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# Central Bank Asset Purchases I: The Theory

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In the face of interest rates having hit their zero lower bound in major economies, large-scale asset purchases have become an important weapon of central banks in recent years. It is, however, not clear whether and under which circumstances such policy measures produce the desired effects. This round-up provides a selective overview of theoretical research that has been devoted to understand under what conditions central bank asset purchases lead to reductions in longer-term interest rates and produce stimulating effects on the overall economy.

## The Lower Bound on Conventional Monetary Policy

The central bank's *operational target* is a variable that (i) can be effectively controlled by the central bank in order to achieve *ultimate targets* such as price stability or full employment, and (ii) provides a sufficiently clear signal about the central bank's monetary policy stance (Bindseil, 2014). Usually, the central bank's operational target is the overnight interbank rate that the monetary authority steers directly by changing its policy rate. In normal times, the monetary transmission channel then starts by variations in the central bank's policy rate which lead to immediate changes in the overnight interbank rate. These changes are transmitted to long-term rates and further affect asset and goods prices, consumption, saving and investment decisions. This brings about variations in aggregate demand, eventually leading to price and/ or employment changes, thereby producing the desired level of the ultimate target(s), e. g. the inflation rate or the employment rate. This view of the monetary transmission mechanism is formalized in the so-called New Keynesian model which is the backbone of a large body of theoretical as well as empirical models in economics and applied policy work, see e.g. [Clarida, Gali and Gertler \(1999\)](#), Gali (2009), or the seminal Woodford (2003).

But: Nominal interest rates cannot become negative. When the policy rate has been lowered to zero, conventional interest rate policy has reached its limits. Large-scale asset purchases by central banks are widely considered to be one means of overcoming this "zero restriction": By purchasing certain long-term assets central banks should affect their prices and yields, thereby exerting direct control over long-term interest rates.

## Wallace Neutrality

What are the conditions conducive for such operations to induce changes in asset prices and yields? To answer this, it may be useful to look at first at situations where *no such effects* occur. [Wallace \(1981\)](#) and [Eggertsson and Woodford \(2003\)](#) provide benchmark neutrality results. They show that if the government changes its balance sheet by purchasing assets – while holding the path of government expenditures and the income distribution fixed – the equilibrium level of household consumption and the equilibrium price level remain unchanged. In this sense, asset purchases are *irrelevant* and the economy is characterized by *Wallace neutrality*. As pointed out by [Woodford \(2012\)](#), this result mainly depends on the following assumptions: (i) investors value assets just for pecuniary returns; (ii) every investor can trade arbitrary quantities of an asset without facing binding constraints on her position; (iii) investors are homogeneous and hold identical portfolios, i.e. there exists a *representative investor*.

To understand why purchases are *Wallace-neutral*, consider the central bank buying, say, a risky asset. Although the representative investor selling the asset thereby disposes of any direct exposure to the risk, it does not vanish from the economy but rather sits in a new place. The difference being that in unfavorable states of the world it is now the central bank's earnings and consequently – as the central bank's balance sheet is just a part of the government's consolidated balance sheet – the government's income that are being reduced. To make up for the lower transfers of earnings from the central bank the government has to increase taxes, implying that the private investor's disposable income is still as dependent on the asset's payoff profile as before the sale. Moreover, the representative investor only cares about what she can afford with her income, i.e. her consumption stream. Given that she does not face any restrictions on asset trades (assumption (ii) above) she will acquire other assets whose combined payment streams allow her to keep her desired consumption profile unchanged. Any effects of central bank asset purchases will thereby be immediately offset by investors' adjustments of their portfolios.

## Portfolio Balance Channel and the like

Wallace neutrality is thus based on the premise that private investors see “assets held by the government and by the central bank as indistinguishable from their own assets” ([Joyce et al., 2012, F276](#)). Conversely, central bank asset purchases can have effects only in situations where investors are not indifferent with respect to switches in their portfolios, i.e. with respect to exchanges of assets held by the private sector for newly created central bank money. In such cases, the ensuing *portfolio re-balancing* may create non-neutral asset price effects, meaning that prices and yields of various security types must adjust. For this *portfolio balance channel* to be effective, the key assumptions needed for Wallace neutrality have to be modified. In this respect, the literature stresses, in particular, *credit restrictions* and *heterogeneity across investors*. Early work by James Tobin ([1961, 1963, 1969](#)) or [Brunner and](#)

Meltzer (1973, 1993) highlight the fact that assets may only be imperfectly substitutable so that the central bank “(...) may influence the demand for [such] securities indirectly by altering yields of marketable debt instruments” (Tobin, 1963, 148). Portfolio adjustments in response to asset purchases occurred also in the above described neutrality benchmarks. However, these were such that any price effects were immediately undone. But with private investors being heterogeneous, i.e. preferring different asset portfolios, prices and yields will adjust so as to make investors *in the aggregate* willing to accept the changes in relative asset supplies and the relatively larger amount of central bank money in circulation.

The *preferred habitat theory* of Modigliani and Sutch (1966), more recently formalized by Vayanos and Vila (2009), ascribes such investor heterogeneity to different preferences for securities with different maturities: For example, while pension funds tend to invest into very long-term securities, a bank’s treasury department demands much more liquid, shorter maturities. One implication of preferred habitat is that financial markets are segmented since each maturity is essentially traded in a separate market. When the central bank purchases, say, assets with a long maturity, it creates excess demand for long-term assets, so that their relative price goes up and their yield declines.

Curdia and Woodford (2011) impose investor heterogeneity by endowing investors with differing degrees of impatience to consume, thereby creating a role for financial intermediation. The intermediaries are assumed to be financial specialists whose access to funding is constricted due to having only a limited amount of own capital. Curdia and Woodford then analyze the impact of central bank purchases of privately issued assets (*credit easing*), and government bond purchases (*quantitative easing*). They show that the former type of purchases can indeed be welfare-improving in the face of financial market disturbances, while the latter type of purchases does not have any effect. The driving force behind this result is their assumption that central bank money and government bonds are perfect substitutes. Consequently, exchanging one for the other has, by definition, no impact on prices and yields. Purchases of privately issued assets, however, may mitigate financial market disruptions that would otherwise impair needed financial intermediation.

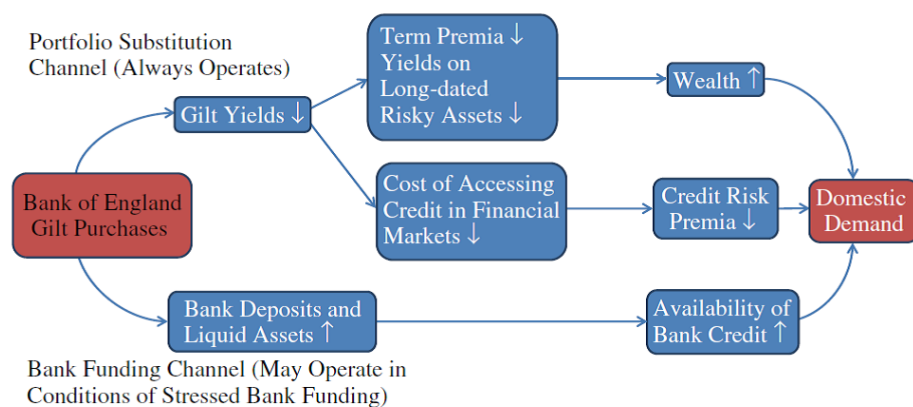
In a similar fashion, Gertler and Karadi (2011) and Gertler and Karadi (2013) focus on binding balance sheet constraints of financial intermediaries as one of the main rationales for the effectiveness of unconventional monetary policy. They interpret central bank asset purchases as a particular type of financial intermediation that can enhance the private sector’s access to credit in times of crisis when private balance sheet constraints become tighter. Essentially, the central bank can obtain funding much more elastically than private banks and thereby it can reduce the cost of credit and prevent aggregate demand from deteriorating. Gertler and Karadi further consider the possibility of the central bank injecting equity into banks in order to prop up their capital base and therefore indirectly enhance credit supply. Whether central banks should decide to inject equity or to provide credit depends on the

particular situation in which banks operate. For example, when financial institutions deal in rather complex commercial and industry loans that require a high monitoring effort, the central bank should loosen balance sheet constraints by injecting equity rather than by engaging itself in the loan business.

[Araujo et al. \(2015\)](#) focus on asset purchases in a general equilibrium model with endogenous collateral constraints in the spirit of [Geanakoplos \(1997\)](#). These constraints impose endogenously determined requirements on the amount of collateral that agents have to maintain to back privately issued assets. If these constraints are non-binding, asset purchases are irrelevant and a type of Wallace-neutrality result emerges. This changes when constraints are binding, so that they prevent certain mutually beneficial transactions from taking place. How do central asset purchases affect such situations? Araujo et al. point out that their effects crucially depend on the investor's specific situation: While it may sometimes be the case that purchases tighten constraints further, they can relax them in other circumstances. Moreover, it becomes also possible that central bank purchases affect asset prices, but they need not necessarily do so. The respective conditions under which purchases are indeed welfare-improving are rather complex; however, Araujo et al. provide some inescapable truths for overly enthusiastic proponents of unconventional monetary policy: "Once a sufficient fraction of the total supply of the asset is held by the central bank (...) purchases will tighten financial constraints (...) and contract aggregate demand." Hence their conclusion that one should not erroneously infer from the usefulness of small-scale asset purchase programs that ever larger purchases are consequently even more useful.

### **Bank Funding Channel**

Besides the operation of the portfolio re-balancing and related mechanisms, [Joyce et al. \(2012\)](#) also point to the existence of a *bank funding channel*. A bank's credit supply is a function of a large array of different variables; among other things it is influenced by the availability of liquidity for refinancing the loans granted to customers. Since central bank asset purchases essentially replace longer term assets with highly liquid central bank money, banks' refinancing possibilities and thus the ability of the bank to provide credit are enhanced. The bank funding channel tends to be more effective (a) during a crisis, when money markets function poorly and banks face a general shortage of liquidity; (b) whenever banks receiving central bank liquidity display a longer debt maturity structure, i.e. have been financed by more long- and less short-term debt; otherwise they would likely hoard the liquidity, rather than extending new loans, in order to build a cushion against sudden withdrawals of short-term funds. The joint operation of portfolio re-balancing and bank funding channel is illustrated in Fig. 1 below.



Joint operation of portfolio balance and bank funding channel, *Source: Joyce et al. (2012).*

### Communication Channels

Modern central banking is at least as much about words as about deeds (see e.g. the survey by [Blinder et al., 2008](#)). Consequently, the empirical literature emphasizes the importance of central bank communication for the impact of asset purchases. The central bank's operational target tends to lose power as a reliable signal of the overall monetary policy stance when the zero lower bound has been reached. A proper and credible communication policy accompanying the introduction and implementation of asset purchases may therefore act as a substitute in communicating the monetary policy stance and help to shape expectations about future policy behavior. Two channels may be mentioned here: an *announcement channel*, as well as a *signaling channel*. As central bank communication crucially influences the expectations of future interest rates, *announcements* of asset purchases, with the stated intent to keep interest rates low for a considerable period of time, may produce a revision in interest rate expectations. Following the expectations hypothesis of the term structure, which holds that long-term interest rates are determined by the sum of actual and expected short-term rates, revisions of expectations about future policy rates should therefore lead to a shift in the yield curve. In addition, actual purchases then may give credence to such statements and may provide a credible *signal* that the central bank will indeed keep its interest low even after the economy has recovered. For example, as emphasized by [Clouse et al. \(2003\)](#), when the central bank purchases long-term fixed-income assets whose value is particularly sensitive to changes in interest rates it may take losses on its asset holdings once it raises its policy rate subsequently. If investors believe that the central bank will seek to avoid losses on its asset positions, they will therefore credibly believe that interest rates will stay low at least until the potential valuation losses from higher rates become sufficiently small.

## Conclusion

Although still considered unconventional, large-scale asset purchase programs have by now become an essential part of the toolkit of most major central banks. It is therefore important for all economic policy makers, not only for the practitioners in central banks, to understand whether and under which circumstances such purchase programs can be effective. Although research on this question has progressed considerably in recent years, many issues are still unsettled and the results coming out of the existing literature are overall quite ambiguous. It is therefore safe to say that the analysis of the effectiveness of central bank asset purchases will remain one of the most contentious issues in financial economics and macroeconomics in the coming future. In the meantime, overly confident assertions by central banks about the effectiveness of their purchase programs should be taken with a pinch of salt.

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