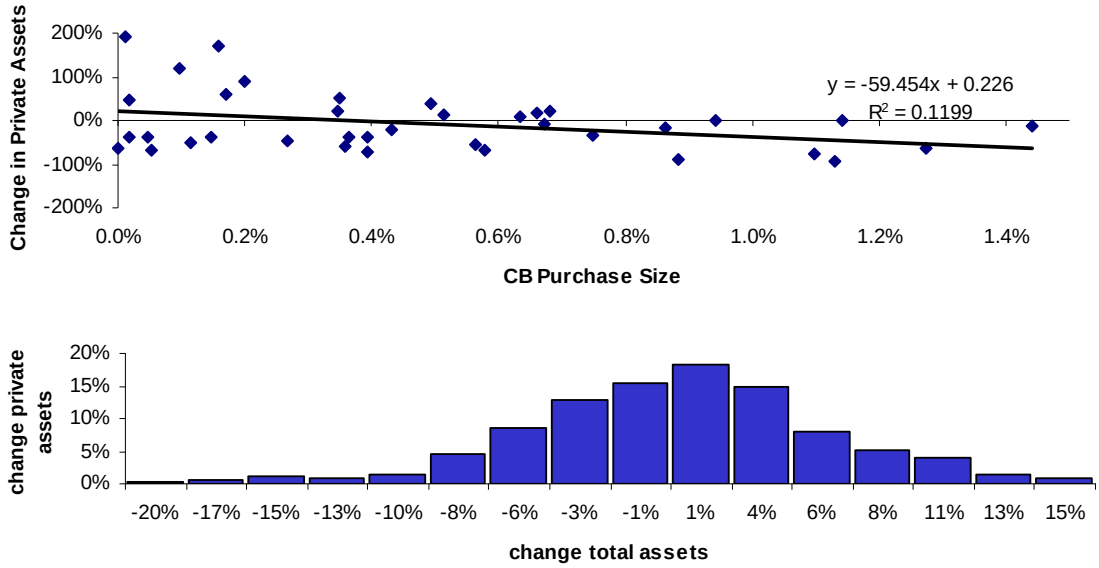


Various policies effect investment levels (as a percent of GDP) much more. As the figure above shows, the usual monetary policy variables affect investment, as do changes in central bank "quality" and the amount of investment/demand in the system. Yet, because of the complexity of the system, simple regression (or groups of regressions) probably will shed little light on the overall effect of direct central bank purchases of private securities. **The large amount of contradictory effects from time period to time period and from country to country militate against the use of typical regression procedures.** We should use other more sensitive methods.

How Much Money Should Go to the Private Sector?

Some evidence suggests that central banks have a target amount of private sector assets in mind – rather than deciding these assets on broader economic and pricing needs.[142] Figure 40 shows the way that central bank private asset purchases change with the central bank's overall asset portfolio (expressed as a percent of GDP). Central banks historically holding more than half a percentage point in GDP in these securities usually divested. Central banks holding less historically acquired more. Holding a certain percentage of the central bank's balance sheet in private assets makes sense from a diversification perspective. Yet, broader simulations of the statistical distributions supposedly driving these data show a different picture. Private asset purchases in the post-crisis period unsurprisingly represent complements, rather than substitutes, for other kinds of asset purchases. The central bank can act as a surrogate for the private market, temporarily providing demand that would have existed in the absence of a crisis. Yet, they tend to finance governments as much or more. Yet, the obvious limits to central banks' private asset purchases point to one possible conclusion. **Some natural limit must exist before the central bank starts distorting private markets more than helping them in a way which does not affect public finance in the same way.** For some counterintuitive reason, governments can absorb far more credit than the private sector in most countries.

Figure 40: Do Central Bank Stock Up on Private Assets Until A Threshold Value of Half-a-Percent of Capital Formation?



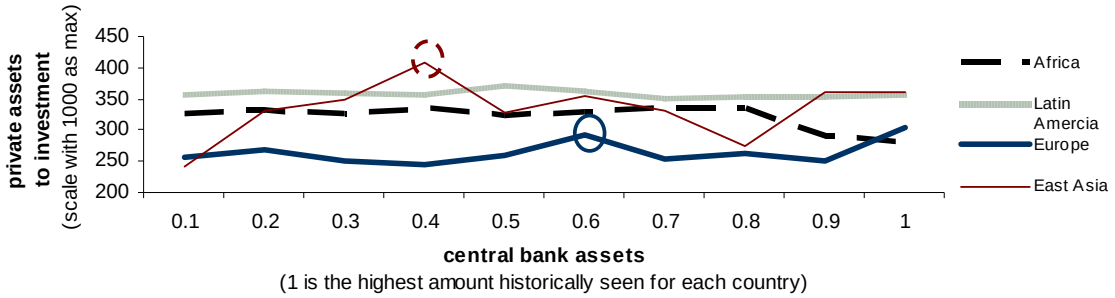
The figure shows the relationship between private asset accumulation by central banks and changes in their overall balance sheets. We show the line of best fit above – showing slight substitutability between private sector assets and other assets more generally. Yet, when simulated via Monte Carlo simulation (using the statistical distributions and correlations these data exhibit), a wide range of relationships exist (from

[142] As noted before, a central bank may purchase private sector securities because a collective action (coordination) problem distorts their prices, using causing temporary out-of-equilibrium under-pricing which can have longer run effects on asset prices.

roughly 10% to -10%). Thus, one can only understand such private asset purchases on a country-by-country basis.

Hopefully, a central bank's preference for holding private sector securities/assets on its balance sheets maximises the extent of profitable, productive investment. Figure 41 shows the level of such central bank securities purchases as a percent of investment in each economy. Basically, upward moving lines mean that central bank purchases represent larger purchases of investments relative to the total change in the capital stock for that year. East Asian central banks naturally purchase more of these private assets than central banks in Europe or usually Sub-Saharan Africa. Yet, we observe the highest amount of such purchases for central banks with relative fewer assets as a percent of GDP (about 40% of the biggest asset holder). In Europe, such a biggest buyer central bank has about 60% of the maximum amount of central bank assets as a percent of GDP. Figure 42 shows these patterns at a disaggregated level. The volatility of Tajikistan's purchases outstrips Macedonia's, Burundi's and Angola's. Most central banks whose balance sheets weigh in at around 40% to 60% of the largest central bank balance sheets, tend to load up on relative more private sector securities/assets. **Both the theoretical and practical literature offers little clue about why central banks tend to limit private asset purchases at certain levels.**[143]

Figure 41: High Point for Central Banks' Private Asset Investment Depends on the Region

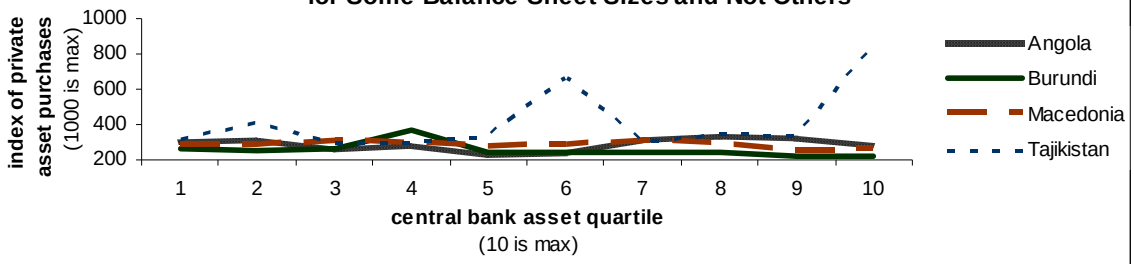


(1 is the highest amount historically seen for each country)

The figure shows the highest level of central bank private asset purchases for the central bank's balance sheet size relative to GDP. Thus for East Asia, highest private asset purchases coincided with these central banks' portfolios at about 40% of their historical max. For Europe, such highs corresponded with about 60% of their max. Each point on the line refers to a "conditional mean" (or the most frequent level of private asset investment for that level of asset bank assets). We used spider plots to generate these plots.
Source: data from IMF (2017)

[143] Williamson and Kang might argue that the central bank can monitor the quality of these assets better – thus this 40% represents those investments/assets whose quality investors find hardest to verify. We assume throughout the paper that everyone can accurately and honestly evaluate and rank investments' marginal returns from highest to lowest. Thus, we don't see central bank purchases as a way of policing investment market quality. See Stephen Williamson, Central Bank Purchases of Private Assets, 2014, available online. See also Kee Youn Kang,
Central Bank Purchases of Private Assets: An Evaluation, 2017, available online.

Figure 42: Central Bank Assets Translate into Private Asset Purchases for Some Balance Sheet Sizes and Not Others

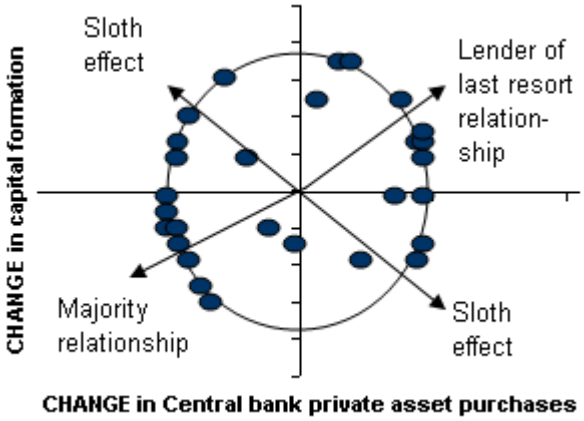


The figure shows the relationship between the growth of central bank balance sheets more broadly and the growth of private sector assets for the countries with the most pronounced growth of such purchases. Unsurprisingly, larger central bank balance sheets do not translate into larger private sector asset purchases. Usually, diversification happens when these balance sheets get to about half of their historical max.
Source: authors, based on data from IMF (2017)

Unsurprisingly, no obvious cross-country pattern seems to exist between investment growth and central banks that buy more private sector securities. Figure 43 shows the "raw" cross country relationship between these two variables after the global financial crisis in 2008-2009 (namely, before controlling for outside influences like the effects of broader monetary policy). The data look like a ball when we plot changes in capital formation after the financial crisis with changes in central bank purchases of private assets. We thus project the data onto a circle in order to look at the way these data relate to each other. Two trends emerge that simple linear regression would not pick up. First, decreases in central bank private asset purchases seem to coincide with decreases in investment far more than increases in such asset correspond with increases in investment in the post-global economic crisis period. Could private sector asset purchases serve as a ratchet – helping to keep investment from falling, but failing to push such investment forward? Second, many jurisdictions witness decreases in private capital formation as the central bank "purchases" private assets/securities. Instead of providing cash usable for investment, such central bank purchases seem to discourage investment – and thus presumably consumption (or at the very least financial distributions to owners and financiers). **We thus posit the existence of some kind of "sloth effect" – such that investment actually falls for some jurisdictions as central bank purchases of private sector securities rise.**

Figure 43: Much of the Relationship between Private Asset Purchases and Investment in the Negative Territory

The figure shows the "polar" (circular) relationship between the change in capital formation and the change in central bank private asset purchases after the 2008 global financial crisis. Dots on the edge of the circle show countries' data further afield. These dots show the cloud-like nature of these data (before controlling for outside factors).



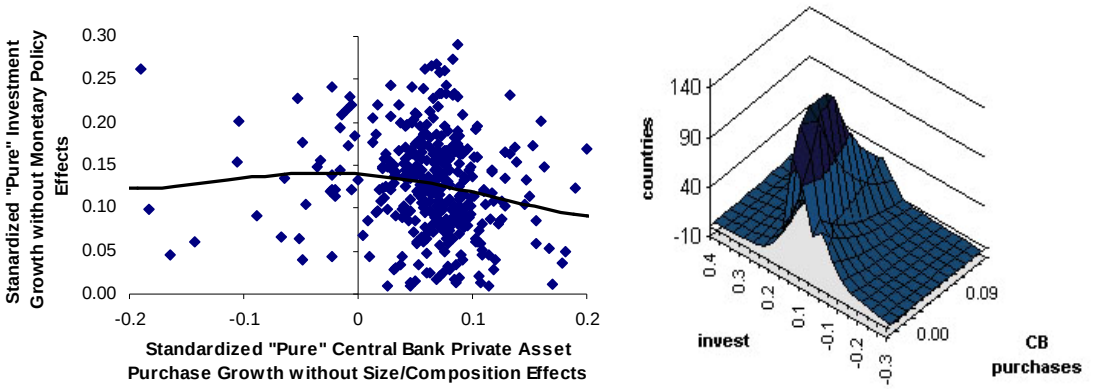
Yet, we see clustering toward the negative left-hand side. Such clustering suggests a possibly asymmetric relationship between such purchases and investment. Central bank private asset purchases can prop up falling investment. But such purchases can not generate new investment. We will see after controlling for other variables later.

Source: authors, with data from the IMF and World Bank (2017).

Even after controlling for the effects of monetary policy on investment, we see relatively little relationship between central bank private asset purchases and investment. Figure 44 shows the relationship between these two variables – after removing the effects of broader money policy through multiple regression.[144] The picture on the right seems to show a data ball – with no obvious pattern between central bank private asset purchases and investment. Yet, looking at the picture on the right side of the figure, we see a positive effect on investment for relatively small increases in these private sector asset purchases. Before controlling for countries' region, income level and other factors, we see significantly diminishing returns to such asset purchases – after controlling for the way that these asset purchases affect broader interest rates and capital markets. Reaffirming what we will further see in the next section, **private asset purchases have positive impacts on investment – but only in relatively small amounts on a national scale and only before crowding out other types of investment.**

[144] Such a control consists of dividing up the effect on investment (for example) between the effect on interest rates, credit available from banks, inflation and the effect on direct demand for securities. For example, if interest rate changes explained 60% of investment in a given year, multiple regression gives the effect of other variables – placing the effects of interest rates in its own "dimension" (the technically correct word which also provides the intuition about what the procedure is actually doing).

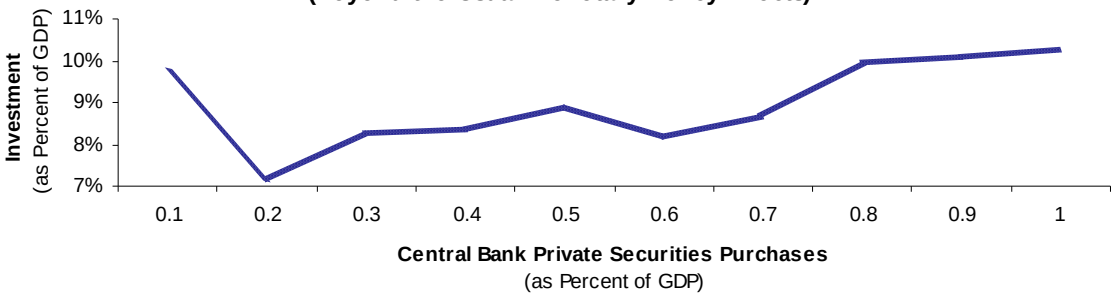
Figure 44: No Historical Relationship Between Contemporaneous "Pure" Central Bank Private Asset Purchases and "Pure" Investment



The figure shows the relationship between regression results looking at the yearly growth rate of gross capital formation while controlling for monetary policy effects as well as such annual growth in central bank private asset purchases while controlling for the central bank's asset portfolio's size and composition. We obtain our data for investment growth by regressing annual gross capital investment growth rates for our countries between 2005 to 2015 on a one-year lag in this change, interest rate changes, credit to the private sector, changes in savings (the ultimate source of funds), government spending, foreign direct investment and overall demand (national expenditure). We sterilize our central bank private asset growth by regressing annual growth rates by the lagged rate, foreign reserves, and total central bank assets as a percent of GDP. As we use residuals, our regressions standardize these "pure" effects of our dependent variables between 0 and 1.

In the aggregate, the data give the impression that more central bank private sector securities purchases correlate with more investment. Figure 45 shows the way that investment (as a percent of GDP) relates to levels of central bank private asset purchases (again as a percent of GDP). Investment rates look the lowest for central banks with about 20% of their peer with the most private assets on their balance sheets (after controlling for monetary policy variables like interest rates, the availability of credit and so forth). Very little or very large private sector asset holdings by central banks seem to correlate most with high levels of investment. Do these data show the investment benefits of a central bank avoiding distorting private investment markets at one extreme and severely managing them at the other extreme? The general conclusion remains – **more central bank private asset purchases (holding other things constant) tends to boost investment.** Yet, these aggregate hide many patterns which we will uncover in the next section.

Figure 45: Central Bank Private Securities Purchases Have a Small Direct Effect Investment (Beyond the Usual Monetary Policy Effects)

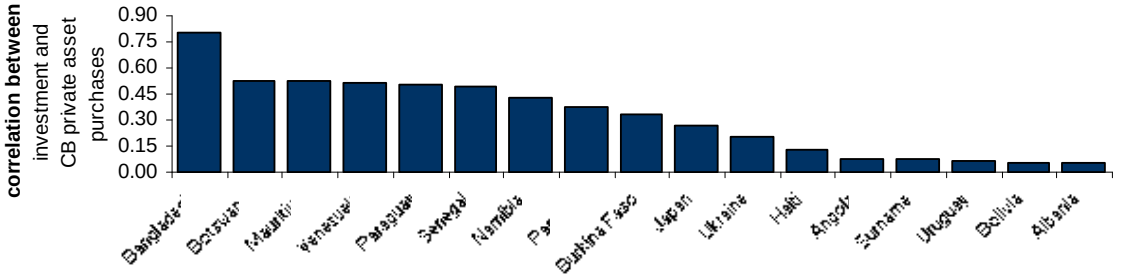


The figure shows the mean level of investment (as the change in fixed capital stock) associated with changes in the central bank's purchases of private sector assets/securities. The data used for this spider plot control for interest rates and other money policy variables.
Source: Data from IMF (2017) and World Bank (2017).

Can Central Bank Asset Purchases Stoke Investment (and Thus Growth)?

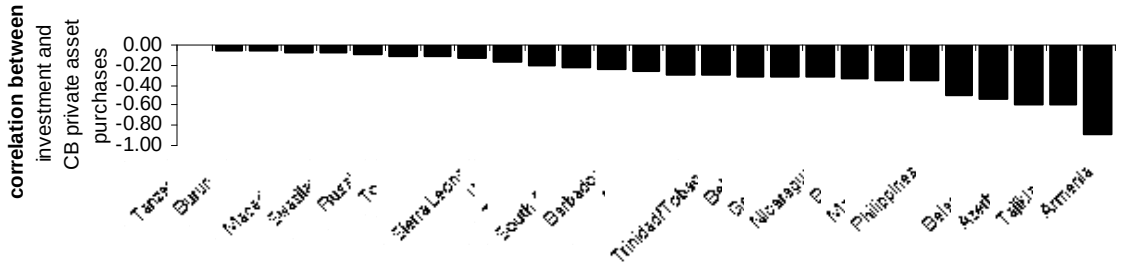
We can obtain a clearer understanding about central bank private securities purchases by grouping (literally clustering) countries. Figure 46a shows the correlation between central bank private securities purchases and investment, after controlling for broader monetary policy effects (as we showed above). Undoubtedly, different countries' investment reacts differently to these central bank securities purchases. The economic situation in Bangladesh has promoted a strong positive correlation between these two variables. The situation in Armenia has encouraged the opposite trend – with increases in its central bank's private securities purchases correlating heavily with lower investment. We have labelled this as a "sloth effect" earlier in this paper. We can thus look at how investment has reacted in the past – and explore deeper correlations in the broader macroeconomy and policy environment. Yet, before conducting any detailed analysis, one conclusion remains clear. **Increased private sector asset purchases foment investment in some times and places, while discouraging such investment in others.**

Figure 46a: Central Bank Purchases Seem to Help Investment in Some Countries...



The figure shows the correlation for 2005 to 2015 between investment (as the change in capital stocks) and the change in central bank private asset purchases. Using multivariate regression, we have removed the wider monetary policy effects on these two variables (specifically removing interest rate, credit to GDP, FDI to GDP, and savings) in order to look at the direct effect of central bank demand for private sector securities.
Source: authors (with data from the IMF and World Bank).

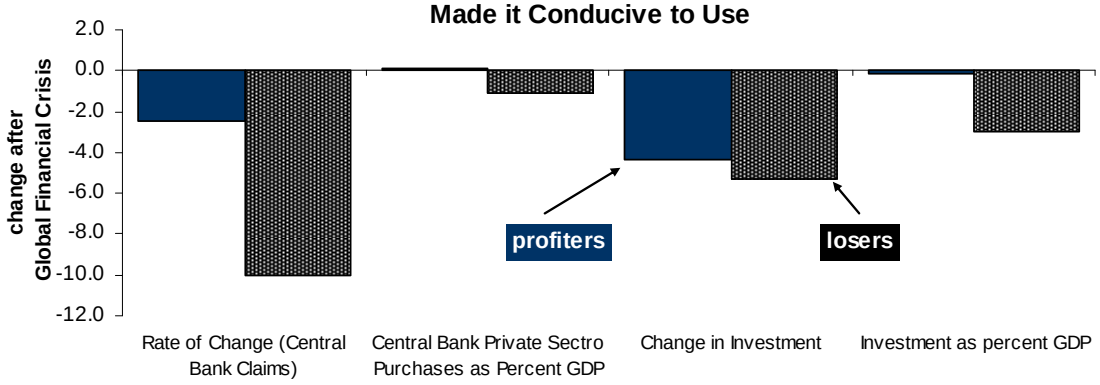
Figure 46b: ...and Crowd It Out in Others



The figure shows the correlation for 2005 to 2015 between investment (as the change in capital stocks) and the change in central bank private asset purchases. Using multivariate regression, we have removed the wider monetary policy effects on these two variables (specifically removing interest rate, credit to GDP, FDI to GDP, and savings) in order to look at the direct effect of central bank demand for private sector securities.
Source: authors (with data from the IMF and World Bank).

The data suggest differences between businesses in jurisdictions investing more when their central bank buys private securities, and those who do not. Figure 47 shows the change in central bank private securities purchases and investment – as well as changes in these variables expressed as a percent of GDP. We label one group of jurisdictions (profiteers) as those with companies who invest more as central bank asset purchases rise. We show the average value of data from this group of the 5 countries above with the highest correlation values. The other group (losers) consist of the 5 jurisdictions with the most negative correlation between these two variables. The data shown in the figure represent the average of these jurisdictions. Large increases in central bank private securities purchases correlates with less investment. We also show the changes in other variables we hypothesize will affect this relationship. Profiteers tended to have "better" macroeconomic policies and outcomes. **Judging by experience only, the use of such central bank purchases coincides with the macroeconomic practices generally accepted as sound and prudential.**

Figure 47: Businesses Used Central Bank "Funding" When Other Policies Made it Conducive to Use



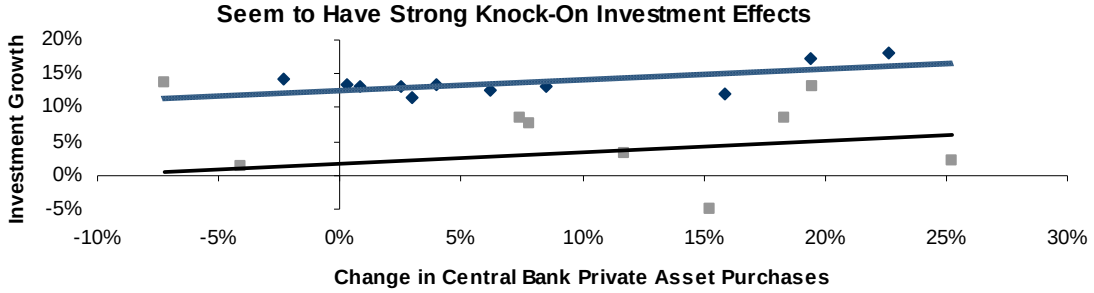
	change from pre to post crisis			change from pre to post crisis	
	profiteers	losers		profiteers	losers
Bank Z-score	0.7	-1.1	General government final consumption expenditure*	0.8	0.3
Lending interest rates	-4.2	1.1	Foreign direct investment, net inflows*	0.5	-2.9
Inflation rate	4.7	1.9	Gross national expenditure*	5.1	1.5
Domestic credit to private sector*	13.6	9.3	Central bank private purchases as a percent of Investment	0.0	0.0
Foreign reserves	-0.3	1.9	Assets- to-GDP*	0.0	0.0
Gross savings*	-3.3	-2.4	Central bank assets to GDP (%) from World Bank	1.1	0.9

* expressed as a percent of GDP

The figure shows the difference between each of the variables shown from 2005 to 2010 (pre-crisis) and 2011-2015 (post crisis). The "profiteers" consist of the 5 countries exhibiting the largest positive correlation between central bank private securities purchases and investment (after controlling both for broader effects on/of monetary policy). The "losers" consist of the group of 5 jurisdictions which had the largest negative correlation between central bank private asset purchases and investment.
Source: authors (based on data from the IMF and World Bank (2017).

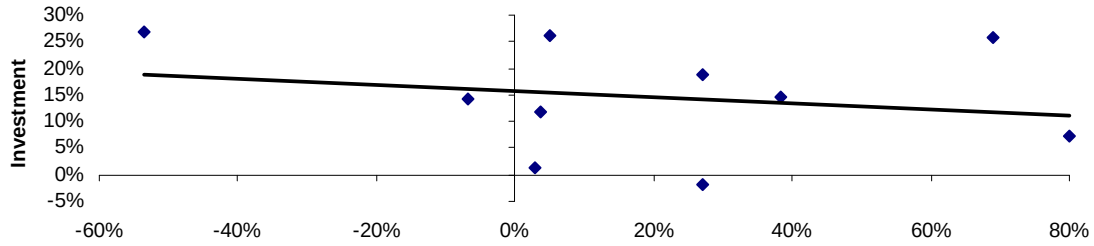
Statistical analysis identifies groups of countries whose investment benefits from – and suffers by -- central bank private securities purchases more than others. Figure 48a shows the relationship between such purchases and investment for two out of 6 countries in the group of countries showing the strongest positive relationship between these private sector asset purchases and investment. Other factors naturally determine the level of such investment corresponding with such purchases – as the level of the different lines attests to. Far more countries suffer from "sloth effects" – some unknown factor which deincentivizes investment as central bank private securities purchases rise. Figure 48b shows this relationship before controlling for monetary policy effects (to show how these data look in-the-wild). A number of reasons might explain such a sloth effect. Yet, the conclusion remains. **Central bank purchases of private securities can significantly incentivize or disincentivize investment – making the composition of central bank balance sheet assets a key tool for promoting investment.**

Figure 48: Some Countries' Central Bank Securities Purchases Seem to Have Strong Knock-On Investment Effects



The figure shows the relationship between unadjusted annual growth rates in investment compared with central bank private asset purchases. We show two countries (Albania and Bangledesh) to illustrate the broader patterns we found in k-means clustering (looking at differences across countries between these and other variables).
Source: authors (data from IMF and World Bank).

Figure 49: The Sloth Effect: When Companies Decrease Investment as Their Central Bank Increases Purchases of their Securities



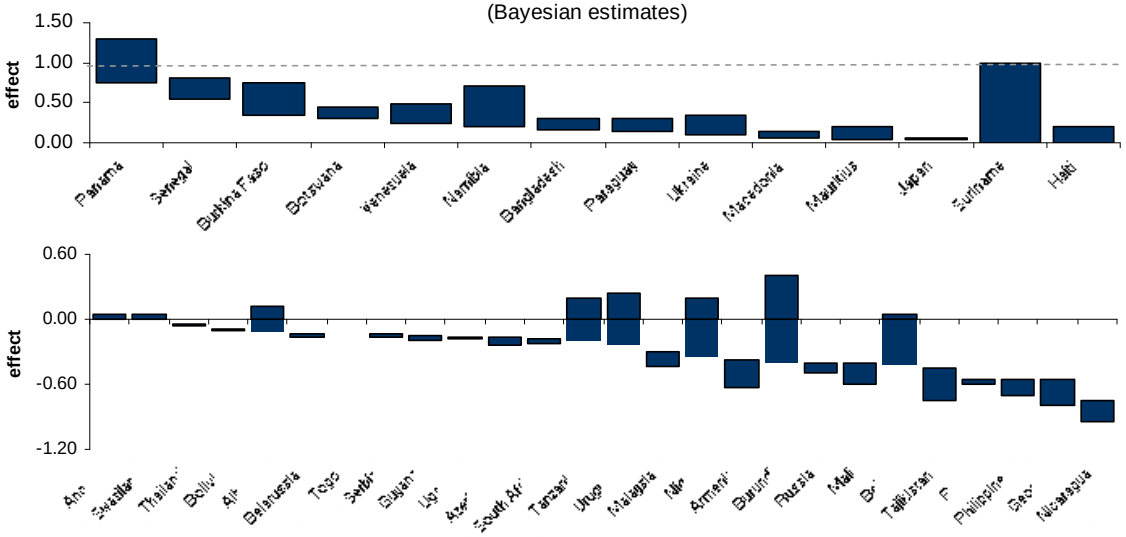
The figure shows the rather tenuous relationship between changes in a country's capital stock and changes in its central bank private securities purchases, for the countries with the most negative correlation between these variables after controlling for monetary policy/market effects. Numerous factors could explain such a phenonmen - including the lack of profitable investment opportunities, a desire to consume driven by the extent of current consumption, over-exaggerated wealth effects, or some third-effect.
Source: authors -- based on data from the IMF and World Bank (2017).

So what supply-side (namely investment) effects can a country's central bank (like the ECB) expect from buying more private sector securities? We looked at the correlation between these purchases and investment above. Yet, these correlations represent just one outcome from a universe of possible values. Maybe random effects pushed investment one way? Or central bank private sector asset purchases another way? Using a technique known as Bayesian methods, we can guess what the relationship between central bank private asset purchases and investment would be if we could observe the same processes occur again and again.[145] Figure 50 shows the painstakingly drawn slopes between 1,000 simulations of data drawn from each country in a way which should represent their true data. The bars show the minimum and maximum values of these 1,000 simulations – with the average (mean) value lying in between. Any ranges lying below 1 indicates that a change in central bank private sector purchases has a less than proportional change in

[145] Such methods, as described in the figure itself, involve drawing random combinations of data and figuring out what statistical distribution from which they likely come. The more samples from these distributions we draw, the more accurately we might obtain the real relationship (assuming other variables known as co-variates) don't change in the meantime.

investment. The bottom panel shows several jurisdictions exhibiting the "sloth effect" – countries from Thailand and Bolivia to Nicaragua. We do not conduct this analysis to single out these countries or any structural issues which may cause such sloth effects. **We merely highlight the positive and negative role that central bank private sector asset purchases can play for investment.** Understanding how certain laws affect the way that these purchases influence investment remains a large challenge.

Figure 50: The True Effect of Central Bank Private Asset Purchases on Investment
(Bayesian estimates)



The figure shows the correlation between central bank private securities purchases and investment. We used Bayesian methods to arrive at these estimates as follows. We took 30 random samples of the original two series (variables) and drew linear regression lines through these 30 graphs. We fit these regression beta coefficients to the best fitting statistical distribution (usually an Hyperbolic Secant (HS) distribution), as determined by a procedure known as maximum likelihood. Maximum likelikood calculates the probability of seeing these data with each of about 50 probability distributions. We found the average of 1000 groups of 30 regression coefficients drawn at random from these probabiliy distributions (known as the Monte Carlo method). We report the 95% confidence interval of this average-of-average-regression-slopes and the mean. The y-axis "effect" measures the average change in investment for a 1% change in Economists usually prefer this method because it does not make assumptions about the probability distribution of these final estimates. The gray dashed line represents the point where such purchases coincide with a more than proportional response in investment (above the line) or less than proportional (below the line).
Source: authors, based on data from the IMF and World Bank (2017)

The effects of long and variable lags unsurprisingly – if unhelpfully -- affect this kind of unorthodox monetary policy. The econometric tools of the day – vector auto-regressions and their impulse functions – assume that effects either die out, or not.[146] One of the few studies of the ECB's unconventional monetary policy also finds increases in German investment as their debt issuances rose.[147] Figure 51 shows a technique used to show how inputs like central bank private securities purchases "transfer" into investment – treating

[146] Neely finds for longer term, persistent effects of unconventional monetary policy. Yet, the entire class of models does not naturally allow an impulse response to sit unheeded for several periods (years) before affecting macroeconomic variables. "Impulse response functions" mean that the research sends a 1 unit jolt or shock into their model and see how other variables react. See Christopher Neely, How Persistent Are Unconventional Monetary Policy Effects? Federal Reserve Bank of St. Louis Working Paper 2014-004C, 2014, available online.
[147] Nathan Foley-Fisher, Rodney Ramcharan, and Edison Yu, Impact of Unconventional Monetary Policy on Firm Financing Constraints: Evidence from the Maturity Extension Program, Paper presented at the Bundesbank Seminar, 2015, available online.

central bank decisions as "control systems." Such a method considers the cumulative effect of the central bank's each year's decisions cumulatively. For the private sector asset purchases undertaken by central banks, the effects reverberate off until about 4 years after the purchase decision. Yet, around 8 to 10 years, we see increased effects from those purchase decisions made a decade ago. Investment decisions do not simply die out – like conventional models have us believe. **Like waves, the investment decisions caused by central bank private sector securities purchase programmes ripple and magnify – sometimes up to a decade later.**

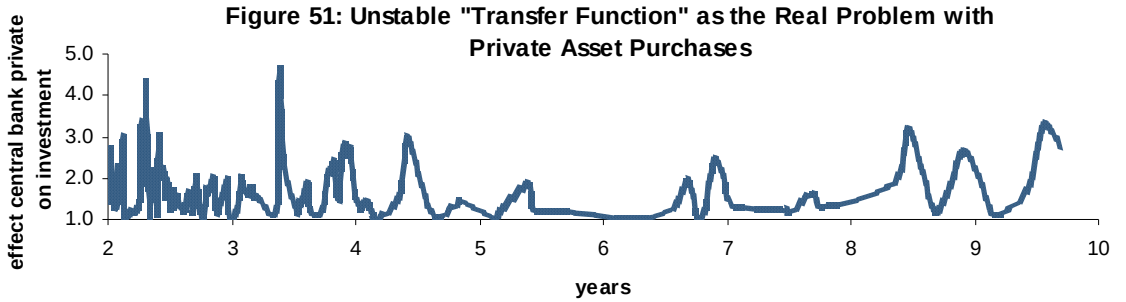


Figure 51: Unstable "Transfer Function" as the Real Problem with Private Asset Purchases

The figure shows the resulting output from a transfer function estimated using central bank private asset purchases and investment decisions for our dataset. Such a technique involved finding the "convolution integral" for investment - in effect looking at all investment decisions responded to the interaction in the way central bank private asset purchases intereacted with each other each year. We do not go into a discussion of Laplace transformations, zeros, or poles to keep this graph simple to read and understand.

So which countries' central banks should stock up on private sector securities (as collateral or through outright purchase)? And when? We do not point to specific countries – as our analysis only aims to concretely show the positive and negative impacts of such policies. Regardless of the likely effect of such purchases, public/administrative law in most jurisdictions prevents more active experimentation and discovery of the relationships we seek to find in this paper. Thus, for most countries, the reform – not fancier econometrics – represents a key way of exploring the use of a central bank's balance sheet to prop up demand for private assets/securities.

The Design of Private Asset Purchase Regulations

Do Central Bank Statutory Objectives Allow Them To Invest at Home?

Many policymakers think that central banks have the legal (or at least operational) mandate to only buy government securities.[148] Perceived restrictions on private asset purchases stem from a historical accident – rather than a conscious design.[149] Historical tradition led to the US Federal Reserve Bank to adopt a "Treasuries only" policy.[150] Yet, the Federal Reserve Act allowed (and allows) the Fed to buy private sector assets in its

[148] Greg Shill, Does the Fed Have the Legal Authority to Buy Equities? 2015, available online.
[149] For a historical overview, see Eric Posner, What Legal Authority Does the Fed Need During a Financial Crisis?, *Coase-Sandor Working Paper Series in Law and Economics No. 741*, 2016, available online.
[150] See Alfred Broaddus and Marvin Goodfriend, What Assets Should the Federal Reserve Buy? *Federal Reserve Bank of Richmond Annual Report*, 2000, available online.

now much-debated article 13.[151] Subsequent rulemaking – some in reaction to the US Fed's private asset purchases during the global economic crisis of 2007-8 -- has sought to hem in such powers.[152] We do not analyse the US law or the best rules for such purchases, given our focus on developing countries. Instead, we wish to correct a misperception held by central banks world wide due to a US policy based more on history than law.[153] **Even in the US, the debate about the extent to which its central bank should become a funder of last resort for private enterprise still remains unsettled.** [154]

Following this conventional wisdom, few countries' central banking laws provide for private asset purchases. Figure 52 shows the number of central bank laws with various objectives – price stability, growth as a subsidiary objective, and growth as equal to price stability.[155] According to these data, most central bank laws seem reasonably sanguine about central bank policies aimed at promoting output growth and thus investment. Yet, our own replication of their work shows a different picture. Most countries' central banking laws remain antagonistic to central bank purchases of private sector securities. Figure 53 compares central bank laws across countries according to whether they have output-investment related objectives and provide for central banks to buy private sector securities. Only about 25% of jurisdictions in our random sample of 25 countries had central banking laws which included economic growth and/or development as a goal. The same percent remain completely hostile to such purchases – completely ignoring output growth as an objective and explicitly forbidding private securities purchases. Thus, private asset purchases depend on more than simply politics.[156] **Developing countries' central banking laws in general prohibit them from using non-conventional private sector asset purchases either during crises or in normal times.**

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[151] Sub-sections 2 and 3 provide the particulars of these purchases for discounting commercial debt and lending respectively. See Federal Reserve Act, Section 13. Powers of Federal Reserve Banks, available online.

[152] For an overview and critique of the Fed's private asset purchase powers, see Alexander Mehra, Legal Authority in Unusual and Exigent Circumstances: The Federal Reserve and the Financial Crisis, *University of Pennsylvania Journal of Business Law 13*(1), 2010, available online.

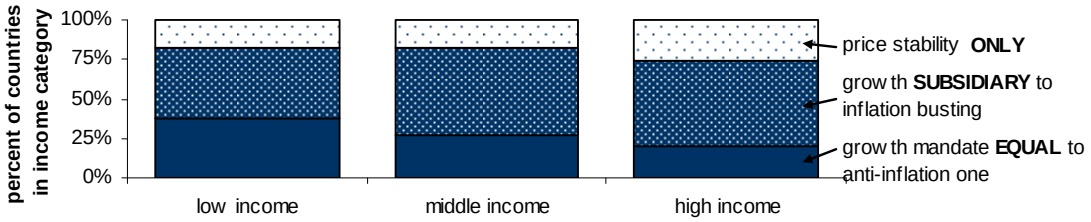
[153] For a fascinating history, see Marc Labonte, Federal Reserve: Emergency Lending, *Congressional Research Service Report 7-5700*, 2016, available online. See also David Fettig, Lender of More Than Last Resort: Recalling Section 13(b) and the Years When the Federal Reserve Banks Opened Their Discount Windows to District Businesses in Times of Economic Stress, *The Federal Reserve Bank of Minneapolis' Region Paper*, 2002, available online.

[154] For a view of such lending as encouraging moral hazard, see Evan Johnson, VIII Revisions to the Federal Reserve's Emergency Lending Rules, *Review of Banking & Financial Law 35*(10), 2016, available online.

[155] See IMF, Updates Central Bank Legislation Database, 2016, available online. See also Ashraf Khan, Central Bank Legal Frameworks in the Aftermath of the Global Financial Crisis, *IMF Working Paper WP/17/101*, 2017, available online.

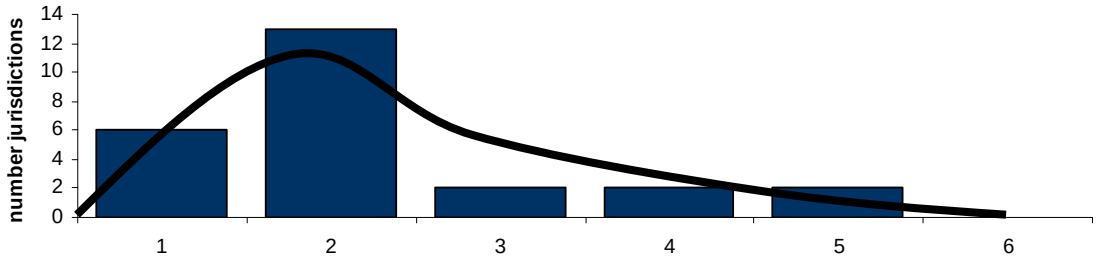
[156] A large investment bank's report, after reviewing only a few jurisdictions (UK, US, EU, Japan) on monetary financing flatulently notes that "taking it all together, we conclude that historical experience and institutional flexibility provides plenty of flexibility for monetary financing. Ultimately, it is a question of political desirability rather than technical or legal constraints." They do not analyse politics at all in their paper. See George Saravelos, Daniel Brehon, and Robin Winkler, Helicopters 101: your guide to monetary financing, *Deutsche Bank Special Report, 15 April*, 2016, available online.

Figure 52: More Than Half of Central Bank Statutes Hostile-ish to Private Asset



The figure show s the proportion of jurisdictions w hose central bank statutes' objectives place price stability first, give macroeconomic grow th an equal (unspecified ranking) role or subordinate/subsidiary role. We rescaled the original figure to find proportions for as a percent of each income group (ie conditional proportions). Our ow n sample of central banks finds significant differences w ith these data.
Source: IMF Central Bank Legislation Database (2016) at Chart 2.

Figure 53: Most Countries Antagonistic Toward Central Bank Private Securities Purchases



Rating	Meaning	Countries
1	Investment not mentioned and private purchases explicitly forbidden	Poland, Mozambique, Ecuador, Malaysia, Guatemala, Philippines
2	Investment not as objective and private purchases ambiguous	Japan, Malta, Uganda, Mauritania, Oman, Switzerland, Burundi, Poland, Cameroon, Madagascar, Switzerland, Turkmenistan, Myanmar
3	Investment as objective but private purchases forbidden	Jamaica and Argentina
4	Investment as objective somewhere and ambiguous about private purchases	Haiti and Iraq
5	Investment as subsidiary objective and private purchases explicitly allowed	Costa Rica St. Vincent
6	Investment as main (primus entre parus) objective and private purchases explicitly allowed	None

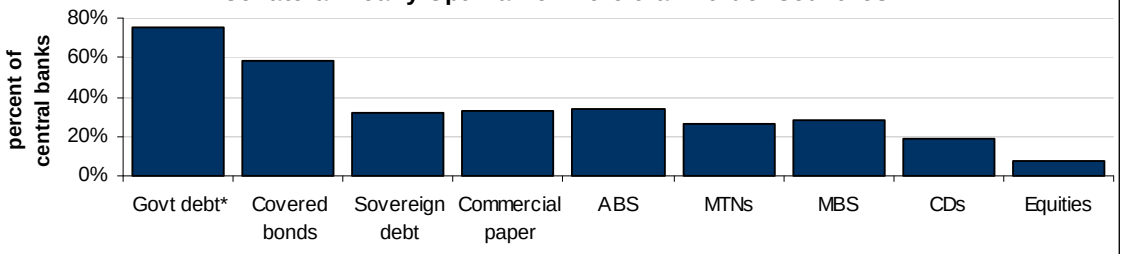
The figure shows the results of a random sample of 25 countries' central bank laws. We assessed whether these laws had output/development related objectives and whether they allowed, forbad or left unclear the central bank's authority to buy private sector securities/assets.

Of the countries which allow the central bank to hold private sector assets, many holdings arise as from collateral that the central bank takes from local banks.[157] As discussed

[157] Such holdings namely come about as the result of discounting, rediscounting or as collateral in the case of default and repurchase agreements. Discounting refers to the central bank's nominal holdings of these

previously, central banks – including the ECB – may discount, rediscount, purchase for repurchase and otherwise accept as collateral private sector securities. Most economists agree that – no matter the central bank objectives in place -- the optimal composition of central bank collateral may consist in part in private sector securities (if only to off-load later).[158] These decisions affect (if not distort) asset prices, allocation decisions and market risks/returns.[159] Less than 40% of central banks allow private securities on their balance sheets. Why should banks take private sector collateral when they suffer from their limited collateral values in times of crisis? Figure 54 shows the percent of central banks holding each type of asset.[160] Covered bonds represent a useful asset class – though low equity holdings represent something more worrying. **These rules forget that such investments supposedly represent real assets sitting somewhere in a real economy.**

Figure 54: Are Private Asset Purchase Restrictions on Central Bank Collateral Really Optimal for More than 40% of Countries?



The figure shows the proportion of central banks allowing each of these types of collateral on their balance sheets. See original source for definitions of these asset classes, countries responding to their survey, etc.
* Such US dollar and Euro denominaed debt covers bonds, billls, and so forth.
Source: Hobson (2016).

Central bank laws do not give the central bank the explicit obligation to use monetary to boost economic growth. Yet, different countries define central bank objectives as instruments which hopefully would promote investment and increase economic growth.[161] Figure 55 shows the five major categories of central bank law objectives we found in our random sample of central bank laws. We provide specific examples from each category in the text below. Yet, in all these laws, we observe one constant. **No central bank law seems to provide clear and definitive authority for the central bank to purchase private sector assets/securities in the interest of either conventional or unconventional monetary policy.**

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securities in exchange for cash which the bank would later sell for a reasonable return equal to roughly the prevailing market interest rate when banks buy the assets back.

[158] To keep our paper relatively focused, we do not review the literature on central bank collateral. See Timothy Lane, Central Bank Operating Frameworks and Collateral Markets, *Committee on the Global Financial System Markets Committee Papers No 53*, 2015, available online.

[159] Kjell Nyborg, Central Bank Collateral Frameworks, 2015, available online.

[160] Dominic Hobson, The Collateral Management Practices of Central Banks: The Case for Modernisation, *Clearstream Working Paper*, available online.

[161] Presumably, maximising output growth and stability never lies far from central banker minds, as well as the minimisation of price growth and instability. See Pier Francesco Asso, George A. Kahn, and Robert Leeson, The Taylor Rule and the Practice of Central Banking, *Kansas City Federal Reserve Bank Research Working Paper 10-05*, 2010, available online.

Figure 55: Examples of Pro-Output Objectives in Central Bank Laws

Investment via ...	Example Countries
Stable banking system	Oman, Jamaica (credit), Japan.
Solid macroeconomic environment	Guatemala
supporting government policies	Ecuador, Poland, Argentina, Madagascar,
direct intervention	Costa Rica, Eastern Caribbean Central Bank, Bank of Central African States, Malta,
exhortations to promote the national interest	Malaysia, Switzerland,

First, central bank laws seek to promote output growth by **maintaining a well-functioning banking system**. Oman's central bank law for example clearly places the onus of growth and development on, "the development of banking institutions which will...contribute to economic, industrial, and financial growth."[162] The Law authorises the Board of Governors with discretion to decide on assets. Most of these assets though should consist of loan and loan-like instruments held by banks, government guaranteed debts or equities, securities/debts from foreign governments and international organisations.[163]

Haiti's central bank law defines numerous, albeit oblique, requirements to foster output growth and/or development as a central bank objective. The Bank must "encourage the most complete and effective development and utilisation of the country's productive resources" and "facilitate the expanse of domestic and international trade with regard for instituting and maintaining an elevated level of employment and real revenue." by adopting methods of payment and credit policies to allocate money "to legitimate needs of the Haitian economy, and in particular, the growth of national production."[164] The law gives the Haitian central bank powers to even "...in the manner of financial institutions' credit operations, vesting and investment determine :a) the objectives of lending...d) the individual or collective limits of different categories of lending operation, placements and investments."[165]

Jamaica's central bank law imposes similar objectives to "influence the volume and conditions of the supply of credit so as to promote the fullest expansion in production, trade and employment."[166] Like most banks, the Jamaican central bank may hold (gold, foreign currencies, government securities and securities from foreign/international financial institutions).[167] Yet, the law expressly forbids the "purchase the shares of any

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[162] Oman Banking Law, at article 1(a), available online.
[163] Id at article 28.
[164] Law of the 17th August 1979 Creating the Bank of the Republic of Haiti Hereafter Designated BRH,m at 2.2, 2.6 and 2.3 respectively, available online.
[165] Id.
[166] The Bank of Jamaica Act, 1960, at article 5, available online.
[167] Id at article 21.

other bank or of any other company or grant loans on the security of any shares in any bank or company."[168] **Thus, the law sees private sector assets on the central bank's balance sheet as a temporary mistake – collateral which the bank must offload quickly rather than a monetary policy tool.**

Japan's experience possibly foreshadows those of other markets. Japan's central bank law aims at, "ensuring the smooth settlement of funds among banks and other financial institutions, thereby contributing to the maintenance of stability of the financial system."[169] The law repeats this objective in the next article "aimed at achieving price stability, thereby contributing to the sound development of the national economy."[170] Certainly nothing foreshadows the eventual private sector asset build-up on the Bank of Japan's balance sheet. Nothing in Japan's central bank law either allows nor prevents the Bank from buying and holding private securities as part of its "regular business" (article 33) or "prohibition of other business" (section 43). Yet, the article allows the Minister of Finance and the Prime Minister to authorise the Bank to conduct other business in "the case where such business is necessary to achieve the Bank's purpose specified in this Act."[171] Nothing in the Bank's objectives suggests that acquiring private assets represents a way of promoting price stability. **Yet, to possibly foreshadow other countries, despite these weak legal rules, Japan's central bank has embarked on large-scale private asset purchases.**

A second way central bank laws target economic growth by creating a **stable macroeconomic environment**. Guatemala's central bank law similarly describes the Bank's contribution to the broader macroeconomic and financial environment rather than direct participation – with "the fundamental objective to contribute to the creation and maintenance of the most favourable conditions for the orderly development of the national economy...[through] monetary, foreign exchange and credit conditions that promote the stability in price levels in general"[172] As one of the stricter laws, Guatemala's law prohibits the Bank from "giving loans to natural or legal persons, except to banks in the banking system..." as well as the purchase shares, except those issued by international financial organisations in which the Bank participates as a member" or "participate directly or indirectly in any commercial, agricultural, industrial or any other class of enterprise."[173] The law thus allows private asset purchases to play no role in monetary policy.

The third way central bank laws target economic growth by **supporting government's economic policies**. For example, Ecuador's constitution makes plain that output promotion, as a policy of the Government, can serve as an objective, as "the formation of monetary, credit, foreign exchange and financial policies is the exclusive remit of the Executive and is conducted through the Central Bank"[174] Similarly, Ecuador's

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[168] Id at article 24(b).
[169] Bank of Japan Act (Act No. 89 of June 18, 1997) at article 1, available online.
[170] Id at art. 2.
[171] Id.
[172] Decree No. 16-2002 Congress of the Republic of Guatemala, at article 3, available online.
[173] Id at article 71b, 71(e) and (g) respectively.
[174] Constitution of Ecuador, article 303.

constitution provides the diffuse competencies for the central bank to place output growth as a key objective, to "orient excess liquidity toward required investments in national development" and influence interest rates toward the "finance of productive activities."[175] Yet, the law hinders Ecuador's central bank's ability to make these investments by prohibiting that it "acquire or guarantee company shares of any class and to participate directly or indirectly in companies or corporations, except in shares or equity participation in international monetary institutions."[176]

Polish law deals with growth in a similar way. While price stability comprises the Bank's prime directive, the Bank must work in "supporting the economic policy of the Government, insofar as this does not constrain the pursuit of [price stability]."[177] Unlike in the previous case though, the Polish law forbids the Bank from holding shares "except those providing services solely to financial institutions and the State Treasury...."[178] Thus, Polish law makes clear that private investment shall represent a way the bank supports government policies.

Similarly, Argentine policy subordinates its central bank to the government "within the framework of its powers and the policies set by the National Government."[179] Within that framework, the law requires the Bank to "promote...monetary and financial stability, employment, and economic development with social equality."[180] The law allows the Bank to transact in "other financial assets" (other than government securities and foreign exchange) – thus presumably opening the door to private sector securities.[181] Yet, the law explicitly forbids the Bank to "purchase shares , except for those issued by international financial organisations" as well as "hold a direct or indirect interest in any commercial, agricultural, industrial or any other company."[182] Thus, like most, **the law starts by forbidding such purchases, but leaves the door open to allowing such purchases in case of need.**

Madagascar's central bank similarly, in a subsidiary objective, requires the Bank to "support[] the Government's general economic policy."[183] Madagascar's central bank law does allow the Bank to intervene in capital markets by buying, selling, repurchasing, or discounting securities as well as by taking securities as collateral.[184] Similarly with other jurisdictions, the law allows the Bank to hold as reserves securities issued by states and financial institutions abroad – with a catch-all exception for "all other negotiable financial asset denominated in a convertible currency.," leaving the Board of Directors

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[175] Constitution of Ecuador, article 302.
[176] Law of Monetary Regime and State Bank, at article 84.
[177] The Act on Narodowy Bank Polski of 29 August 1997, Journal of Laws of 2013 item 908, at article 3.1, available online.
[178] Id at article 5.2.
[179] See Charter of the Central Bank of the Argentine Republic (Carta Organica), available online.
[180] Id.
[181] Charter of the Central Bank of the Argentine Republic (Carta Organica), available online.at art. 18(a).
[182] Id at sec 19 (f) and (g).
[183] Statute of the Madagascar National Bank, Law No. 2016-004 of 29 July 2016, #3708 of the 26th of September 2016, p.5629, available online.
[184] Id at article 17.

free to "pass resolutions related to the management of foreign exchange reserves by the Central Bank in order to assure their liquidity, security and yield."[185]

The fourth way consists of **directly intervening** to promote growth. Costa Rica's law places the "orderly development of the Costa Rican economy" as its first subsidiary objective "to achieve full use of the Nation's productive resources, avoiding or controlling inflationary or deflationary tendencies which may arise in the monetary and credit markets."[186] The Bank's Department for Economic Promotion and Development may "channel funds... for financing different economic activities" by granting "adequate and timely credit for increasing production, promoting productivity and efficiency, and seeking improvements in producers' technical capacities" to local financial institutions.[187]
Along similar lines, the law authorises the Bank to "buy, sell and maintain, as an investment, or as open market operations, first-class bonds and transferrable securities" with the Bank's Board determining the "kind of transferrable securities for the operations" as well as "buy and sell securities in the banking and stock markets"[188] Thus, Costa Rica's central bank law clearly allows private asset purchases to play a key role in the country's monetary policy – if its policymakers so choose.

Monetary unions play a special role in empowering their central banks to purchase private sector assets. The Eastern Caribbean Central Bank Law allows accords the Bank with hands-on powers to acquire assets in member states like St. Vincent and the Grenadines. Specifically, the Law allows the Bank to "actively promote through means consistent with its other objectives [regulate availability of money and credit, monetary stability] the economic development of the territories of the Participating Governments."[189] The Bank seemingly mixes the functions a central bank and development bank, "financing economic development of the territories of Participating Governments"[190] The Bank may even "subscribe to, hold, and sell shares of a corporation organized with the approval or under the authority of the Participating Governments" albeit only for financing activities.[191] Yet, the law prohibits active – rather than passive – ownership by "engag[ing] in trade or praticipat[ing] directly or indirectly in the ownership of any financial, agricultural, commercial, industrial, or other enterprises."[192]

The Bank of Central African States (BEAC) plays a radically different role for countries like Cameroon. The Bank just "issues the money of the Monetary Union and guarantees its stability. Without prejudice to this objective, the Bank supports the general economic policies of the Member States of this Union and these present laws."[193] None of the

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[185] Id at article 19.
[186] Organic Law of the Costa Rica Central Bank, Law No. 7558, at art. 2(a), available online.
[187] Id at art. 110(a), 110(b) respectively and 108 respectively.
[188] Id at art. 52(c) and 52(f) respectively.
[189] Eastern Caribbean Central Bank Agreement Act http://www.eccb-centralbank.org/PDF/bank_agreement1983.pdf at article 4(4).
[190] Id at 42(e).
[191] Id at 42(2).
[192] Id at art. 43.
[193] Statutes of the Bank of Central African States, available online.

Law's specific objectives hint at private asset purchases as part of such support to "general economic policies."[194] Only one provision hints at the use of these purchases, authorising the use of foreign reserves to be "employed in market operations to buy, sell, lend, or borrow negotiable debt instruments denominated in foreign currency and issued by the government, private or public issuers, or international financial institutions having a rating equivalent to a AA from a rating agency or benefiting from a state guarantee from one of the countries named above or appearing on the official Government of the Central Bank list or belonging to the euro zone, in applying the directives fixed by the Monetary Policy Committee" (underlying ours).[195]

Countries like Malta occupy a special place in such currency/banking zones. They support the general objectives of the zone's central bank, in this case as the Law's subsidiary objective to "support the general economic policies in the [European] Union."[196] The European Central Bank has its own law, objectives and rules. Yet, the Bank of Malta – as a member of the banking union – has its own rules which must conform to those of the Union. Within its division of competencies, the Law provides for the "subscription to, purchasing, selling, discounting or rediscounting equity, debt or other financial instruments as may be approved by the Board" only for "the satisfaction of debts due to it" and as long the Bank sells them "at the earliest suitable moment"[197] In other words, the Maltese central bank only takes on private assets as the result of unwanted circumstances, denying them any role in the conduct of monetary policy on the island.[198]

The fifth way that central bank law provides for investment, growth and thus potentially private asset purchases comes from **omnibus exhortations to promote the national interest**. Switzerland's law aims at "serving the interests of the country as a whole," while "in so doing, it shall take due account of economic development."[199] The law gives the Swiss Central Bank the right to "buy and sell, in the financial markets, Swiss franc or foreign currency denominated receivables and securities."[200] Just like in the other cases, Malaysia's law envisions achieving output goals through (rather than in addition to) price stability. Yet, its central bank law represents one example of appealing to "the national interest."[201] Combined with the vesting of "powers necessary, incidental or ancillary to give effect to its objects" its law seems to give a wide berth to private asset purchases (or indeed any other policy).[202] As if to remove any doubt, article 26 authorises the Bank to

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[194] These objectives include defining monetary and exchange rate policies, issuing money, managing foreign reserves, regulating payment systems and promoting financial stability.
[195] Id at art. 11.1.
[196] Central Bank of Malta Act (Cap. 204) at art. 4, available online.
[197] Id at 17(a) and 17(c) respectively.
[198] We only state the facts. We do not try to explain here the reasons for these restrictions (which lets the ECB in Frankfort buy private assets but not Malta's central bank as an ECB member).
[199] Federal Act on the Swiss National Bank 951.11 at art. 5, available online.
[200] Id at art. 9(c).
[201] Central Bank of Malaysia Act 2009, at article 5(4). available online. The Act, as if to ensure we heard it, repeats this objective in article 22, as "in promoting monetary stability, the Bank shall pursue a monetary policy which serves the interests of the country with the primary objective of maintaining price stability giving due regard to the developments in the economy." Id at art. 22.
[202] Id at article 5(3).

"undertake such other financial transactions involving currencies, securities, precious metals or other commodities or financial instruments as approved by the Monetary Policy Committee."[203] The Bank may even "establish a body corporate or acquire or hold shares of a body corporate, create a separate legal body for the purchases of [promoting financial stability."[204] Yet, like most of its peers, the Act authorises the Bank to "purchase, sell, repurchase lend or borrow currencies, securities, gold..." while simultaneously prohibiting "the purchase of shares of any corporation."[205]

The last group of countries consist of those where the law **gives little if any weight to investment, growth and development.** Uganda's law lists, as a last 11th objective, "where appropriate" to "participate in the economic growth and development programmes."[206] In this vein, the Bank may "with the approval of the Minister and subject to [restrictions], subscribe to, hold and sell shares of any corporation or company established for the purpose of facilitating the financing of economic development."[207] Yet, the law forbids the Bank to "engage in trade or otherwise have a direct interest in any commercial, agricultural, industrial, or any other undertaking" except when collected as part of a debt owed to the Bank and disposed of as soon as "reasonably practicable."[208] With more details, the law forbids the Bank from the "purchase the shares of any body corporate or incorporate, including the shares of any financial institution" or "grant loans upon the security of shares."[209]

Countries that engaged in private sector asset purchases after the global economic crisis tended to bend rules inadequately written for this purpose. For the EU, the Decision establishing the Corporate Sector Purchase Programme pinned its "constitutional" basis on the Treaty provision allowing the European Central Bank's governors "to define and implement the monetary policy of the Union" as well as the authority to "implement monetary policy in accordance with the guidelines and decisions laid down by the [ECB's] Governing Council", "to define and implement the monetary policy of the Union."[210] On the positive side, the legal instrument the ECB relied on to buy private sector assets contained legal provisions no more specific or concrete than those in the countries we reviewed. On the negative side, these rules hardly give the central bank a clear mandate to engage in such purchases (a fact challenged by the German Constitutional Court as we will see later). **If all academics agree about one thing from the Global Financial Crisis, they agree that well-defined, clear and sufficiently**

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[203] Id at 26(e)
[204] Id at article 48(c) – the provision makes reference to article 32, which refers to buying securities (usually of financial entities) to ensure financial stability. We replace that text to make this text more readable.
[205] Id at article 75(d) and 76 (b) respectively.
[206] The Bank of Uganda Act at Chap 51, available online.
[207] Id at art. 29.2(d).
[208] Id at 29.3(a)
[209] Id at 29(3)b and c.
[210] EU Treaty at art. 127.2 point 1. See also Protocol on the Statute of the European System of Central Banks and of the European Central Bank, available online.at article 12.1 para 2, 3.1 and

detailed rules should govern the central bank (and broader governmental) ability to buy private sector assets before the crisis appears.[211]

Legal Prohibitions from Acting as a Funder of Last Resort

Since the global economic crisis, many countries have considered using central bank purchases of private assets to prop up asset values – in effect making central banks funders of last resort in places like Russia.[212] In places like the UK, central bank rules increasingly allow central banks to hold private sector securities as collateral against bank loans – making the central bank still the final funder.[213] Sceptics pejoratively refers to these purchases as get rich quick schemes.[214] Yet, more central banks use "outright purchases" as an instrument of stabilization – rather than simply trying to influence money and credit through the banking system. Unlike typical lending, the Bank may share in residual risks/rewards of their collateral/assets. **Such purchases make these banks funders-of-last-resort rather than lenders of last resort – as these purchases keep money flowing to productive enterprises in the same way any investment would.**

Few countries have the *de jure* legal provisions in place to address crises using central bank purchases of private securities – making their *de facto* use both risky and unpredictable. Figure 57 shows the countries from our random sample whose central bank laws have provisions covering their banks' conduct during a crisis (or as a lender of last resort) as well as clear rules for engaging in private asset purchases and the independence needed to act when government can not. Burundi, for example, may purchase assets of any kind (and indeed hold collateral from banks for their loans).[215] Yet, nothing in the law talks specifically about a lender of last resort function (even if the bank's purchase and sales powers give the bank such *de facto* power). Poland's central bank law forbids the bank from holding private securities and has no special section dealing with either financial emergencies (and thus a lender of last resort function) or its independence.[216] A poorly done statistical analysis of the Bank of the Central African States (BEAC), finding that the Bank's finance to government and banks did more harm than good to investment and wealth creation led to the same conclusion – **the central bank should fund productive business directly.**[217]

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[211] For a restatement, see Robert Rasmussen and David Skeel, Governmental Intervention in an Economic Crisis, *University of Pennsylvania Journal of Business Law 19*, 2016, available online.
[212] Jack Farchy, Russia's central bank to help companies refinance debts, *Financial Times December 24*, 2014, available online.
[213] Tim Wallace, Bank of England plans to accept equities as collateral from banks, *UK Telegraph, 13 Jul* 2015, available online. See also Sam Goldfarb and Christopher Whittall, New Tool for Central Banks: Buying Corporate Bonds, *Wall Street Journal Aug. 4*, 2016, available online.
[214] Eshe Nelson, Central banks have hatched a get-rich-quick scheme for companies in an attempt to avoid a slowdown, *Quartz, Aug 25*, 2016, available online.
[215] Statutes of the Bank of the Republic of Burundi, Law 1/34 of 2 December 2008, at art. 10, available online.
[216] We discuss this in more detail in the following pages. See The Act on the Polish People's Bank of August 29, 1997 as published in Law Journal of 2013, item 908, at art. 30, available online.
[217] Serge Elle, The BEAC Central Bank and Wealth Creation in Cameroon Economy, *International Journal of Innovation and Applied Studies 3*(3), 2013, available online.

Figure 57: Only About 25% of Central Banks Have a Basis for Using Private Securities Purchases as a Last Resort

Country	LLR	PC	I	Country	LLR	PC	I	Country	LLR	PC	I
Jamaica	0	1	0	**Argentina**	0	0	0	**Guatemala**	1	0	0
Haiti	0	1	0	**Ecuador**	0	0	0	**Cameroon**	0**	0	0
Poland	1	0	0	**Oman**	1**	0*	1	**Madagascar**	1	1*	0
Japan	1	0	1	**Malaysia**	1	0	0	**St. Vincent**	1	1	0
Malta	1	0	1	**Switzerland**	1	1	1	**Switzerland**	0	1	1
Uganda	0	0	0	**Costa Rica**	1	0	0	**Turkmen**	0	0	0
Mauritania	1	1	1	**Burundi**	0	0*	1	**Myanmar**	1	0	0
Mozambique	0	0	0	**Poland**	0**	0	0	**Philippines**	1	0	1
Iraq	1	0*	1								

LLR = lender last resort
PC = explicit authorisation for private collateral
I=independent
* Board has unlimited power to decide what securities – but private not mentioned specifically
**= for national emergency... not specifically financial crisis

Mauritania (surprisingly) has a well thought-out stabilisation policy which explicitly allows for the kinds of policies the EU, US and UK pursuits under questionable legal authority. Mauritania's central bank law sets up a two-tier authorisation for buying assets.[218] The Bank may serve as lender of last resort to banks under "exceptional circumstances."[219] In a "grave financial crisis" or when "there does not exist any other way to avoid irreversible damage to the stability of the financial system," the Bank can receive collateral from "the public" (presumably legal and natural persons).[220] The Law mentions "other counterparties" in contrast to "banks and financial establishments" in several places – which we interpret as private sector parties.[221] The Law also places such a premium on the Bank's independence that the drafters thought it prudent to demand that "The independence of the Bank should be respected at all times and no person or entity should seek to influence the members of deciding bodies or agents of the Bank in the execution of their functions or interfere in the Bank's activities."[222] The source of the Bank's protections of independence came about from an ordinance from the Military Council for Justice and Democracy – and military governments bad reputations for respecting the independence of executive bodies. Nevertheless, the words on paper look like everything a central bank like the Federal Reserve might need in a crisis.

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[218] Ordinance 004/2007 Statute on the Central Bank of Mauritania, 2007, available online.
[219] Id at article 67.
[220] Id at article 68.
[221] Id at 43.
[222] Id at art. 3.

Oman's law exemplifies most countries' approach to allowing funder of last resort asset purchases. Oman's central bank would deal with crises and situations requiring a lender/funder of last resort as a "national emergency" using "emergency provisions."[223] Any discretionary activities conducted in such a situation should be "referred to the Board of Governors for ratification or modification at a special meeting."[224]

Switzerland's law provides a far worse basis for establishing the basis for funder of last resort functions. The confederation's law highlights the Bank's role in protecting the stability of the financial system in a) requiring other parties to provide information, b) delivering that information to the Swiss Financial Market Supervisory Authority, c) letting these parties know about the information the Bank gave, and d) telling the Supervisory Authority the final outcome of its "information procurement" (namely research).[225] Like most, the law only indirectly describes the Bank's authority to buy private sector securities, by letting it "buy and sell, in financial markets, Swiss franc and foreign currency denominated receivables and securities" and "enter into credit transactions with...other financial market participations [other than banks]."[226] Poland's law gives its People's Bank a similar role of "provid[ing] the Committee for Financial Stability data and information... analyses, studies and opinions on the assessment of the systemic risk, financial stability and macroeconomic imbalances."[227]

The two regional central banks in our random survey hold the clearest authorisations for making direct investments in productive private (or public) sector companies. The Central African States' Bank (BEAC) hints at its role in private securities markets by authorising the use of foreign reserves to be "employed in market operations to buy, sell, lend, or borrow negotiable debt instruments denominated in foreign currency and issued by the government, private or public issuers, or international financial institutions having a rating equivalent to a AA from a rating agency or benefiting from a state guarantee from one of the countries named above or appearing on the official Government of the Central Bank list or belonging to the euro zone, in applying the directives fixed by the Monetary Policy Committee (underlying ours)."[228] Unlike in the Central African Union, the Eastern Caribbean Central Bank Law specifically allows the Bank to "actively promote through means consistent with its other objectives [regulate availability of money and credit, monetary stability] the economic development of the territories of the Participating Governments."[229] Mixing the functions a central bank and development bank, the Bank can furthermore engage in the "financing economic development of the territories of Participating Governments"[230] The Bank may even "subscribe to, hold, and sell shares of a corporation organized with the approval or under the authority of the

[223] Oman Banking Law, at art. 19, available online.
[224] Id.
[225] Federal Act on the Swiss National Bank 951.11, at art. 16(a)-16(d) respectively, available online.
[226] Id. at art. 9(b) and 9(e) respectively.
[227] We translate "narod" as people rather than national. The Act on Narodowy Bank Polski of August 29, 1997 as published in Dziennik Ustaw (the Journal of Laws) of 2013, item 908, at art. 30, available online.
[228] Statutes of the Central African States' Bank, at art. 11.1, available online.
[229] Eastern Caribbean Central Bank Agreement Act, at article 4(4), available online.
[230] Id at 42(e).

Participating Governments" albeit only for financing activities.[231] The law has the prohibition against "engag[ing] in trade or praticipat[ing] directly or indirectly in the ownership of any financial, agricultural, commercial, industrial, or other enterprises."[232]

Missing rules about private sector asset purchases in most of these central bank laws potentially impose significant costs on these central banks. Figure 58 shows many of the costs identified by scholars during the recent financial crisis to the US Federal Reserve Bank and to a lesser extent the European Central Bank.[233] By some accounts, the Federal Reserve used legal machinations the US often exemplifies, in order to purchase securities. According to one account, the Fed created – and subsequently lent to -- five separate Delaware limited liability companies: Maiden Lane LLCs I, II, and III, Commercial Paper Funding Facility LLC (CPFF), and Term Auction Lending Facility LLC (TALF) in order to buy up securities.[234] The Fed made these special purpose vehicles to get around the unclear authority in article 13 (which we previously discussed). **Developing country banks may not be able/willing to create the special purpose vehicles needed to get around their laws like the US did.**[235]

Figure 58: Private Asset Purchases and the Costs of Incomplete Central Bank Law

In hindsight, central banks responding to the financial crisis in a zero-interest environment would have responded better to the crisis with laws that allowed them to use private asset purchases more fully. Posner – in his analysis of the Fed – identified the following problems:

- act more cautiously than otherwise (p. 1)
- avoid accountability by blaming failures on the absence of law (p. 1)
- excessively structured transactions (p.2)
- fragmented authority and action with the Treasury, FDIC and SEC (p.2)
- shareholder litigation costs and fines (p.2)
- restrictions on fiscal activities
- requirements for full collateralisation and repayment.
- can value assets better than private actors – and see long-term value.

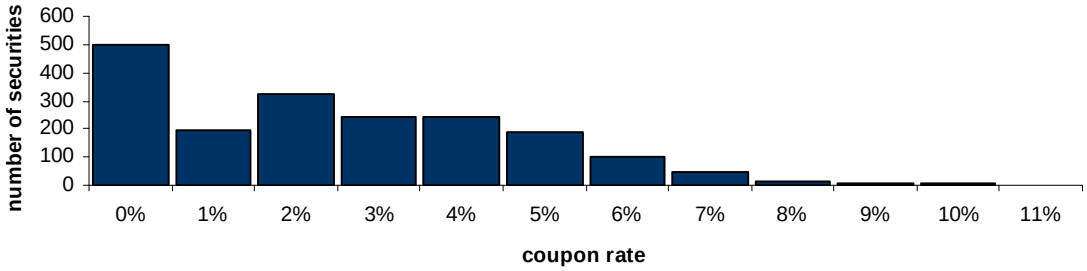
Source: Posner (2016).

The EU authorisation to buy private sector assets represents a wrong way to design such a programme. The now ended securities market programme gave the ECB the right to buy private sector securities.[236] These securities had to come from a list of eligible assets,

[231] Id at 42(2).
[232] Id at art. 43.
[233] Eric Posner, What Legal Authority Does the Fed Need During a Financial Crisis?, *Coase-Sandor Institute for Law and Economics Working Paper No. 741*, 2016, available online.
[234] JP Koning, The legal scope of Fed purchases, 2011, available online.
[235] We describe Russia's provisions for a resolution body later in this paper.
[236] Decision of the European Central Bank of 14 May 2010 Establishing a Securities Markets Programme (ECB/2010/5), available online at art. 2.

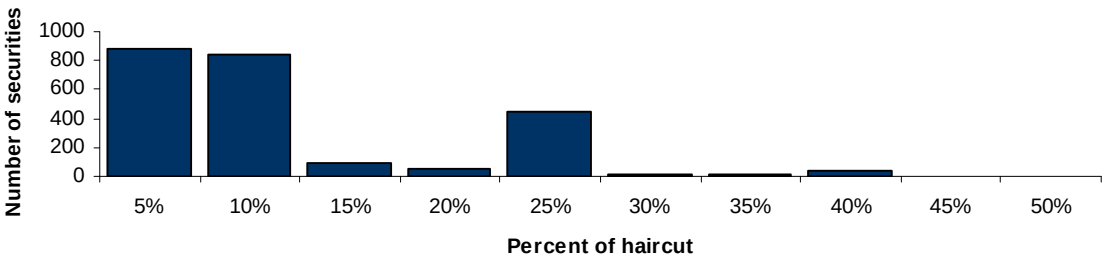
categorized as tier 1 and tier 2.[237] Figure 59 and 60 show some salient securities from among the 2,370 securities listed for private and public sector companies only. Basically, the decision told the central bank which securities it could – and could not – purchase. Unlike the Outright Purchases Programme, the ECB adopted the Securities Market Programme "in view of the current exceptional circumstances in financial markets, characterized by severe tensions in certain market segments which are hampering the monetary policy transmission mechanism and thereby the effective conduct of monetary policy oriented towards price stability in the medium term."[238] Figure 61 shows some of the private and less than private sector companies authorized on the list.

Figure 59: Is Treating the Central Bank Like an Idiot Such a Good Idea?



The figure shows the number of securities on the list of authorised securities to purchase and their corresponding coupon rates. Most have a coupon of zero -- yet the macroeconomic pay-off should concern central bankers far more than the nominal pay-off.
Source: ECB (2000).

Figure 60: Most Securities Not Discounted Very Much



The figure shows the number of securities on the ECB's list along with the discount in the market value of these securites (something the ECB calls a "haircut").
Source: ECB (2000).

[237] European Central Bank Guideline of the European Central Bank of 31 August 2000 on Monetary Policy Instruments and Procedures of the Eurosystem (ECB/2000/7), 2000, available online at Annex I, Chapter 6.
[238] Decision of the European Central Bank of 14 May 2010 Establishing a Securities Markets Programme (ECB/2010/5), recital 2, available online.

Figure 61: What Makes ECB Private Asset Investors Smarter than their Russian, Argentine and Yankee Counterparts?

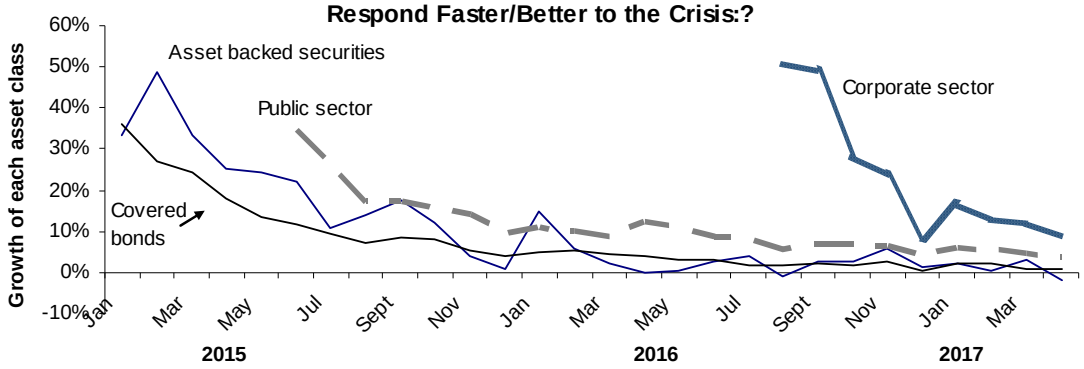
The word cloud shows examples of the over 5,000 companies and entities on the list of organisations authorized by the ECB for support. Why should lawmakers decide which securities central bankers buy tactically?
Source: ECB (2000).

The EU's and ECB's piecemeal approach to private securities purchases rulemaking has made even understanding – much less using – private asset purchase programmes exceedingly difficult. The ECB's main operational Guideline only contains mentions of outright transactions in passing.[239] A technical Annex to a press release contains much of the official wording for the programme.[240] Other ad-hoc decisions and guidelines govern the treatment of collateral, asset backed securities, covered bonds and corporate bonds respectively.[241] Numerous other decisions amend these regulations or represent previous

[239] Guideline (Eu) 2015/510 of the European Central Bank of 19 December 2014 on the Implementation of the Eurosystem Monetary Policy Framework (ECB/2014/60) (recast), available online.
[240] Press Release: ECB announces expanded asset purchase programme – Technical Annex ECB Announces Operational Modalities of the Expanded Asset Purchase Programme, 22 January, 2015, available online.
[241] Guideline of the European Central Bank of 20 March 2013 on Additional Temporary Measures Relating to Eurosystem Refinancing Operations and Eligibility of Collateral and Amending Guideline ECB/2007/9(ECB/2013/4), available online. See also Decision of the European Central Bank of 19 November 2014 on the Implementation of the Asset-Backed Securities Purchase Programme (ECB/2014/45), available online. See also Decision of the European Central Bank of 15 October 2014 on the Implementation of the Third Covered Bond Purchase Programme (ECB/2014/40), available online. Finally, see Decision (EU) 2016/948 of the European Central Bank of 1 June 2016 on the Implementation of the Corporate Sector Purchase Programme (ECB/2016/16), available online.

programmes.[242] As Figure 62 shows, the regulate-as-you-go approach adopted by the ECB probably led to delays in the use of unconventional monetary policies related to private asset purchases which dulled the effective of these policies. The ECB's experience suggests that clear rules governing the ECB's use of asset purchases might have helped the Bank respond to the crisis promptly. **Having clear authorisations in place similar to the ECB's might save other central banks the expense and delay experienced by the European economies.**

Figure 62: Could Corporate Asset Purchase Regulations Have Helped the ECB Respond Faster/Better to the Crisis:?



Source: ECB at History of cumulative purchases under the APP (2017).

As its part US Fed's experience shows what not to do. Ignoring the democratic or oversight arguments involved, we could not find any rigorous study showing that the Fed abused or even used its asset purchase powers incompetently or ineffectively.[243] Many forgot about the conditions half a century ago which led Congress to give the Fed the power to fund companies directly – because banks would not.[244] Figure 63 summarises the changes to the Federal Reserve Act and related legislation governing the Fed's use of asset purchases as a means to supporting asset markets. US rules have gone toward restricting private securities purchases. Most of these rules require the obvious – such as the admonition that the "Federal reserve bank shall obtain evidence that such individual, partnership, or corporation is unable to secure adequate credit accommodations from other banking institutions."[245] Even among academics, most favour putting in place rules dictating what the central bank should do in such exigencies.[246] Yet, these rules – 5 in the case of Calomiris *et al.* – seek to limit powers which the Fed has not demonstrably abused or used to limited effect. **Proposals to limit the Fed's asset purchase powers –**

[242] For example, the covered bond programme had 2 iterations.
[243] For one more official assessment, the Office of the Inspector General Report from 2010 fails to highlight any problem with the use of the Fed's Article 13(3) powers (which we describe throughout this paper). See Board of Governors of the Federal Reserve System Office of Inspector General, The Federal Reserve's Section 13(3) Lending Facilities to Support Overall Market Liquidity: Function, Status, and Risk Management, 2010, available online.
[244] Tim Sablik, Fed Credit Policy During the Great Depression, *Federal Reserve Bank of Richmond Economic Brief EB13-03*, 2013, available.
[245] H.R.3996 - Financial Stability Improvement Act of 2009, at sub-title H, available online.
[246] Charles Calomiris, Douglas Holtz-Eakin, R. Glenn Hubbard, Allan Meltzer and Hal Scott, Establishing Credible Rules for Fed Emergency Lending, 2017, available online.

like those used to limit other central banks' powers – present solutions to unproven problems.

Figure 63: The US Federal Reserve: How Not to Amend a Central Bank Law

Every rigorous analysis of Fed policy during the Global Financial Crisis we've seen has claimed that the Fed successfully used its powers in article 13(3) to buy particular assets and thus stave off further crisis. Yet, mob rule has resulted in several new or proposed laws which would hinder this ability. The *Dodd-Frank Act* at sec. 1101 prevents loans to single institutions (rather than as a broad sectoral or economy-wide programme as well as non-bank loans -- unless approved by the Treasury Secretary).[247] The Act also places severe restrictions on lending to non-banks. A *Financial Stability Improvement Act* (sub-title H) takes away discretionary authority to extend loans or make purchases – and vests such authority in a committee (the Board of Governors). The *Fed Oversight Reform and Modernization Act* prevents the Fed from taking equity as collateral (sec 11) and allows lending only to solvent companies.... in effect providing an umbrella only on sunny days.[248] The Act requires the Fed to adopt nominal GDP targeting – something we advocate. Yet, that law (and the others) remove the Fed's ability to hit those targets by removing its ability to affect GDP at the firm level. Emerging markets should not look to US law to decide how to reform their central banks.

Even if detractors have problems with central banks' direct purchase of securities, few could argue with the need to develop collateral and repurchase markets in most developing countries. Numerous laws accept the role of such funding to promote the creation of collateral. Jamaica's central law, for example, allows that country's central bank to "with the approval of the Minister grant loans and advanced for fixed periods to, or subscribe to, hold and sell the shares of any corporation which with the approval of or under the authority of the Government, is established for the purpose of promoting the development of a money market or securities market in Jamaica, or of improving the financial machinery for the financing of economic development."[249] At first glance, this law might seem to authorise state-owned or managed enterprises to take credits from the central bank. Yet, the complexity of the provision opens the door for the Bank's authority to lend, a tool in promoting the creation of money/securities markets rather than simply funding politically connected friends. And what better way to promote such development than through the creation of securities which can be lent, borrowed and otherwise used as collateral?[250]

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[247] All 6 of the sub-provisions in the section go against the analysis we have reviewed in this paper (namely the empirical results discovered in the crisis). See Dodd-Frank Wall Street Reform and Consumer Protection Act at sec. 1101.

[248] Federal Reserve Oversight Reform and Modernization Act. (H.R. 3189) at sec. 11.

[249] The Bank of Jamaica Act, 1960, available online. art. 23(j).

[250] To keep this paper under 200 pages, we must ignore the role that such asset purchases might have on the creation of the collateral that makes financial and securities markets work. For statistical analysis of the role that ECB purchases played in deepening these markets, see Massimo Ferrari, Claudia Guagliano, Julien Mazzacurati, Collateral scarcity premia in Euro area repo markets, *ESMA Working Paper 1*, 2017, available online.

Are Asset Purchases Fiscal Spending?

Are central bank asset purchases fiscal policy by other means? Such purchases avoid much of the related philosophical issues by focusing on the marginal productivity of capital (and thus investment).[251] The European Central Bank's rules illustrate the legal issues involved. In the ECB case, the legality of ECB finance (whether repaid or not) depends on the definition of "the direct financing of public expenditure." In one popular version, the ECB could give loans through Targeted Longer-Term Refinancing Operations (TLTROs) as long as such policies do not replace fiscal spending.[252] Article 21 admonishes that "the ECB and national central banks may act as fiscal agents [of Community institutions or bodies, central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of Member States]."[253] Like with the other central bank laws we studied, the ECB may "operate in the financial markets by buying and selling outright (spot and forward) or under repurchase agreement and by lending or borrowing claims and marketable instruments, whether in Community or in non-Community currencies, as well as precious metals [and] conduct credit operations with credit institutions and other market participants, with lending being based on adequate collateral." [254] As with other central bank laws we studied already, the Bank's Governing Council may decide on "operational methods of monetary control as it sees fit." ECB management itself has erstwhile flagged Treaty obligation 123(1) – and its prohibition against lending to government bodies -- as a barrier to such purchases.[255] Nevertheless, they went ahead and bought private assets anyway.[256] **Legal experts might thus find that such central bank finance does not run afoul of current restrictions as long as such finance does not replace fiscal transfers.**

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[251] For the well-worn issues involved, see Athanasios Orphanides, Fiscal Implications of Central Bank Balance Sheet Policies, Institute for Monetary and Financial Stability *Goethe University Frankfurt Am Main Working Paper 105*, 2016, available.

[252] Eric Lonergan, Legal helicopter drops in the Eurozone, available online.

[253] Protocol on the Statute of the European System of Central Banks and of the European Central Bank, available online.at article 21. We combined 21.2 with its reference to "entities referred to in Article 21.1" for the sake of readability.

[254] Protocol on the Statute of the European System of Central Banks and of the European Central Bank, available online.

[255] Specifically article 123(1) and its "overdraft facilities or any other type of credit facility." See Consolidated versions of the Treaty on European Union and the Treaty on the Functioning of the European Union - Consolidated version of the Treaty on the Functioning of the European Union - Protocols - Annexes - Declarations annexed to the Final Act of the Intergovernmental Conference which adopted the Treaty of Lisbon, signed on 13 December 2007, available online.

[256] In their place, we might have even raised article 124 (prohibiting preferential access of entities like companies to financial institutions like central banks). See Id.

Nothing necessarily implies that such purchases replace fiscal policy transfers, purchases and procurements.[257] Stephen Grenville in an online blog decries central bank asset purchases as fiscal policy in disguise.[258] Grenville – like many who make this claim -- do not cite any black letter law in support of this legal analysis. The closest law might consist of a Treaty obligation, such that if central bank purchases do represent public spending, then the ECB must submit these purchases along with the relevant Commission body for budgetary consideration and approval.[259] As public expenditure, "the Union shall not adopt any act which is likely to have appreciable implications for the budget."[260] To ensure the legality of purchases – following this line of legal reasoning – the EU Parliament must ratify such spending. A complicated work-around for the monetary-policy-masquerading-as-fiscal-policy problem consists of setting up yet another EU institution taking out loans in order to fund public investments (a la European Investment Bank and its brethren).[261] **As mentioned before, developing countries lack many of the democratic and even professional safeguards which make fiscal policy a viable substitute (or even complement) to unconventional monetary policy.**[262]

Developing country jurists may look to a recent EU Court of Justice case before deciding whether central bank asset purchases constitute fiscal policy by other means. Figure 64 shows the lessons the case raises for developing countries. In Gauweiler and Others (Judgment in Case C-62/14), the court had to decide on the legality of the ECB's Outright Monetary Transaction Programme.[263] The court specifically struck down claims that the Programme represented broader over-reach into economic policymaking by looking at Bank's "objectives and instruments."[264] The decision noted that even though the programme had broader economic effects, both the aim (of conducting monetary policy) and instruments (of using asset purchases) fell within the Bank's purview. The

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[257] Cemal Karakas, Helicopter money: A cure for what ails the euro area? Briefing April 2016 European Parliamentary Research Service, available online.

[258] Karakas supra cites Grenville on p. 6. See Stephen Grenville, Helicopter money, VOX, 2013, available online.

[259] See Treaty at 310(1).

[260] Id at 310(4).

[261] Jorg Bibow, The Euro's Savior? Assessing the ECB's Crisis Management Performance and Potential for Crisis Resolution, Levy Economics Institute of Bard College Working Paper No. 845, 2015, available online.

[262] Even the harshest critics of unaccountable central bank asset purchases must acknowledge the greater harms from fiscal policies conducted by incompetent, corrupt and authoritarian regimes. For easy to understand data, see Aygun Garayeva and Gulzar Tahirova, Government Spending Effectiveness and the Quality of Fiscal Institutions, *Azerbaijan Central Bank Center for Research and Development Working Paper*, 2016, available online.

[263] Preliminary Ruling Concerns the Validity of the Decisions of the Governing Council of the European Central Bank (ECB) of 6 September 2012 on a Number of Technical Features regarding the Eurosystem's Outright Monetary Transactions in Secondary Sovereign Bond Markets ('the OMT decisions') and the Interpretation of Articles 119 TFEU, 123 TFEU and 127 TFEU and of Articles 17 to 24 of Protocol (No 4) on the Statute of the European System of Central Banks and of the European Central Bank (OJ 2012, C 326, p. 230; 'the Protocol on the ESCB and the ECB'). Available online.

[264] Alicia Hinarejos, Gauweiler and the Outright Monetary Transactions Programme: The Mandate of the European Central Bank and the Changing Nature of Economic and Monetary Union: European Court of Justice, Judgment of 16 June 2015, Case C-62/14 Gauweiler and others v Deutscher Bundestag European Constitutional Law 11(3), 2015, at p.568 available online.

Programme tackled the problem addressed proportionally – meaning that the Bank didn't use excessive powers or authority to achieve its objectives when buying these assets.[265] The court also stressed the limits of the programme – such as limits on the amount of debt purchases, time held and so forth.[266] Nevertheless the conclusion remains. **Even in the EU context, the courts have found sufficient existing bases for private asset purchases, even with the abstract wording in existing law.**

Figure 64: Lessons of *Gauweiler et al.* for Developing Countries' Central Banks' Private Asset Purchase Programmes

1. Price stability objectives as a problem. The ECB had a hard time showing the legality of its asset purchase policy in connecting it to only price stability. Politicians wanted a rule-bound institution. But price stability as a main objective helped create the basis for a challenge that most expected to be overturned anyway. Developing countries wanting to keep such purchases as a back-up option in tackling crisis may wish to rethink focus on price-stability objectives.

2. "Objectives and instruments" as a test for legality. The Court, in the end, decided the case in part on whether the ECB's asset purchases had objectives aligned with the Bank's objective (a stretch even for proponents) and instruments (using already existing asset purchasing procedures). Developing country courts will do well to use a similar metric, unless the bank law changes.

3. Private asset purchases as a way to avoid monetary spending. The ECB ran into trouble because buying government debt looked like a way to monetize deficit spending. Many developing countries have restrictions on buying government bonds/debt. Favouritism and discrimination in buying assets will always be an issue (why buy her's rather than his' securities)? But at least it helps prevent indirect finance of government deficits.

4. Private asset purchases as bulwark of Bank independence. Many indicated that government bond purchases potentially violated the Bank's independence from the executive. For developing countries' central banking laws without independence, this is not even an issue. But for those laws that guarantee central bank independence, the purchase of private assets can help diffuse criticisms that the Bank engages in government spending by other means.

5. Importance of statutory authorisations. The case shows clearly that countries need clear definition in their law (and especially limits) so courts don't eventually question and even potentially cancel such asset purchases.

Former Federal Reserve Chairman Ben Bernanke has proposed a scheme for dealing with the potential legal and democratic/accountability problems inherent in such purchases.

[265] Id at p. 569.
[266] Id at 574.

The legislature might establish an asset purchase fund with which the Bank can buy assets. Such a fund would impose the necessary political and resource limits on central bank asset purchases – while still providing flexibility. In Bernanke's conception of the scheme, Congress (or the relevant legislative body) would adopt a law giving the central bank the authority to capitalise an account held at the central bank.[267] As a budgetary unit, the Treasury would record disbursements from the account (as any government expenditure...capital or otherwise). The legislative instrument might define a limit for such spending – a limit set by the likely amount of money needed to achieve some nominal GDP growth or other target. The usual budgetary process – or perhaps an expedited process – would then determine spending from the account. As we have said before, **all flavours of proposals aimed at giving politicians power over central bank asset purchases only eliminates the main benefit of such purchases in the first place.**[268]

Wrapping Rules in a Statutory Mandate for Nominal GDP Targeting

How to endow central banks with a simple mandate to buy private assets and do anything else needed to promote stabilization and growth? Despite calls for nominal GDP targeting among economists, legal scholars have paid almost no attention to central bank rules as an important area of public law in its own right. Economists recently generally favour nominal GDP targets – as they provide both discipline and flexibility.[269] Authors like Hoelle and Peiris find that such rules would ensure a Pareto efficient outcome only if all countries adopted these rules simultaneously and if all economic actors wanted the same things.[270] For authors like Csermely and Toth, the technical issues involved in such targeting would rule out such policies.[271]

The very limited data available suggests that nominal GDP targeting would perform better than the current approach targeting prices. The zero interest rate environment (and the attending monetary policy conducted in a liquidity trap) revived much interest nominal GDP targets.[272] Bhandari and Frankel in particular look at a social loss function

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[267] Ben Bernanke, What tools does the Fed have left? Part 3: Helicopter money, *Brookings Brief April 11*, 2016, available online.

[268] Goldoni represents a recent well-intentioned and misguided reincarnation of this position. The author turns back the clock by arguing that the "ECB cannot be deemed to be only an administrative independent agency, but it should be treated as an organ with constitutional functions...Such recognition implies that the ECB's decisions ought to be treated not only procedurally, but in a genuinely political and constitutional way." See Marco Goldoni, The Limits of Legal Accountability of the European Central Bank, *George Mason Law Review 24*, 2017, available online.

[269] Jeffrey Frankel The Death of Inflation Targeting, *Vox, 19 June* 2012, available online. Some models do not provide such clear-cut answers. See Julio Garin, Robert Lester and Eric Sims, On the Desirability of Nominal GDP Targeting, *CATO Working Paper 32/CMFA No. 7*, 2015, available online.

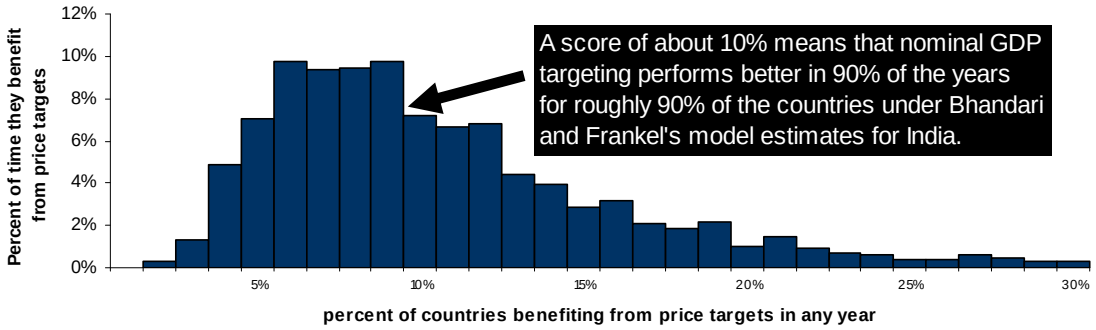
[270] Matthew Hoelle and Udara Peiris, On the Efficiency of Nominal GDP Targeting in a Large Open Economy, *Krannert Working Paper Series, Paper No. 1273*, 2013, available online.

[271] Agnes Csermely and Mate Toth, Nominal GDP Targeting: What Are Central Bankers Talking About? *MNB Bulletin*, 2013, available online.

[272] For a readable (and rightly caustic) analysis of using such a rule as legislative mandate, see Alex Nikolsko-Rzhevskyy, David Papell, and Ruxandra Prodan, Policy Rule Legislation in Practice, 2015, available online.Not everyone agrees and depending on the model parameters, nominal GDP targeting could result in worse performance at the zero lower bound (when an economy stays stuck in a liquidity

similar to the Taylor monetary rule – one which penalises deviations from optimal output and low inflation rates.[273] They find, in the Indian context, that a nominal GDP target would have raised welfare more than price targets. They particularly find the price elasticity of output needed such that central banks would prefer a price target (of roughly 2.14). Extending on their work, we calculate the price elasticity of GDP for all the jurisdictions for which the World Bank have data – repeating the same procedures used by Bhandari and Frankel. Figure 65 shows the percent of countries and the percent of years (from 2005 to 2015) where price elasticities of output rose high enough to make price targets worthwhile. As shown, their model would only choose a price target in about 10% of the cases. Figure 66 generalises these results – showing that, under reasonable assumptions, such nominal GDP targets generally outperform other types of monetary policy rules.[274]

Figure 65: Price Targeting Better than Nominal GDP Targeting only 10% of the Time at Most



The figure shows the percent of years that countries benefits from a price, rather than a nominal GDP target. Thus, the greatest benefit these countries can hope for is that 10% of countries' monetary policy performs better 10% of the time from price targeting. The rest militates for nominal GDP targeting. We calculated these data by finding the inflation (GDP deflator) elasticity of aggregate supply (GDP) for each year from 2005 to 2015 for 180 countries. We flagged years where this elasticity exceeded Bhandari and Frankel's elasticity -- found for India - where a price target works better than a nominal GDP target. The data thus reflect proportion of "country years" (years for all countries) where nominal GDP targeting should perform worse. Naturally, 100% minus these data gives the extent to which nominal GDP targeting does better.
Sources: World Bank (for data) and Bhandari and Frankel (2015) for model and policy thresholds.

Figure 66: Nominal GDP Targets Smooth Inflation and Output Gaps Best?
(lower numbers = "better")

Model	var (π)	var (y)	Welfare Loss
Standard Taylor Rule	4.12	2.32	2.95
Imperfect information Taylor Rule	4.45	4.05	3.22
Nominal GDP Target	3.60	3.12	2.60
Difference Rule	4.38	3.73	3.16

trap). See Roberto Billi, A Note on Nominal GDP: Targeting and the Zero Lower Bound, *Sveriges Riksbank Working Paper Series 270*, 2013, available online.

[273] Pranjul Bhandari and Jeffrey Frankel, Nominal GDP Targeting For Developing Countries, *NBER Working Paper 20898*, 2015, available online.

[274] David Beckworth and Joshua Hendrickson, Nominal GDP Targeting and the Taylor Rule on an Even Playing Field, available online.

The Taylor Rule refers to a monetary policy whereby the central bank tries to minimise a weighted combination of price variability and output variability (or differences from some pre-defined desired level). Source: Beckworth and Hendrickson (2015).

Such a mandate differs radically from the so-called **Taylor Rule**. Under such a rule, the central bank should – or must – follow a rule which requires the central bank to minimise an inflation gap and an output gap. As a recent US Congress Research Service note has observed, "the Taylor rule cannot make policy prescriptions at the zero lower bound—different combinations of deflation (falling prices) and output gaps would prescribe a negative federal funds rate under the Taylor rule, but that prescription would not be actionable because the federal funds rate is a market rate."[275] The central bank has a superiour information which allows the institution to adjust to output and inflation gaps better than any Taylor Rule.[276]

Existing central bank law shows the benefits of targeting nominal GDP as a central objective of a central bank's law. The Russian Central Bank law shows why a similar nominal GDP targeting rule provides far more transparency and accountability than a piece-meal approach. Figure 67 shows the various provisions in the 86 page law (the longest one we have seen in our sample).[277] Article 2 of the law vesting federal ownership in any property owned by the Bank of Russia could exert a potentially market chilling effect on any private sector securities purchase programme. Numerous provisions allow for such provisions – under relatively ill-defined conditions and usually as a way of funding government entities. As we show in our previous review of central bank laws, both authorisations and prohibitions on buying private sector assets exist – usually leaving the decision up to the central bank's governing board. **Such ad hoc authorisations to buy private sector securities provide a far worse basis for central bank policymaking than simply requiring the central bank to achieve a certain inflation/output mix under results-outcomes based legislation.**

Figure 67: Russian Central Bank Law as the Emblematic of Over-Legislating

Article 8.5	The Bank of Russia shall *not* be entitled to participate in the capital or be a member of other commercial or non-commercial organisations, *if they do not provide support to the activities of the Bank of Russia and its institutions, organisations and employees, except for the cases established by federal laws*
Article 8.6	[provisions above] shall not apply to Bank of Russia operations on the open market...
Article 8.7	For the purpose of ensuring the rouble's stability, the Bank of Russia shall have the right to establish and (or) participate in the capital of organisations engaged in the trust management of Bank of Russia assets, and also assets transferred to their management by the Russian Federation, state corporations created by the Russian Federation and other public legal entities or organisations, *including foreign*

[275] Marc Labonte, Federal Reserve: Legislation in the 114th Congress, *Congressional Research Service R44273*, 2015, available online.
[276] Sofia Bauducco, Ales Bulir, , and Martin Cihak, Taylor Rule Under Financial Instability, IMF Working Paper WP/08/18, 2008, available online.
[277] On the Central Bank of the Russian Federation (Bank of Russia), *Russian Federal Law No. 86-FZ*, July 10, 2002, available online.

	entities, for investment in the Russian Federation and (or) foreign states.
Article 26	The Bank of Russia shall disclose information about the transactions it conducts in trades organised by the stock exchanges and (or) other organisers of trade on the securities market....
Article 39.2	Purchase and sale of other securities specified by the Board of Directors, provided that they are listed for organised trades, as well as the conclusion of repo agreements with these securities.
Article 46.2	To buy and sell securities on the open market and also sell securities accepted as collateral for Bank of Russia loans
Article 47.2	In the cases established by the decision of the Board of Directors, other valuables and also warranties and bank guarantees may be used as security for Bank of Russia loans. A subsequent pledge of property held as collateral for a credit institution's obligations to the Bank of Russia shall be allowed, if this is stipulated in an agreement between the Bank of Russia and the credit institution.*
Art 76.1-12	Establishes a securities management company dependent on the central bank, supposedly for financial institutions' "bankruptcy prevention." Yet, the law provides for no obvious arms-length relationship (and the central bank serves as the only shareholder).

* The general tenor of the article does not favour the purchase or acceptance of such securities

Adding a nominal GDP target as a primary objective of a central bank law would also prevent much of the legal contortions central banks currently use to effect such transactions. The US Fed, for example, would not need to register a legal entity like "NGDP Targeting LLC" to engage in such purchases.[278] Such an objective provides a more specific objective that "promoting the development of the national economy."[279] Such an objective also improves upon a standard formulation in central bank laws stating something to the effect that, "the primary objective of the [central bank] is to maintain price stability to a balanced and sustainable growth of the economy."[280] To repeat the formula, the Iraqi central bank law states that, "the primary objectives of the [central bank] shall be to achieve and maintain domestic price stability and foster and maintain a stable competitive market-based financial system. Subject to these objectives, the [central bank] shall also promote sustainable growth, employment and prosperity in Iraq."[281]
Why leave such nominal GDP targets abstract and diffuse when central bank laws can incorporate them directly?

The variety of institutional structures (and thus central bank laws) make the best way to introduce a nominal GDP target different, according to the context. Figure 68 shows possible ways of incorporating such a legal requirement in the different systems we reviewed in our random sample of central bank laws. The simplest approach consists of modifying existing objectives to read in the tight language of a nominal GDP target. In the case of a country like Poland (antithetical to output targeting), the objective could read, "The basic objective of the activity of NBP shall be to promote the growth of nominal GDP, namely growth in the real economy while maintaining price stability,

[278] JP Koning, The legal scope of Fed purchases, 2011, available online.
[279] Law Creating the Bank of the Republic of Haiti, 1979, at art. 2, available online.
[280] The New Central Bank Act of the Philippines, *Republic Act No. 7653*, at sec 3, available online.
[281] Central Bank of Iraq, Annex A, 2004, at. sec. 3, available online.

while supporting the economic policy of the Government..."[282] As previously seen, lawmakers could consign output-based targets to subsidiary tasks and objectives. In Poland's case, such an objective might read "ensure the equitable, sustainable growth of nominal GDP, investing as necessary in productive assets while guaranteeing the stability of prices and foreign exchange." **Nothing forbids the central bank from carrying out its other objectives as already enshrined in its central bank law.**

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Figure 68: Legislative Approaches to Nominal GDP Targeting

Lawmakers might consider the following legal drafting strategies for adding nominal GDP targeting to their central bank laws, only when central bank has guaranteed and proven independence and during times of crisis (as defined by the lawmakers).

1. Direct application. Adding nominal GDP growth as a primary (or if impossible) a secondary objective during an economic crisis for the purposes of stabilization. The legislature can decide whether to set up a limited account from which the central bank can conduct purchases.

2. Through government policy. For central bank laws requiring following government policies/rules, an executive degree could simply establish the nominal GDP target (and thus the authorisation to purchase private securities on an independent basis).

3. Definition of already existing objectives. When the central bank law already makes reference to economic objectives, to add the purchase of non-inflationary, GDP growth enhancing portfolio holdings in the short or longer run – rather than leaving it to a monetary policy committee to decide.

4. Lender of last resort and stabilisation rules. When the central bank law includes sections on the bank's role as lender of last resort and/or stabilization, explicitly allow for the purchase and holdings of private sector securities directly as a function of the bank.

5. Distribution rules for monetary unions. When a crisis affects several members of an economic union, either a separate treaty or negotiated executive level regulation could define the level of private asset purchases from each country and which shares the bank buys from which jurisdiction.

6. Relations with national development banks. The law would define conditions under which the Bank would transfer securities to the development bank (if existing) or operate a department as a developmental arm.

[282] The Act on Narodowy Bank Polski of 29 August 1997 (Journal of Laws of 2013 item 908, at article 3, available online.

Why would a nominal GDP target authorise a central bank to participate more directly in private sector securities markets (rather than through expanding bank credit)? The Bahamas central bank law provides an obvious example. The Bank's objectives require the Bank to "a) promote and maintain monetary stability and credit and balance of payments conditions conducive to the orderly development of the economy, b) in *collaboration with the financial institutions*, to promote and maintain adequate banking services and high standards of conduct and management therein, and c) to advise the Minister."[283] Almost as an after-thought, the Law allows the Bank to buy company/corporate bonds at art. 29.1(d), securities at art. 29.1(e), or lend in general at art. 29.1(f).[284] One could hardly imagine a situation where such purchases or loans aim primarily at maintaining monetary stability (as required by the Bank's objective). **If buying private sector securities helps promote stabilisation and economic growth, law should quell public debate and let technocrats get on with allocating capital to its highest risk and externality adjusted, expected marginal returns.** [285]

At the very least, the explicit mandate to maximise nominal long-term, risk-adjusted, nominal GDP would simplify central bank laws. In the previous sections, we reviewed the numerous cases where central bank laws repeated authorisations to buy securities (often related to the government). In a developing/emerging market context, central bank asset purchases should probably focus less on public debt/securities – and more on private sector securities.[286] Putting authorisations for buying private sector securities in a subsequent section (like Malaysia's Part VI Chapter 1) only distracts attention away from the central bank's dual role in maximising real output (with optimal inflation).[287] Japan's central bank law clearly absolves the central bank from any responsibly for development or output growth – something most "synthesis economists" would find bizarre.[288] **Even the causal student of economics familiar with the IS-LM model could not fail to argue for a legislative role for the central bank in determining in nominal GDP growth**

Conclusion

Central bank policies determine both national output and prices – and thus nominal GDP. Why not make them responsible for such nominal GDP? When banks fail to allocate

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[283] Statute Law of the Bahamas Central Bank of the Bahamas, Chap. 351, LRO 1/2010, at art. 5, available online.
[284] Id.
[285] Academics have found fashionable calls for more democracy in central bank asset purchases. Johnston and Pugh represent one of the most baleful examples of such writing. They object to the ECB's purchase of government bonds (a basic central bank tool of monetary policy) and call for greater open debate – without showing how such debate would led to better outcomes. See Andrew Johnston and Trevor Pugh, The Law and Economics of Quantitative Easing, Sheffield Institute of Corporate and Commercial Law Working Paper Series, 2014, available online.
[286] Shamshad Akhtar, Henri Lorie and Arne Petersend, Effectiveness of Central Banks And Their Role In The Global Financial Crisis, Asian Development Bank Monograph, 2009, available online.
[287] Central Bank of Malaysia Act 2009, available online.
[288] Synthesis economists refers to most professional PhD economists educated after the 1970s – integrating fiscal and monetary policies into a theory of output and inflation. See Marvin Goodfriend and Robert King, The New Neoclassical Synthesis and the Role of Monetary Policy, *NBER Macroeconomics Annual 12* 1997.

credit or price risk/returns correctly, legislative rules forcing central banks to act through these failing entities only imperils the macroeconomy. Central banks should have the right/obligation to transact in private sector securities – if only to help fulfil their mandate to achieve economic growth. Through most of central banks' recent history, such "unconventional" monetary policy has been relatively conventional. Perceived legal limitations on central banks in the US, EU, UK, and Japan have probably led these central banks to buy far fewer private securities than they should have. Central banks should have the clearer and more forceful legislation authorising them to purchase of private sector securities, as/when appropriate.

We find that investment due to such purchases increases in certain countries at certain times. Countries like Greece, Bulgaria, Ukraine and others look like good candidates for such purchases. Technocratic central banks can help keep investment levels and returns up during an economic/financial crisis in countries with corrupt and/or incompetent fiscal authorities, with low interest rates, inflation, economic growth and high levels of public debt. Unsurprisingly, we found – using very sensitive statistical methods known as Bayesian measures – that central bank private sector securities "purchases" (including the holding of such assets as collateral) can promote investment. More surprisingly, we find that such purchases may backfire due to a "sloth effect" – which we did not try to explain. Central bank's legislatively mandates objectives should reflect central banks' role and ability to unconventional asset purchases to promoting economic growth in crisis times and possibly outside them.

Appendix I: Terms of Reference for Pilot Asset Purchase Impact Assessment

Macroeconomic analysis does not represent the best way to understand the impact of central bank private securities purchases on investment. None of the central banks we contacted wanted to measure the extent to which specific securities purchases led to investment. Thus, we provide these terms of reference for internal audit departments in central banks interested in testing our theories at the micro-level. We structure this as an internal audit, as one of the authors works as an internal auditor.

Broader question: Would tying specific central bank securities purchases change the public or private returns on investments underlying these securities?

Audit objective: assess the risk and return inherent with securities purchases as well as use the audit to increase the accountability of spending by securities issuing entities.

Audit plan – choose 8 securities in primary markets each individually or a group within the same securities class equal to $1 million. These eight (8) securities consist of two (2) general obligation bonds worth $1 million in total, two (2) specific obligation bonds (as available and/or eligible), the purchase of two (2) corporate debt instruments and the purchase of two (2) purchase of newly issued shares in randomly chosen companies for a total of $1 million between these two companies.

Agreement with Entities – the audit team shall secure the permission of the entity receiving the investment to detailed investment/revenue/cash transaction information and expense information, as allowed by private contract. As none of the entities consist of regulated bodies, the central bank has no legal right to demand this information.

Accounting for the use of funds – Treat central bank purchases on a last in-last out basis. Thus, if a government collects $1 million and the central bank buys $1 million in bonds. The auditors will assume the first $1 million buys something else. Only the $1 million after would be traced in expenditure tracking. Similarly, if the central bank buys $1 million in shares, adding to $50 million in cash. The company spends the $50 million on COGS, operating expenses, and so forth. Only the $1 million after that would be tracked.

Mapping funds to activities – each of these purchases will correspond to specific purchases (costs of goods, salaries, investments and so forth).

Exit interview – the auditors will make a questionnaire asking spending level officials if knowledge that specific funds can specifically from the central bank influenced their spending/investing behaviour.

Depending on the value of the information obtained, the audit team can expand the number of investments/entities and even participation in secondary markets to assess the extent to which central bank securities purchases distort spending or investment decisions.

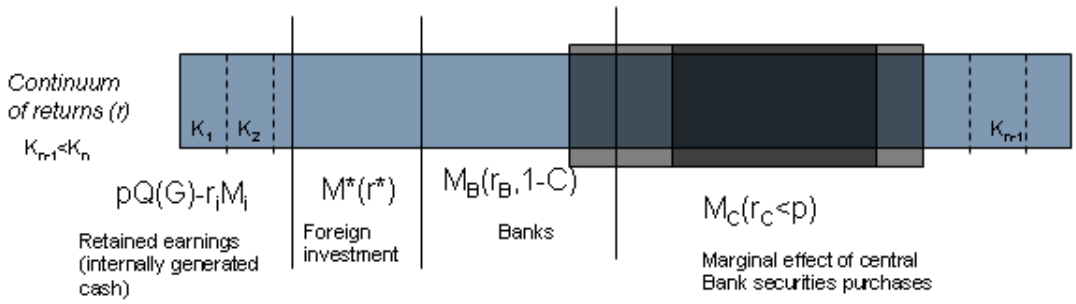
Appendix II: Modelling and Data used for the Study

Outline mathematical model

We start with firms which deploy capital K which generates λK units of output with a nominal cost $p\lambda K$ and with a return $p\lambda K$ $(1+r)$. Each unit of capital has its own marginal returns to such capital. Firms must use money to purchase this capital, and we assume that all money from firms only goes to capital $M = pK$. In fact, K represents the log value of capital – such that increases in the orders of magnitude of capital pass through into more output. Thus, the marginal return to capital equals $r=1/K$, such that such returns approach zero (though never go negative). Clearly, the providers of money M receive $p(1+r)$ in order to part with their cash. In such a world, banks should lend as much money as possible – earning a return of r. Banks get their money from the central bank or savings from households and companies.

Imagine, that the central bank has a monopoly power over the creation of money (and thus credit for this simple model). The central bank uses a Taylor-esque rule, seeking to maximise real output growth and thus find the "right" inflation rate. In this world, the central bank's money can earn three returns r_G, r_B, and r_C with each of the returns accruing to government's capital K_G, banks' lending K_B and direct securities purchases K_C. In our model, only government spending generates demand in the real economy – and government spending and companies make output Q. Companies thus deploy capital in order to make goods and services $Q=\alpha\lambda M$ (ignoring the government for the time being) – with lambda being the way that money turns into capital like machines. Firms charge $pQ= (K+r) = M$.[289] If banks function perfectly, firms use K_B and never need K_C.

Figure A: Controlling for Money Market Effects



Controlling for effects means only looking at how central bank funding (the black box bit) affects changes in investment (the length of the blue bar). Different macroeconomic and other events make the best size of the black box bigger or smaller. Our main purpose consists of measuring if the black box actually exists and if such central bank spending hurts investment more than it helps.

Clearly if Q-Q' fell for any reason, firms must deploy more capital to book production. If $p<r_B$, then firms will not deploy capital. This requires a cheaper source of capital – r_C (which is essentially free, minus inflationary effects). If firms refuse to use capital, then

[289] An easy way to think about this consists of the quantity theory of money py=mv, with constant velocity.

money simply passes into changes in the price level *p*. **The model obviously predicts that as bank capital rises in price (or lowers in availability), central bank capital directly to firms helps boost investment (and thus output).**

Other variables might influence the way that central bank funding influences investment (and thus output). As firms report capital constraints, central bank funding should become more important. Central bank independence and control of corruption allows the central bank to target money to the firms (and thus capital projects) with the highest return. Figure B shows the variables we used in various parts of our analysis. Figure C shows how we used those variables in various equations to test alternative theories of investment – given central bank funding. Remembering that we need to remove the effect of monetary policy variables, Figure D shows changes in investment with those effects removed. As shown, we needed to adjust any regression analysis for the increasing variance in these values (from left to right in Figure D). **Given the serious problems with regression analysis in general, we only use regression as a method of illustration and possibly suggesting areas for further inquiry.**

Figure B: List of Variables Analysed During the Course of Our Study

Central Bank Funding Panel	Investment Panel
Rate of Change (CB Claims)	Change in Invest
CB PS Buys as Percent GDP	Invest as percent GDP
High CB Buys (more 3%)	High invest (more 40%)
LAG Rate of Change (CB Claims)	LAG Change in Invest
LAG CB PS Buys as Percent GDP	LAG Invest as percent GDP

Banks Desperate	Central Bank Qualities
banks as funders	Independence
funding as NO constraint	Control of Corruption
Bank Z-score	

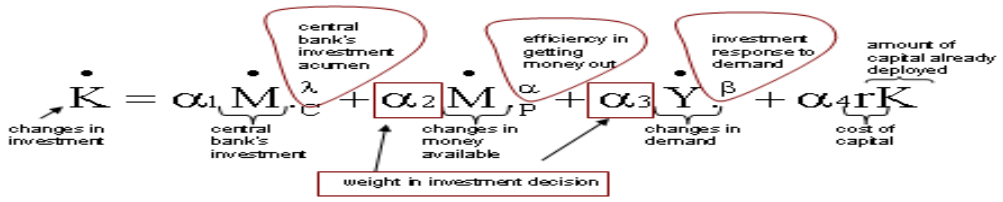
Funds in the system	Monetary policy
Gross savings (% of GDP)	Lending interest rates
General gov. consump. expend. (% of GDP)	Inflation
Foreign direct investment, net inflows (% of GDP)	Domestic credit to private sector (% of GDP)
Gross national expenditure (% of GDP)	Foreign reserves
Central bank private purchases as % of Invest	

	Constructed variables
	CB from portfolio effects (predicted var)
Ratio of assets to GDP	CB without portfolio effects (residual))
Central bank assets to GDP (%) from World Bank	Invest from monetary policy effects (predicted y)
Ratio of central bank assets to GDP (constructed from IMF with GDP World Bank)	Invest without monetary policy effects (residual)

All variables downloaded for countries which the World Bank and IMF had data from 2005 to 2015.

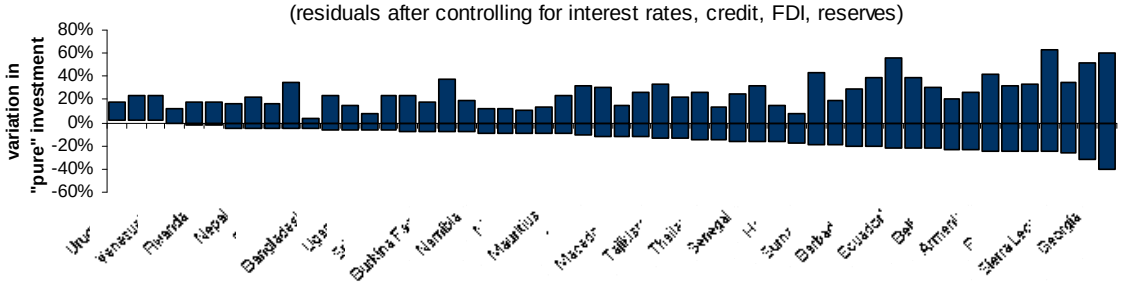
Figure C: Regression Panels Used to Test Alternative Theories of the Central Bank-Investment Nexus

Theory of investment	Equation
investment based on demand	$K_t = \beta C + \beta Y + \beta G$ *
investment based on lethargy	$K_t = \beta K_{t-1} + \beta C_t + \beta C_{t-1}$
investment based on credit available	$\ln K_t = \beta \ln C + \beta \ln B + \beta \ln B' + \beta \ln r + \ln \varepsilon$
investment based on central bank acumen:	$K_t = \beta C + \beta I + \beta Z + \beta R$



K represents the log value of the capital stock at time t (and thus K dot represents the difference between K at time t and K at time t-1). Y represent national expenditure (and thus demand for things companies produce). C represents the central bank's private asset purchases. G represents the part of government spending completely uncorrelated with overall output/expenditure (calculated through a procedure called principal components which we will not discuss here). The variable B represents bank credit, while B' refers to foreign direct investment (as basically a type of foreign bank credit). The variable r refers to the lending interest rate. The variable I refers to the independence of the central bank, Z to control of corruption in the public administration more generally and R as reserves. We show below the general form of the equation (whose pieces we show above it).

Figure D: Investment Changes With Monetary Effects Removed
(residuals after controlling for interest rates, credit, FDI, reserves)



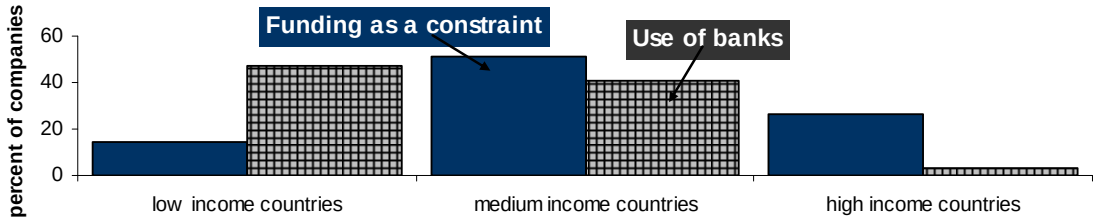
The figure shows the standardized values of investment (changes in capital stock) after removing influencing factors like interest rates, credit, FDI and reserves). The values range from 0 to 1, with an overall mean of 0 -- ensuring no pre-existing pattern before looking at other factors like central bank private securities asset purchases.

No central banker would find our analysis useful if firms do/did not have capital constraints. Thus, we must establish – independent of the existence of shadow banks – that direct central bank funding might help alleviate these funding constraints.[290] Figure

[290] Most economists looking at the shadow banking sector argue that these modes of finance appear to provide money when traditional lenders/investors can not or will not. Any "search for yield" obviously reflects the higher marginal productivities of capital we illustrated in Figure A. See Zoltan Pozsar, Shadow Banking: The Money View, *Office of Financial Research Working Paper 14-04*, 2014, available online.

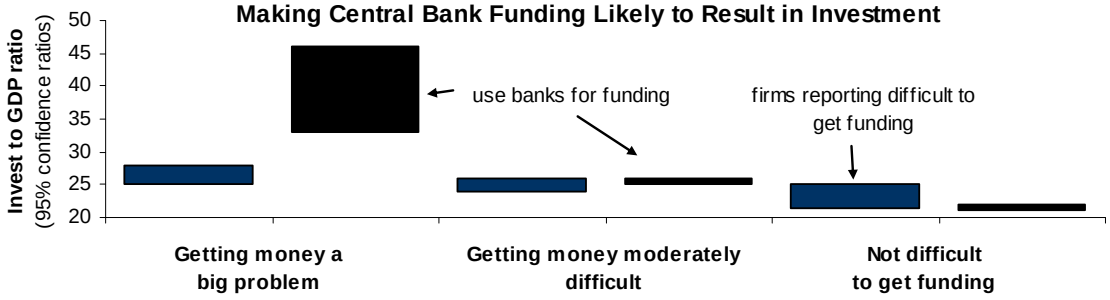
E shows data for something obvious to most investors in international markets. Companies even in rich countries do not receive all the funding they might need to squeeze all the output out of their investments. Figure F moreover shows the extent to which firms have access to finance – and use this finance to invest. In this and other analysis, we find that plenty of credit available when/for firms reporting difficulty obtaining funding. **The large supply of funding and the difficulty of matching credit/money to demand suggests a mismatch which a competent central bank might be able to correct.**

Figure E: Even in Normal Times, Many Firms Cash Constrained



The figure shows the proportion of companies reporting funding as a constraint and the percent of those respondents using banks for finance. The 20% of respondents from low income countries reporting sufficient finance probably reflects businesspersons' and entrepreneurs inability to see up the technological continuum we depict in Figure A. We know that these rates go up greatly during financial and economic crises -- pointing to a clear role for central banks to provide resources.
Source: World Bank (2017)

Figure F: Capital Constrained Firms Seem Most Investment Oriented
Making Central Bank Funding Likely to Result in Investment



The figure shows the 95% confidence intervals for investment to GDP ratios in countries where business report the ease or difficulty of obtaining funds for investment. Roughly a quarter of companies have difficulty obtaining funding. Capital constrained firms often turn to banks - making disfunctional banks a huge problem for these firms.

Which countries would benefit from private securities purchases? In Figure 36, we provided a crude list of countries which might have potentially qualified for such purchases in at least one year, based on public statements by proponents of such funding. Figure G shows these criteria assembled in one place – and the countries which we found have had low inflation, growth, interest rates and high public debts.

Figure G: Roughly 58 Countries Could Qualify to Benefit from Compensated or Uncompensated Central Bank Private Asset Purchases

The authorities we cited in this paper refer to the following list of criteria in order for a country to benefit from unconventional monetary policy – and specifically private securities purchases (as described in this paper).

1. recession or low growth (often after lowering interest rates fails to reignite growth),
2. deflation (making the addition of more money in the economy less inflationary),
3. irreversable and irredeemable commitment to central bank funding (often as a one-time event),
4. traditional policies don't work (ie banks already have too many reserves, interest rates are as low as they can go, etc.),
5. deficits and particularly debts are too high to sell bonds to the central bank in the usual way,
6. people dont save (but invest it on productive activities),
7. liquidity trap (particularly at the zero limit bound) and thus zero interest rates, and
8. asset demand artificially low (due to bubble bursting and related price falls).

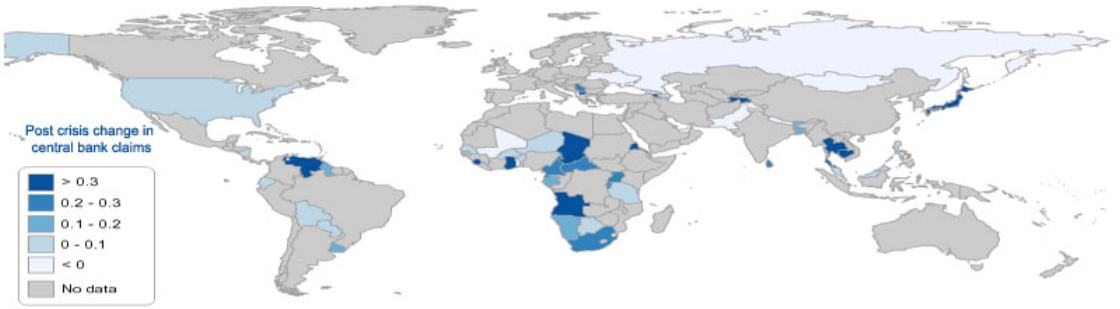
The follow countries in at least one or more years emerged from our crude Excel analysis of low interest rates, low growth, low inflation and high deficits/debt. These countries might thus represent some of the first candidates for unorthodox monetary policy (depending on the corruption and incompetence of their central bank relative to their fiscal authorities).

Aruba	Barbados	Singapore	Guyana	Afghanistan	Tonga	Suriname
Bulgaria	Bosnia and Herzegovina	Solomon Islands	Iran	Angola	Ukraine	Togo
Burundi	Brunei	South Sudan	Iraq	Antigua and Barbuda	Fiji	Equatorial Guinea
Republic of Congo	Central African Republic	St. Kitts and Nevis	Ireland	Maldives	Georgia	Estonia
Guinea-Bissau	Chad	St. Lucia	Japan	Mali	Greece	Yemen
Montenegro	Cyprus	St. Vincent and the Grenadines	Latvia	Nicaragua	Grenada	Zimbabwe
Seychelles	Dominica	Vanuatu	Lebanon	Niger	Macao	Libya
Sierra Leone	El Salvador	West Bank and Gaza	Liberia	Oman	Madagascar	Lithuania
Romania	Samoa					

Results from Preliminary Statistical Analysis

As previously mentioned, serious weaknesses in the data and the methodologies available to analyse them have led us to rely on Bayesian methods. The first weakness (as shown in Figure H) consists of the limited number of countries we could analyse – based on the IMF's availability of central bank balance sheets. As shown in Figure I, correlations between variables turned out as less of a problem that imagined. Few of the variables we analysed statistically significantly correlated with each other – making adjusting them unnecessary. Figure J shows potential non-linearities in the regressions we ran. Again, we do not comment on these – as we do not wish to give regression analysis the impression of veracity.

Figure H: The Limited Number of Jurisdictions Makes Any Results Tentative at Best



The figure shows the jurisdictions we analysed in our study - along with the change in central bank claims post crisis. Data availability constrained our choice of countries - with IMF data on central bank private asset purchases representing the largest constraint.

Figure I: Correlation Between Variables Analysed in this Study

	Valid N	Mean	CB/ GDP	I/Y		Valid	Mean	CB/ GDP	I/Y
Central Bank's Change in private invest	628	0.1	**	**	**CB Quality Independence**	440	0.4	-0.155	0.077
Central Bank's private invest to GDP ratio	573	0.0	**	-0.015	**CB Quality control corruption**	682	1.7	-0.26	0.17
Invest to GDP ratio	669	24.9	-0.015	**	**Funds Savings/GDP**	587	21.8	-0.257	0.398*
Desperation Banks as funders	627	103.5	-.186	.406	**Funding government/ GDP**	672	14.3	-0.19	-0.21
Desperation funding as constraint	627	103.3	.21	.35	**FDI/GDP**	676	4.2	0.178	0.622*
Bank z-score	585	11.1	0.154	-.0016	**Funding Spending/GDP**	669	107.1	-.193	-.219
interest rates (lending)	559	12.9	0.598*	0.11	**CB assets/GDP**	628	0.3	-.024	-.162
Inflation	653	6.7	0.03	0.185	**Assets/GDP (World Bank)**	601	5.7	-.27	-.268
Credit to Private Sector to GDP	670	40.2	-0.211	-.017	**Foreign reserves**	676	35.1	-0.168	-0.164

CB/GDP refers to central bank private asset purchases expressed as a percent of GDP
I/Y refers to investments relative to GDP

Figure J: Pointing Toward the Sloth Effect at Investment/GDP at 27%

(when funding is a medium constraint)

	B-value	p-value	eta squared	non-centrality	break-point 1	break-point 2
Gross savings (as % GDP)	0.80	.00627	0.35	7.18	0.037	.53
Bank Z-score	0.773	0.016	0.15	2.32	-.326	0.558
Lending interest rates	1.83	0.012	0.28	5.09	-.123	0.336
CB Buys as % GDP	-150	0.022	0.41	9.31	4.885	23.4
National expenditure	.62	0.027	.32	6.18		

Explains 84% of data.

The various models of central bank private asset purchases fail to explain the link between these purchases and invest. Figure K shows the regression coefficients for multiple regression—reported unconventionally as a column (rather than on a per model basis). As we described in the main text, we test four configurations of variables – with investment driven by past (lagged) variables, monetary policy (such as interest rates and the availability of credit), available funds from savings, foreign investment and other channels, and the quality of the central bank and banking sector. **We do not wish to place too much emphasis on these regressions, given the very small effect sizes.** Because of these small effect sizes, we used Bayesian methods instead to

Figure K: Effects on Investment

CHANGE in Investment to GDP Ratio	B	Std.Err. - of B	LEVELS of Investment to GDP	B	Std.Err. - of B
Intercept	**0.11**	**0.01**	**Intercept**	**29.75**	**1.32**
CB Change in private invest	-0.01	0.02	CB private invest to GDP ratio	-3.68	5.28
LAG Rate of Change (CB Claims)	0.01	0.01	**interest rates (lending)**	**-0.33**	**0.08**
LAG Change in Invest	0.06	0.04	**Inflation**	**0.19**	**0.06**
Intercept	0.03	0.03	**Credit to PS as GDP**	**-0.03**	**0.01**
CB Change in private invest	-0.02	0.02	Intercept	-0.60	1.35
interest rates (lending)	**0.00**	**0.00**	LAG CB PS Buys as Percent GDP	-1.29	1.99
Credit to PS as GDP	**-0.00**	**0.00**	**LAG Invest as percent GDP**	**0.92**	**0.02**
Funds Savings/GDP	**0.00**	**0.00**	**Funding Spending/GDP**	**0.02**	**0.01**
Balance Assets/GDP (World Bank)	0.00	0.00	**Intercept**	**-32.82**	**3.00**
Intercept	**0.17**	**0.03**	CB private invest to GDP ratio	-3.27	3.58
CB Change in private invest	-0.01	0.02	**Funds Savings/GDP**	**0.59**	**0.02**
Foreign reserves	-0.00	0.00	**Funding government/GDP**	**0.24**	**0.06**
CB Quality Independence	0.01	0.04	**Funding FDI/GDP**	**0.38**	**0.06**
CB Quality control corruption	**-0.02**	**0.01**	**Funding Spending/GDP**	**0.36**	**0.02**
CB private sector as percent of Capital	-0.02	0.13	**Intercept**	**19.39**	**1.41**
Intercept	-0.14	0.08	**CB private invest to GDP ratio**	**-17.88**	**5.35**
CB Change in private invest	-0.01	0.01	**Bank z-score**	**0.17**	**0.06**
Funds Savings/GDP	**0.00**	**0.00**	Foreign reserves	-0.00	0.00
Funding government/gdp	-0.00	0.00	CB Quality Independence	3.28	2.0
Funding FDI/GDP	0.00	0.00	**CB Quality control corruption**	**2.15**	**0.56**
Funding Spending/GDP	**0.00**	**0.00**	**Balance Assets/GDP (World Bank)**	**-0.16**	**0.08**

B refers to the extent to which the independent variable changes for a unit change in the dependent variable. For example, investment changes by -2% as control of corruption worsens.

The next logical question might revolve around whether central bank private asset purchases depend on investment (rather than visa-versa). Figure L shows the regression coefficients for the same combinations of multiple regressions we described previously. As previously, levels respond more actively to the variables in our model.

Figure L: Effects on Central Bank Private Asset Purchases

Change in CB Purchase	B	Std.Err. - of B	p-level	Levels of Purchases	B	Std.Err. - of B	p-level
Intercept	0.13	0.06	0.03	Intercept	0.00	0.00	0.63
Invest change levels	-0.05	0.09	0.59	**LAG CB PS Buys as Percent GDP**	0.80	0.03	0.00
LAG Change in Invest	0.07	0.10	0.42	Invest to GDP ratio	-0.00	0.00	0.21
LAG Invest as percent GDP	-0.00	0.00	0.65	LAG Invest as percent GDP	0.00	0.00	0.24
Balance Assets/GDP (World Bank)	-0.00	0.00	0.80	Funds Savings/GDP	-0.00	0.00	0.77
Intercept	0.07	0.09	0.44	**Balance Assets/GDP (World Bank)**	0.00	0.00	0.02
Invest change levels	-0.10	0.11	0.36	Intercept	0.01	0.01	0.33
Bank z-score	0.00	0.00	0.59	Invest to GDP ratio	-0.00	0.00	0.37
interest rates (lending)	0.00	0.00	0.13	**Bank z-score**	0.00	0.00	0.00
Inflation	-0.00	0.00	0.10	interest rates (lending)	-0.00	0.00	0.81
Credit to PS as GDP	-0.00	0.00	0.30	Inflation	-0.00	0.00	0.93
Funds Savings/GDP	0.00	0.00	0.78	Credit to PS as GDP	0.00	0.00	0.55
Intercept	0.06	0.08	0.43	**Funds Savings/GDP**	-0.00	0.00	0.00
Invest change levels	-0.07	0.13	0.58	**Intercept**	0.09	0.02	0.00
Foreign reserves	0.00	0.00	0.85	**Invest to GDP ratio**	-0.00	0.00	0.00
CB Quality Independence	0.20	0.12	0.09	Foreign reserves	0.00	0.00	0.13
CB Quality control corruption	-0.04	0.03	0.22	**CB Quality Independence**	-0.07	0.01	0.00
Funding FDI/GDP	0.00	0.00	0.47	**CB Quality control corruption**	0.01	0.00	0.05
Balance Assets/GDP (World Bank)	0.00	0.00	0.30	Balance CB Assets/GDP (IMF constructed)	-0.04	0.02	0.11
Intercept	0.05	0.14	0.67	Intercept	-0.01	0.04	0.71
Invest change levels	-0.03	0.09	0.72	Invest to GDP ratio	-0.00	0.00	0.42
Foreign reserves	0.00	0.00	0.55	Funds Savings/GDP	-0.00	0.00	0.74
Funding government/gdp	-0.00	0.00	0.90	Funding government/gdp	-0.00	0.00	0.33
Funding FDI/GDP	0.00	0.00	0.05	Funding FDI/GDP	-0.00	0.00	0.74
Funding Spending/GDP	0.00	0.00	0.84	Funding Spending/GDP	0.00	0.00	0.12
Balance Assets/GDP (World Bank)	-0.00	0.00	0.66	**Balance Assets/GDP (World Bank)**	0.00	0.00	0.00
Invest change levels	-0.08	0.16	0.59				
Bank z-score	0.00	0.00	0.67				
interest rates (lending)	0.00	0.00	0.21	Funding government/gdp	0.00	0.00	0.54
Inflation	-0.01	0.00	0.02	Funding FDI/GDP	0.00	0.00	0.58
Credit to PS as GDP	-0.00	0.00	0.33	Funding Spending/GDP	-0.00	0.00	0.69
Foreign reserves	0.00	0.00	0.50	Balance Assets/GDP (World Bank)	0.00	0.00	0.62
CB Quality Independence	0.16	0.13	0.21	Funds Savings/GDP	0.00	0.00	0.89
CB Quality control corruption	-0.03	0.05	0.44				

B refers to the extent to which the independent variable changes for a unit change in the dependent variable. For example, investment changes by -2% as control of corruption worsens.

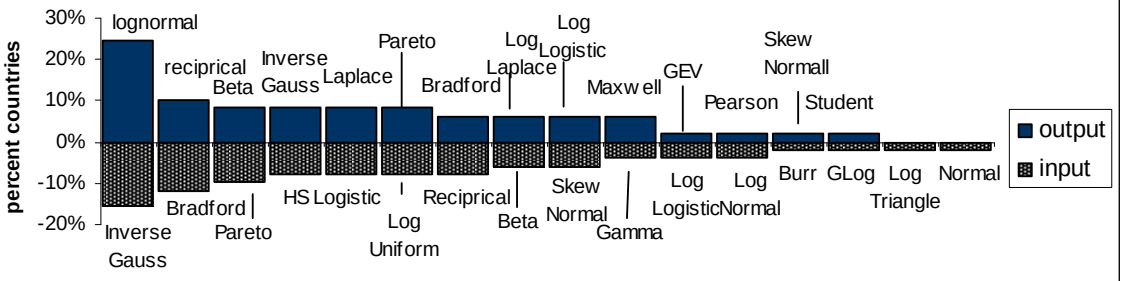
Making the Bayesian estimates

We start with central bank private asset purchases as a percent of investment in each economy i in each year t or $y_{it}=\Delta(P/I)_{it}$ as the independent variable. Total central bank assets as a proportion of GDP represents the dependent variable – or $x_{it}=\Delta(C/Y)_{it}$ Assuming that these pairs for each year t represent random draws from a stable distribution, then each we can represent $\mathbf{z}[t] =[y_t\ x_t]$ for the 10 years covered, drawing t from a uniform distribution from t=1 to t=10. In other words, each pick resulted in two cells with x and y side by side. From **z**, we could calculate $b(j)= (y_i\text{-}a\text{-}e)/x$ – or slopes from each of these bootstrapped values. We calculated 25 of these slopes such that j ranged from 1 to 25 for each country *i*. We used maximum likelihood methods to fit a distribution to these 25 data points. Roughly speaking, the best distributions represent the one that minimises the difference between the values predicted by the distribution and the actual data. The HS distribution represented the best fitting distribution for almost all these data.

With these distributions, we could draw 25 observations from each distribution and find an average. From there, we could simulate 1000 such averages, and draw a histogram showing these averages. Each of these histograms has a mean and 95% confidence intervals on the positive and negative sides.

The spider plots followed roughly the same methodology. We fit a distribution around each of the annual rates of change (none of which exhibited drift of any kind). Figure G shows the distributions these followed. We then simulated 1000 times the relationship between these two distributions, under the assumption the correlation remains the same.

Figure M: Can You Know the Effect of Central Bank Private Asset Purchases By the Distribution They and Investment Follow?



The figure shows the distribution of best fit (the maximum likelihood distribution) for changes in central banks' private asset purchases relative to investment and these banks' total assets relative to GDP. Explaining why each jurisdiction's firms and central banks react differently remains a core challenge of unconventional monetary policy analysis.