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Maximizing price stability in a monetary economy

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Working Paper No. 864

Maximizing Price Stability in a Monetary Economy*

by

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ABSTRACT

In this paper we analyze options for the European Central Bank (ECB) to achieve its single mandate of price stability. Viable options for price stability are described, analyzed, and tabulated with regard to both short- and long-term stability and volatility. We introduce an additional tool for promoting price stability and conclude that public purpose is best served by the selection of an alternative buffer stock policy that is directly managed by the ECB.

Keywords: European Central Bank; Monetary Policy Tools and Price Stability; Buffer Stock Policy

JEL Classifications: E52, E58

1. INTRODUCTION

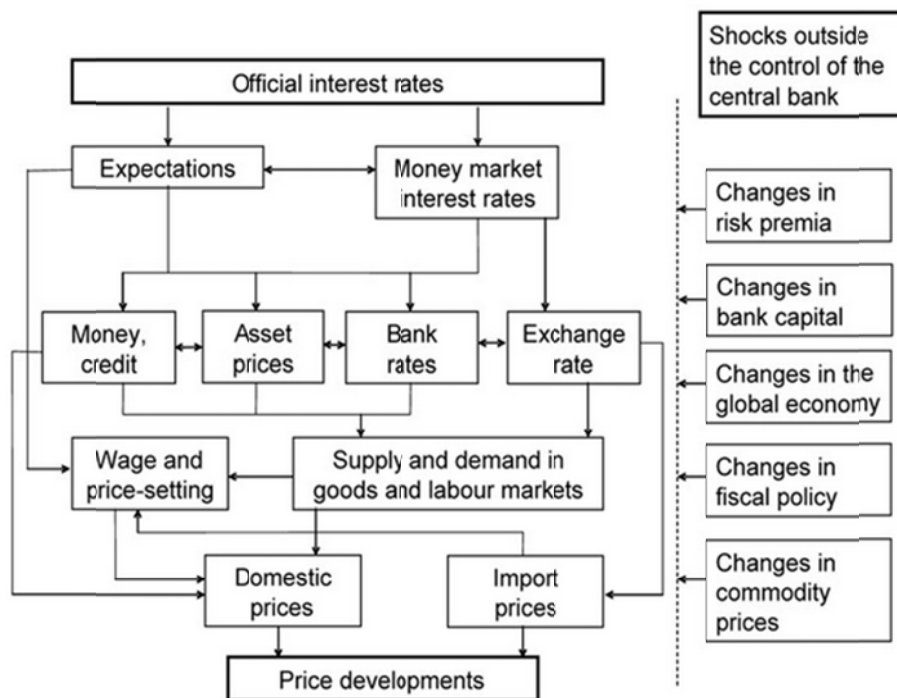
Article 127 of the Treaty on the Functioning of the European Union establishes that the primary objective of the European Central Bank (ECB) is to maintain price stability. Other policy goals related to the objectives laid down in Article 3 of the Treaty on the European Union, including “full employment” and “balanced economic growth,” are supported by the ECB but “without prejudice to the objective of price stability.”

While the Treaty does not give a precise definition of what is meant by price stability, the ECB’s Governing Council has clarified that price stability implies maintaining a year-on-year increase in the Harmonized Index of Consumer Prices (HICP) for the euro area below but close to 2% over the medium term.

The central bank is the monopoly supplier of the euro monetary base (banknotes and bank reserves). By virtue of this monopoly, it sets the conditions at which banks borrow from the central bank. The central bank thereby manages liquidity in money markets and also influences the terms and conditions at which banks trade with each other in this market (the money market interest rates).

In turn, in the short run, a change in money market interest rates induced by central bank policy sets in motion a number of mechanisms and actions, which, ultimately, are presumed to influence developments in economic variables, such as output and prices, through a highly complex transmission mechanism.

Figure 1: European Central Bank Operational Framework



Source: <https://www.ecb.europa.eu/mopo/intro/transmission/html/index.en.html>

However, setting a short-term interest rate target judged appropriate for achieving price stability is not the only monetary policy instrument the ECB uses to achieve its aim.

Additionally, the operational framework includes a set of instruments and procedures that can be utilized to alter a desired term structure of interest rates and their transmission to the economy, generally through the banking system. To this end, the ECB may:

- (i) buy and sell outright (spot and forward) or under repurchase agreements and lend or borrow any type of marketable instruments (therefore including sovereigns) in any currency as well as precious metals; and
- (ii) conduct credit operations with credit institutions and other market participants, with lending based on adequate collateral.

The operational efficiency of the central bank is a function of the ability of the operational framework to enable monetary policy objectives to feed through as precisely and quickly as possible to short-term money market rates.

Success rests on two presumptions. The first is that the ECB mandate—the price level—is a function of interest rate policy. The second is the more general notion that by keeping inflation stable economic activity can be, for all practical purposes, as close as possible to its potential. Therefore, by focusing on the single mandate of price stability, policymakers are at the same time and by that same policy promoting their desired levels of output and employment. And while the empirical coincidence between stable inflation and potential output may lack confirmation, the theoretical causation is considered sufficient justification for the primary policy focus to be that of price stability.

The second presumption is that while it is presumed inflation is a function of the term structure of interest rates—the policy variable of the ECB—it is further presumed that interest rates work through the inflation expectations channel, with inflation presumed to be a function of inflation expectations. That is, the monetary policy channel is guiding economic agents' expectations of future inflation. And, towards that same end, a central bank with a high degree of independence and credibility promotes the anchoring of expectations of price stability. Therefore central bank policy is designed to anchor expectations of price stability so that economic agents do not increase their prices for fear of higher inflation or reduce prices for fear of deflation, thereby promoting continuing price stability.

Integral to this process is the rate of unemployment, with the presumption that lower rates of (cyclical) unemployment promote pressure for wage increases and therefore higher inflation expectations, and higher rates of unemployment lower wage pressures and therefore promote lower inflation expectations. In fact, there is a presumed level of (structural) unemployment called the NAIRU (non-accelerating inflation rate of unemployment) below which it is further presumed that inflation will accelerate. Therefore, the policy for price stability is directed at determining that minimum rate of unemployment and enacting policy to ensure unemployment remains above that minimum level.

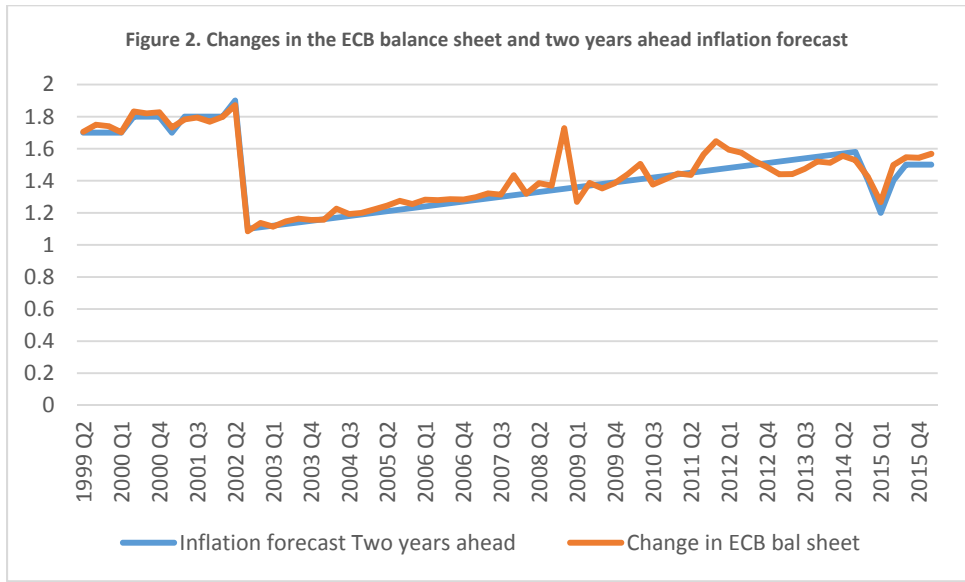
The macroeconomic developments during the crisis that started in 2007 have brought into question both the primary argument for inflation targeting along with the instruments used by the ECB to pursue their price stability mandate in the eurozone. Additionally, the relationship between unemployment and inflation has been called into question.

From the beginning of the crisis, in most of the advanced economies inflation has remained close to the range observed before the crisis, despite the large cumulative decline in output relative to trend, and the sharp increase in unemployment during the same period. It had previously been assumed that an increase in the output gap of this magnitude would have induced a much more rapid and larger decline in the rate of inflation than the gradual decline that has been observed, along with a high probability of substantial deflation. The weak relationship between the output gap and inflation during the crisis suggests that price stability as mandated may be consistent with large and undesirable increases in the output gap.

In addition, the crisis has shown that the nominal policy interest rate—the primary tool for achieving mandated price stability—can reach what’s called “the zero lower bound” and thereby limit a central bank’s ability to lower their nominal policy rate. Consequently, to affect prices and output, central banks have experimented with unconventional policies including quantitative easing, targeted easing, negative interest rates, and new forms of liquidity provisioning. On January 22, 2015, for example, the ECB announced a quantitative easing program, including the purchase of at least 1.14 trillion in euro securities over two years, in an attempt to increase the rate of inflation in the euro area from near zero to its target of 2% over the medium term (Micossi 2015).

However, as figure 2 shows, it does not seem that this program is capable of affecting inflation expectations as were presumed to be required for achieving price stability. Indeed, since the period quantitative easing implementation began in the euro area the gap between the change in the ECB balance sheet and the two years ahead inflation forecast, the ECB’s critical determinant, increased.

Figure 2. Changes in the ECB Balance Sheet and Two-years Ahead Inflation Forecast



Source: ECB Data Warehouse

The lack of correlation between price stability and desired levels of output and employment has led some authors (e.g., Blanchard et al. 2013) to ask whether central banks should explicitly target activity. Cited are the mandates of the Federal Reserve and the Bank of England, which include an employment mandate on an equal basis with price stability. However, while both the US and UK economies have outperformed the euro zone subsequent to 2008, it is far from definitive that it was central bank policy that was responsible for the difference.

In this paper, we first argue that fiat currencies (such as the euro) ultimately and necessarily rely on a managed buffer stock policy to achieve price stability and other ancillary objectives. The general history of buffer stock policies, in fact, dates back to biblical times. We examine a variety of these policies, including those that utilized grains, precious metals, and other currencies as buffer stocks for price stability, as well as the current policy of using a buffer stock of unemployed labor and excess capacity in general to achieve price stability. Included is a vector autoregression (VAR) analysis of the policy tools used to manage buffer stock policies, and the costs and benefits associated with those policies.

We conclude that a fixed-wage employed buffer stock policy is the unambiguously superior policy option with regard to the ECB's primary objective of price stability, as described in Article 127 of the Treaty on the European Union. Incidentally, this policy contributes to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on the European Union. Specifically, we propose that the ECB adopt an employed buffer stock policy to optimize compliance with mandated objectives.

The paper includes ten sections. Section 2 states the purpose of the paper, and section 3 sets the criteria for the choice among alternative buffer stock tools. Section 4 discusses current monetary policy and section 5 presents empirical evidence on the impact of this policy. Section 6 compares the labor buffer stock policy to current policy, and section 7 describes the role and operation of the employed buffer stock wage. Section 8 adds further considerations on the labor buffer stock policy and section 9 evaluates the costs and benefits of this policy, as well as the likely impact on inflation and the growth rate. The final section concludes the paper.

2. STATEMENT OF PURPOSE

The aim of this paper is to show first that a buffer stock policy that uses employed labor at a fixed wage as a buffer stock functions as a superior price anchor than a buffer stock that employs commodities. We then show further that an employed labor buffer stock provides a superior price anchor than that achieved by the ECB's current policy, which utilizes a buffer stock of unemployed labor to stabilize prices.

a. Buffer Stock Policy Definition

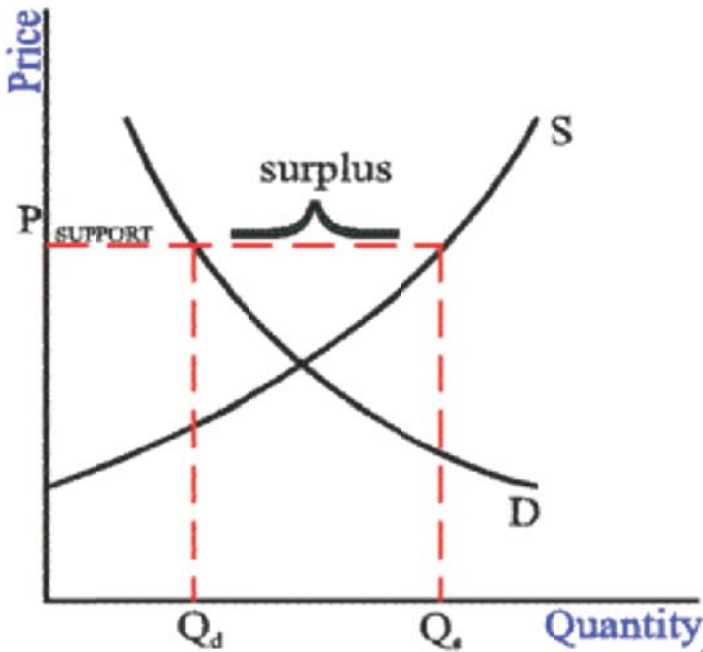
We define a buffer stock policy as a policy of buying a commodity or currency at a support price while at the same time offering to sell that commodity or currency at the same price or a slightly higher price, for the further purpose of promoting price stability. In a competitive market economy, prices continuously adjust to reflect relative values, which are also known as indifference levels. A buffer stock policy utilizes the setting of one price—the price of the buffer stock—and allowing all other prices to reflect relative values.

Note that this means the object of the buffer stock policy can always be monetized at the support price, and in that sense the object of the buffer stock policy is always what can be called “fully employed” as it can always be “sold” to the monetary authority at that price.

b. Vulnerabilities

Buffer stock policies face two risks. The first risk is that the support price results in an unwelcome increase in supply and quantity purchased at that support price. The purpose of the support price is to prevent the commodity or currency from exchanging at a price lower than the support price, hence the label “support price.” Furthermore, the reason the government is able to purchase the buffer stock at that price in the first instance is that market forces have determined the relative value of that commodity or currency is at or lower than the support price. That is, purchases at the support price indicate that the support price is higher than where the intersection of supply and demand would be for that commodity absent the government intervention. This above-market price then results in an increase in supply to the extent the supply curve is upward sloping.

Figure 3: Equilibrium with “Support Price”



Source: <http://www.colorado.edu/Economics/courses/econ2020/section4/gifs/fig39.gif>.

In figure 3, market forces would lead to the combination of price and quantity at the intersection of D and S. By fixing a support price (P_{support}) above the market equilibrium price, the government moves the equilibrium to $(P_{\text{support}}, Q_s)$, and consequently must buy the surplus of supply at the support price in order to maintain its chosen price level.

Therefore, the potential problem is that (for an extreme example) a support price for a wool buffer stock could result in the streets being overrun with sheep. Furthermore, with a buffer stock policy such as a gold standard, for example, where gold becomes the object of taxation with the further purpose of increasing the buffer stock, human endeavor is then directed at procuring gold for storage, which may not be deemed to support public purpose.

The second risk is financial. A government pursuing a buffer stock policy faces the possibility of substantial increases in public spending to purchase the object of the buffer stock. This becomes part of the process that evidences the downward shift in the value of the object of the buffer stock relative to all other goods and services, a process commonly called “inflation.” And in the case of a fixed exchange rate policy, where the currency itself is supported by its own buffer stock (such as gold or another currency), increased expenditures used to support an additional buffer stock (such as grains or wool) can cause a loss of gold or foreign currency reserves for the monetary authority.

3. SELECTING A BUFFER STOCK

The value of fiat currency in a market economy is directly or indirectly tied to a buffer stock policy, with the monetary authority attempting to utilize its available tools to influence the general price level, stability, and other characteristics of the currency, which ultimately reflect those of the underlying buffer stock.

In this section we analyze a selection of potential buffer stocks for price stability and liquidity. For price stability we use nominal prices. Additionally, we provide a comparison of liquidity, defined as the required quantity of the buffer stock an external entity would historically have

needed to purchase to shift the relative value of that commodity by 1%. This is done only by narrative, as we found it impossible to quantitatively differentiate specific causes of price changes. However, while this determination of liquidity is at best imprecise, the magnitudes of the differences between the contending commodities were sufficiently large for a useful distinction.

a. Volatility

Four buffer stock options were selected—gold, silver, corn, and hourly labor. Additionally we included data from the Commodity Research Bureau (CRB) index, a combination of numerous commodities, for general background information. The first three commodities were selected because they have been used historically and gold has been the object of more recent proposals as well, including proposals to return to a gold standard. The fourth, an employed labor buffer stock, is a derivative of our current policy of utilizing unemployment as a buffer stock, which will be used as a basis of comparison after the analysis of the four options selected.

The table below displays measures of volatility of the buffer stock options.

Table 1: Volatility of Potential Buffer Stocks

	Average annual price change (AV%)		
	1984–1994	1994–2004	2004–2014
Gold	10.3%	8.5%	17.9%
Silver	14.3%	11.7%	31.8%
Corn	22.0%	17.3%	22.3%
CRB	7.4%	6.5%	13.6%
AHE	2.9%	3.3%	2.7%

Source: Bloomberg

Table 1 reports the average annual price change of gold, silver, and corn. In addition, there is the average annual change of a price index of selected commodities monitored by the CRB. We display this index as representative of an example of how the price of a basket of commodities fluctuates over time. Finally, we present the average annual change in hourly earnings (AHE) of production and nonsupervisory employees, provided by the US Bureau of Labor Statistics. The

price change of the commodities does appear less severe than gold, corn, or silver; however, the annual changes range from over +35% to approximately -25%. The average hourly earnings display far lower volatility than the metals or commodities. The year-over-year change has fluctuated from a low of about 1.5% to a high of just over 4% since 2000, and only once went to just over 9% in the early 1980s.

With a buffer stock policy the nominal price of the buffer stock is defined by the state, and in our proposal it would be defined by the ECB per its mandate for price stability as specified in the Maastricht Treaty. Subsequently, market forces result in other prices continuously reflecting indifference levels that express relative value with regard to the value of the buffer stock.

Likewise, with the nominal price of the buffer stock fixed, any change in the relative value of the buffer stock itself is expressed as a change in the nominal price level of all other prices.

Therefore the lower the price volatility of the selected buffer stock in the current policy, the greater the expected general price stability when the price of that buffer stock is, in our proposal, fixed by the ECB. On this basis, the employed labor buffer stock is clearly superior.

b. Liquidity

For purposes of this analysis, we define liquidity as the resistance to price changes for a given amount of buying or selling. Whereas the purpose of the buffer stock is to provide price stability, we judge a buffer stock to be superior if its price is less altered by a given volume of buying or selling. We abbreviated this analysis, as the liquidity of an employed buffer stock dwarfed the other options by orders of magnitude, rendering the outcome self-evident.

c. Market Capitalization

We next calculate the “market capitalization” of the new supply offered for sale annually of each potential buffer stock as a comparative indication of the quantities that might need to be purchased or sold to influence price. Again, we look at how a given purchase would influence the price of gold, corn, and labor in the recent past when they were not the object of a buffer stock policy as an indication of the stability of their relative value.

Assuming there are approximately 170 million Europeans working at the average wage of €21 per hour, with an average workweek of 35 hours, their weekly income amounts to approximately €110 billion, or a wage bill of about €5.5 trillion annually.

In contrast, annual global gold mining totals about 2,500 tons, which is 80 million ounces, and at €966 per ounce equals €77.2 billion in annual sales; fourteen billion bushels of corn at €3.5 per bushel equals only €49.2 billion in annual sales. Therefore, on the basis of our measure of “market capitalization,” we conclude that an employed labor buffer stock will be a superior price anchor for the euro.

The above analysis indicates that the employed labor buffer stock is dramatically superior with regards to both historical price stability and liquidity. Additionally, the current socioeconomic reality is that a labor buffer stock is not subject to the first traditional risk of buffer stock policies. That is, employing labor in a transitional job is not expected to result in a commensurate growth in population, the way a gold or silver standard can result in new mining and hoarding, or a corn buffer stock can result in an increased corn surplus.

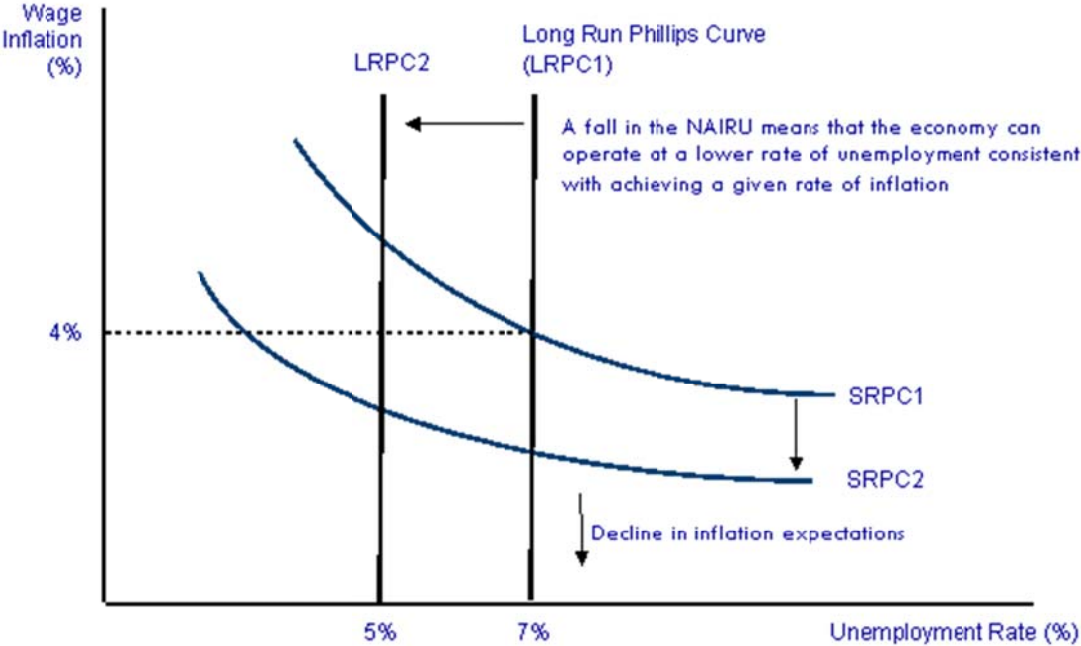
Nor, as further analyzed, does the expenditure related to the employed labor buffer stock policy pose any financial solvency risks to a government with a floating exchange rate policy.

4. CURRENT POLICY

For all practical purposes the euro uses unemployment (a measure of the output gap) as a buffer stock to promote price stability, enacting policy designed to increase unemployment (the size of the buffer stock of unemployed) when inflation is deemed to be too high, and enacting policy to decrease unemployment when higher rates of inflation are desired. Specifically, the ECB uses its policy tools to (indirectly) promote alterations in the unemployment rate for the further purpose of promoting price stability. The theory is that of the Phillips curve, where inflation is a function of the level of unemployment, with lower unemployment an inflationary bias and higher unemployment a deflationary bias. It is further assumed that the curve shifts both in slope and

along the y-axis with alterations to the institutional structure. Furthermore, a NAIURU is presumed, where inflation accelerates when unemployment goes below that point. This acceleration is presumably caused by accelerating inflation expectations triggered by the low rate of unemployment, which triggers the two primary drivers of inflation expectations—demand for higher wages and accelerated spending. Figure 4 is a typical Phillips curve.

Figure 4: Long-run and Short-run Phillips Curve



Source: http://tutor2u.net/economics/content/essentials/phillips_curve_clip_image004.gif

ECB policy initiatives are designed to shift the economy’s position on the curve, while other government policies—such as what are called “structural reforms”—along with demographic changes, work to shift the curve. So while the policy instrument is the term structure of interest rates, the cause of inflation is inflation expectations, which can be altered directly by the influence of interest rate policy, as well as by the influence of the level of unemployment on inflation expectations.

The monetary link between interest rates and unemployment is through credit channels. Higher rates are presumed to reduce the desire and ability to borrow to spend on real goods and services for both consumption and investment, thereby reducing sales, output, and employment.

Conversely, lower rates are presumed to increase desires to borrow, thereby increasing sales, output, and employment. In particular, investment has traditionally been assumed to be largely a function of interest rates. Furthermore, the link between interest rate policy and output and employment has been deemed sufficiently robust to the point where it's presumed monetary policy can be utilized to sustain desired levels of output and employment, with national governments budgeting fiscal surpluses to reduce their national debts.

The last several years have provided substantial empirical evidence with regard to several previously presumed causations.

In addition to inflation being less sensitive to changes in output and employment than presumed, the link between interest rates, inflation, investment, output, employment, and even credit expansion itself appears to have been largely severed as well. After over five years of a near-zero-percent rate policy, and more recently quantitative easing and negative rates, private-sector credit expansion remains depressed and has not been the presumed driver of investment, consumption, or inflation, as the output gap remains alarmingly wide and the monetary system borders on deflation. Along with the exceptional magnitude of the real output lost from what has the appearance of permanently elevated levels unemployment, the political pressure generated by the negative externalities of unemployment have intensified as well. The outcomes of the last several years have also largely obviated the proposals of Blanchard et al. (2013) regarding the expansion of the ECB's mandate, as the evidence calls into question assumptions that the proposed ECB's mandates are a function of its available policy tools. Consequently, the unemployed buffer stock concept per se has become highly problematic.

Interest rates were lowered aggressively after credit growth ended.

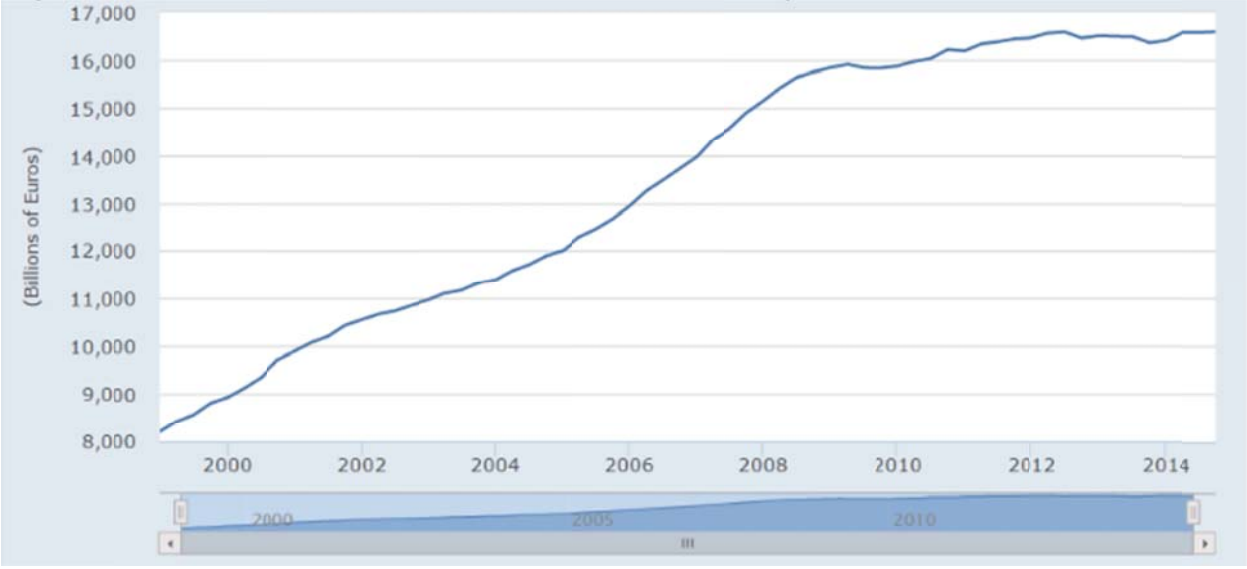
Figure 5: Three-month London Interbank Offered Rate (LIBOR) (based on the euro)



Source: ICE Benchmark Administration Limited (IBA)

However credit growth has yet to resume.

Figure 6: Total Credit to Private Non-financial Sector, Adjusted for Breaks (for euro area)



Source: Bank for International Settlements

Unemployment rose as credit expansion ended and remains elevated.

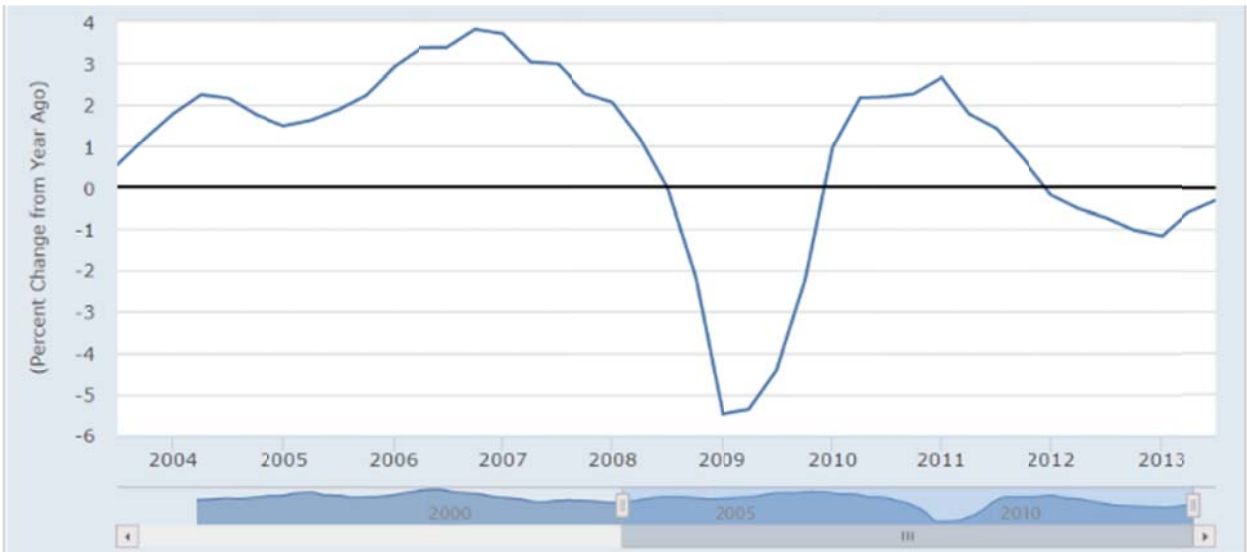
Figure 7: Harmonized Unemployment: Total for All Persons in the Euro Area



Source: Organization for Economic Co-operation and Development

And output remains depressed.

Figure 8: Gross Domestic Product by Expenditures in Constant Prices: Total Gross Domestic Product for the Euro Area



Source: Organization for Economic Co-operation and Development

This sequence of events has been supported very recently by *The Economist* (2016: 9). It states that “For all the cheap money, the growth in bank credit has been dismal. Pay deals reflect expectations of endlessly low inflation, which favors that very outcome.”

5. EVIDENCE ON THE IMPACT OF THE ECB MONETARY POLICY

In this section we provide empirical evidence with regard to the ECB monetary policy in the euro area. The aim of this exercise is only to give an idea of the history of monetary policy, inflation, and growth in the euro area, and, based on the ECB’s own functions and assumptions, of the likely impact the ongoing ECB quantitative easing program can have on growth and inflation in the next two years.

The success of conventional and unconventional monetary policies in achieving price stability, given the assumptions that price stability is a function of rates and expectations, further relies on the working of two transmission mechanisms: 1) the ability to affect relative prices of long-term securities relative to short-term securities; and 2) the ability to bring inflation expectations toward the targeted level (see figure 1).

To estimate to what extent these mechanisms may be presumed effective, we tested a vector autoregression (VAR) model with quarterly data from 1999I to 2015IV for the euro area. We also performed a forecasting exercise, assuming the ECB will increase total assets by €60 billion per month until the end of 2017.

The VAR model we consider is:

$$Y_t = \alpha + A(L)Y_{t-1} + B\varepsilon_t, \quad (1)$$

where Y_t is a vector of endogenous variables, α a vector of constants, $A(L)$ is a matrix polynomial in the lag operator L , and B is the contemporaneous impact matrix of the mutually uncorrelated disturbances ε . In our specification, the vector of endogenous variables (Y_t) comprises three

variables: the log of seasonally adjusted real GDP, the log of the seasonally adjusted consumer price index, and the log level of the seasonally adjusted central bank assets.¹

By assuming the implementation of monetary policy actions is reflected in the size of the central bank balance sheet, our aim is to then assess the overall impact of central bank balance sheet policies on inflation and growth, taking account of the agents' inflation expectations.

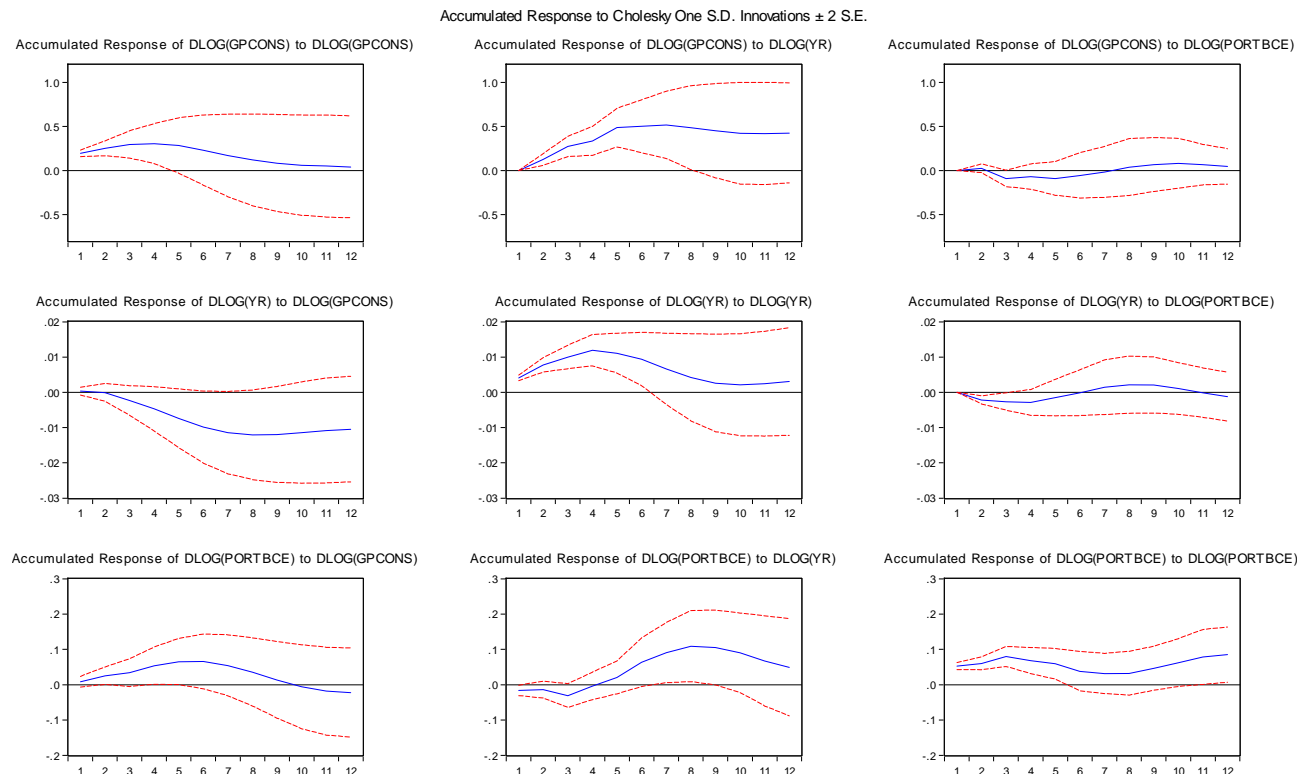
Data for estimating the above VAR model come from the Eurostat dataset and the ECB Statistical Data Warehouse.

First, we performed the usual lag-length selection criteria to estimate lags of the endogenous variables. It turned out that the three-lag length was significant, although the results proved robust to different specifications of the lag length. Therefore, we estimated a three-lags VAR system using ordinary least squares (OLS). Levels and changes of all the variables are quarterly.

In figure 9 we report the accumulated impulse responses for the full period.

¹ It is commonplace that the central bank balance sheet is a more suitable tool for analyzing the macroeconomic impact of central bank's policies when the official interest rate reaches the lower bound; see, among others, Curdia and Woodford (2003) and Borio and Disyatat (2010). However, even when the policy rate is presumed effective, changes in the policy rate affect the size of the central bank balance sheet. On the other hand, the size and composition of the central bank balance sheet may also change endogenously because of the demand for reserves of the banks, as happened during the 2007–09 financial crash.

Figure 9a. Accumulated Impulse Response (3 lags), 2000Q1–2014Q4

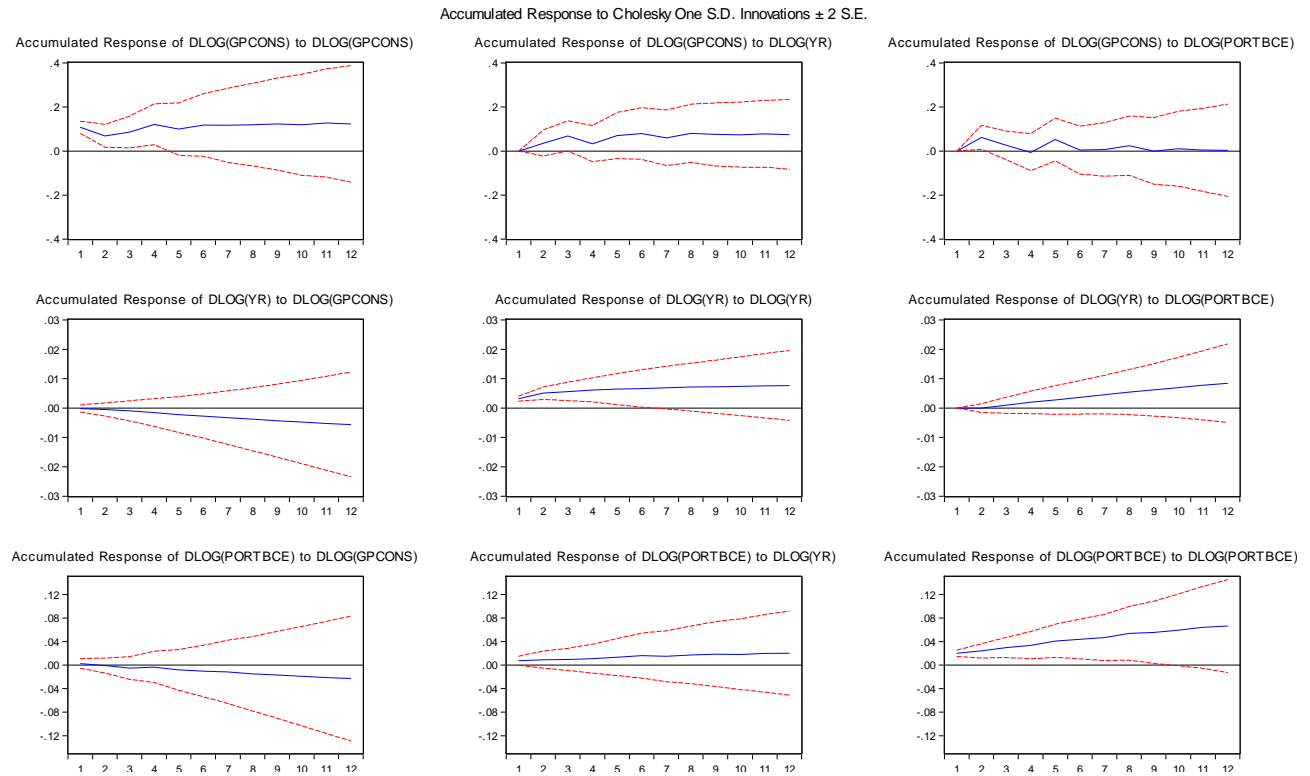


It is remarkable to notice that the accumulated response of inflation (GP CONS) and real GDP growth (YR) to exogenous shocks in the ECB balance sheet (PORTBCE) is negative, and becomes positive after six quarters.

These results support previous conclusions regarding the weak impact of the ECB monetary policy on inflation and output.

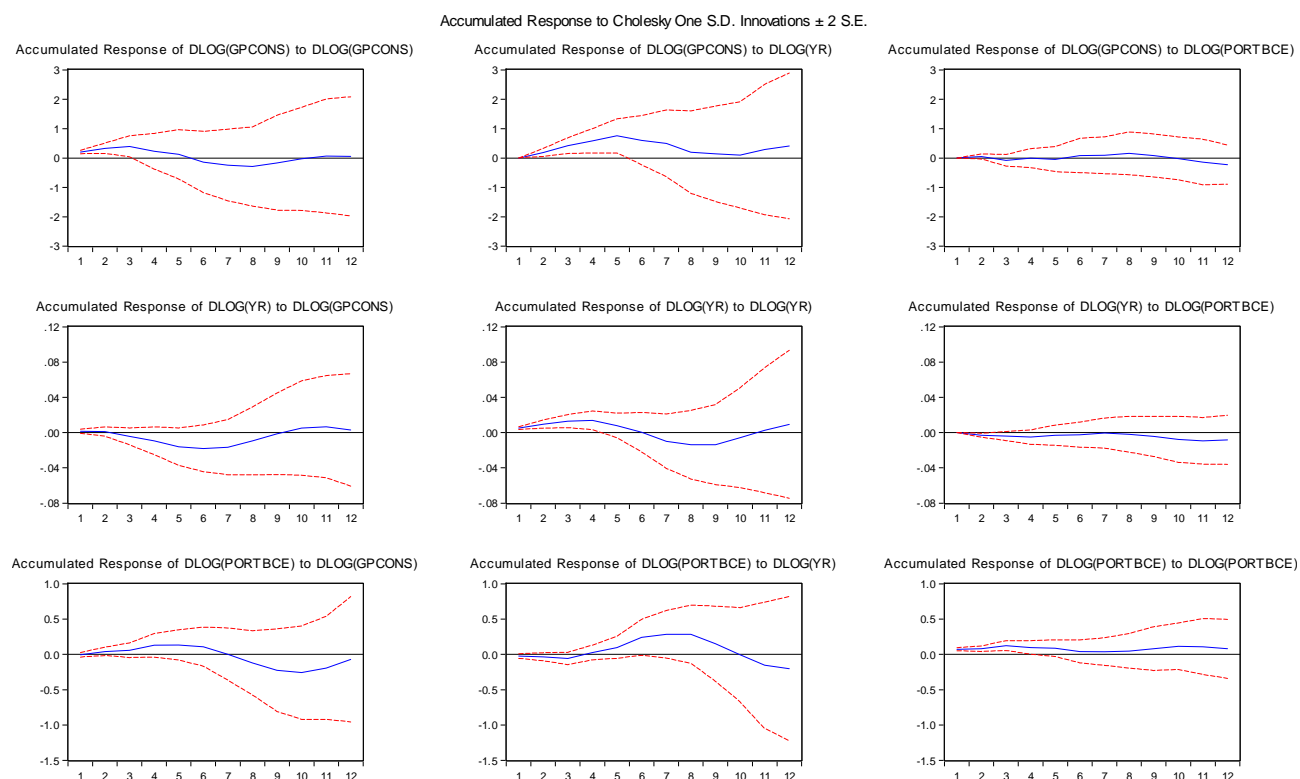
To understand to what extent these results are influenced by the crisis period, we estimated separately the accumulated impulse response for the periods 1999–2006 and 2008–14. The results are reported in figures 9b and 9c.

Figure 9b. Accumulated Impulse Response (3 lags), 1999Q1–2006Q4



Indeed, the results in table 9a are driven by the period subsequent to 2007 (see figure 9.c). By contrast, in the period preceding the financial crisis a random shock in the ECB balance sheet determined a positive impact on both inflation and growth (figure 9b).

Figure 9c. Accumulated Impulse Response (3 lags), 2008Q1–2014Q4



These results suggest that the monetary policy has been ineffective in spurring inflation and growth in the crisis period. Indeed, in this period the ECB mainly played the passive role of providing the liquidity necessary to save distressed banks, rather than an active role in promoting price stability. By contrast, after 2013 the primary target of the ECB has been the fight against deflation in the euro area.

Therefore, utilizing the ECB’s internal methodology, what is the likely impact on inflation and output of the ongoing program of asset purchases by the ECB, taking account also of the latest inflation expectations surveyed by the ECB for the euro area?

Table 2 reports the results of the forecast simulations assuming that current European monetary policy is carried out until the end of 2017 (i.e., ECB balance sheet increases of €180 billion per

quarter),² and the two-years-ahead inflation expectations (INFLE2) is equal to 1.5% (the same as the latest ECB survey of December 2015).³

Table 2. Forecast of Inflation (DEFL) and Real GDP Growth (YR) Assuming Exogenous the ECB Balance Sheet and Two Years Ahead Inflation Expectations Are 1.5 Percent (as December 2015).

	Inflation	Real GDP Growth
	$100*(DEFL_0/DEF_L_0(-4)-1)$	$100*(YR_0/YR_0(-4)-1)$
2015Q2	1.301619	1.409245
2015Q3	1.358842	1.152422
2015Q4	1.444656	0.958054
2016Q1	1.488940	0.622841
2016Q2	1.504230	0.502472
2016Q3	1.564958	0.501283
2016Q4	1.579769	0.366197
2017Q1	1.603393	0.199058
2017Q2	1.607359	0.155539
2017Q3	1.598012	0.173293
2017Q4	1.597353	0.189806

The results of the forecasts show that, given the ECB's own assumptions and the empirical evidence, even if the ECB pursues the current policy of an asset purchase program until the end of 2017 the target inflation rate of 2% is unlikely to be achieved.⁴ More worrisome is the low growth rate of the real GDP forecast, shown in the last column of table 2, suggesting that current monetary policy is unlikely to bring the euro area out of the present sluggish growth rate.

From the previous analysis, it is straightforward to conclude that, given the data and the ECB's assumptions, current monetary policy by the ECB is unlikely to lead to price stability in the euro area. This is because in the context of large output gap, presumed inflation expectations, which are further presumed to cause inflation, hamper the achievement of the monetary policy target.

² Indeed, the ECB security purchase program started in March 2015 and is expected to end by September 2016.

³ Notice that, among others, we are abstracting from changes in the rest of the world that can affect inflation expectations and the other variables used in the VAR model.

⁴ Gambacorta et al. (2014) estimated that the impact of an exogenous increase in central bank balance sheets at the zero lower bound in most advanced economies leads to a temporary rise in economic activity and consumer prices, but the impact on the price level is weaker and less persistent.

In the next sections we provide evidence that a labor buffer stock policy is a superior policy in achieving price stability relative to current policy, with respect to both the costs and benefits of monetary policy.

6. COMPARISONS TO CURRENT POLICY

We next compare an employed labor buffer stock policy with today's policy of using the unemployed as a buffer stock.

In its elemental form an employed labor buffer stock policy is one where the government offers a fixed-wage transitional job to anyone willing and able to work. We call it a "transitional" job because it's designed to facilitate the transition from unemployment to private-sector employment (note that we further suggest it is arguably not wrong to call this policy a "structural reform" that promotes efficiency and "competitiveness"). In practice, the size of the labor buffer stock would increase as demand for labor in the economy weakens, and the size of the labor buffer stock would diminish as the demand for labor in the economy increases, much like today's unemployment increases and decreases.

The first beneficial attribute of the employed labor buffer stock versus unemployment is that it is more liquid than today's unemployed buffer stock policy, and therefore it would provide a superior price anchor in support of the ECB's single mandate. Additionally it is more supportive of private sector growth in output and employment.⁵ The primary reason for this superior labor liquidity and performance versus today's policy of using unemployment as a buffer stock is that employers prefer to hire people already working rather than hiring those who are unemployed.⁶

⁵ Indeed, it would also support the structural changes in the labor market aimed at increasing flexibility in hiring and firing by the private sector. Also, a labor buffer stock establishes the minimum wage private firms may have to offer to workers to attract them.

⁶ There are several reasons why employers prefer hiring the employed rather than the unemployed: 1) People who have a job are proven to be interested in working; 2) You can't be sure why the unemployed lost their jobs; 3) The employed will adjust quicker to a new job; 4) An employed candidate has fresher job skills and known work habits (*Time* 2011).

Furthermore, this resistance to hiring increases as a function of the length of unemployment.⁷ This tendency leads to labor shortages even as unemployment remains at relatively elevated levels. Therefore, what appears to be excess capacity—the rate of unemployment—is for all practical purposes not accessible.

Additional benefits include the possibility of the transitional jobs performed by the employed labor buffer stock itself producing more useful output than that of the unemployed, as well as the positive socioeconomic externalities associated with full employment and the elimination of the negative socioeconomic externalities associated with today's unemployment policy.

This proposal replaces the concept of the natural rate of unemployment with the natural rate of transitional employment (with the ECB utilizing an employed labor buffer stock policy to sustain inflation at its desired level), rather than utilizing an unemployed labor buffer stock, as per current policy. Furthermore, we conclude that during an expansion with a given inflation target, the level of transitional employment will be less than the level of unemployment would have been had the ECB attempted to achieve its inflation target with its current policy. The difference is due to the greater ease of transition to the private sector and therefore a greater level of employment facilitated by transitional jobs when the economy operates at, for example, today's targeted 2% level of inflation. In other words, we claim that an employment buffer stock allows the economy to operate at higher levels of non-inflationary output and employment than in the current case where the NAIRU is the target of monetary policy. Moreover and most importantly, a labor buffer stock policy is likely to reduce fluctuations in prices as compared to the current policy due somewhat to the countervailing effects of transitional employment when the private sector slows down, but to a greater extent when the private sector expands and seeks to hire transitional workers rather than unemployed workers.

⁷ Kroft et al. (2012) and Krueger et al. (2014), among others, provided evidence that the long-term unemployed have a 20 to 40% lower probability of being employed one to two years in the future than do the short-term unemployed. Federal Reserve Chairwoman Janet Yellen, in a speech to the 2014 National Interagency Community Reinvestment Conference in Chicago, reported evidence of a long-term trend joblessness increase and of a decrease in the participation rate of the labor force after 2000.

7. THE ROLE AND OPERATION OF THE EMPLOYED BUFFER STOCK WAGE

In a market economy a buffer stock policy is used to set one price, with all other prices subsequently reflecting relative value with regard to that set price. This was the basis for the gold standard, for example, with the price of gold set by the government and subsequently all other prices reflected values relative to gold. Therefore any new gold supply entering the market would be inflationary in that the relative value of gold to other goods and services would decline, and with policy holding the price of gold constant, other prices would increase to reflect the altered relative value.

Likewise, with a labor buffer stock policy, the ECB (in this proposal) would set the wage of the transitional job, with the presumption that market forces would subsequently determine all other prices as they express their value relative to the set price of transitional job labor. The employed buffer stock wage therefore functions as the price anchor for the currency, as an instrument of price stability, and, in practice, the source of the definition of the value of the euro in the euro area. The management and operation of an employed labor buffer stock policy would, as a point of logic, be a responsibility of the ECB.

The role of the buffer stock wage as set by the ECB is described by standard microeconomic monopoly pricing theory, where monopolists are the “price setter” rather than “price taker,” with monopolists setting two prices. The first is the “own rate,” which is how their product exchanges for itself. With a currency this is the interest rate, and the ECB, for example, is the price setter of the policy interest rate for the euro. The second price set by monopolists is how their product exchanges for other goods and services in the economy, and this is done by setting the terms of exchange for at least one traded good or service. With this proposal, that price becomes the wage paid to transitional workers participating in the employed labor buffer stock. That is, that wage becomes the numeraire for the currency, with market forces adjusting all other prices so as to continuously reflect indifference levels with the employed buffer stock wage set by the ECB.

The ECB would then use this wage to achieve its inflation target. Leaving the wage constant would promote 0% inflation of final prices, assuming, for example, 0% productivity growth. And, for example, if the target was 2% inflation, the wage could be continuously increased at a 2% annual rate, again assuming 0% productivity growth. With higher productivity growth, the transitional job wage could be increased by that much to achieve the same increase in final prices.

At the same time, while the wage of the transitional job determines the rate of inflation, it is also critical to manage the size of the buffer stock to ensure it functions as an effective price anchor without prejudice to other aspects of public purpose. Therefore, the ECB would be minding the size of the employed buffer stock as well as the wage. If the size was deemed to be larger than needed to be an effective price anchor, the ECB has the mandate to enact policy designed to increase GDP, which we suggest could include options to accommodate fiscal expansion of the member nations. Likewise, if the size of the employed buffer stock was deemed to be too small to function as a price anchor, restrictive policy would be in order.

a. Fiscal Balance

Fiscal balance is ultimately market determined. The public debt is the accounting record of the net financial assets held by the non-government sectors. It is a total of the euro spent by the national governments that have not yet been used to pay taxes, and which will remain outstanding as cash, as euro balances in reserve accounts in the ECB system, and as euro securities account balances in the ECB system until they are used to pay taxes. That is, when a government spends a euro, it is either used to pay taxes, in which case it is removed from the economy, or it is not used to pay taxes and instead held as “savings.”

When the public deficit is too small to accommodate the private sector’s saving desires, market forces—perceived shortages of income required to be able to meet savings desires—depress spending and employment, which reduces tax revenues and increases state transfer payments, thereby increasing the public-sector deficit. These market forces continue to the point where the public-sector debt is, by identity, equal to desired net savings of euro-denominated financial assets.

With the proposed employed transitional labor buffer stock the same market forces are at work to determine the level of public sector debt. When desired savings exceeds the size of the public debt, market forces work to reduce spending, sales, output, and private sector employment which reduces tax revenues, and, in this case, increases the number of transitional job employees and at the same time the total wage bill for the workers in the transitional job. As is currently the case, the public sector deficit and debt would continue to be set by market forces that equate savings desires with available savings.

b. Accounting

The accounting for the ECB payments to the transitional workers in the employed labor buffer stock per se are of no real economic consequence. However, the nominal expenses do carry serious political considerations under the current institutional structure. For example, should the ECB simply expense the payments, ECB stated capital is reduced. While operationally capital denominated in its own currency is of no practical consequence for a central bank, there are currently politically determined consequences. For example, in the EU there is a political requirement for the ECB to be capitalized, and if expenses reduce capital the ECB is required to make capital calls to the member states, which are further required to comply with debt and deficit limits. The following financial proposals, therefore, are presented only in response to current political realities.

The first political decision is whether the expense for the buffer stock wage should be accounted for with an allocation to each member nation based on the expense incurred within its boundaries, or whether the expense should be divided *pro rata* based on total population. Given that unemployment compensation is currently paid by the member nations, we are proposing to account for the nominal cost of the transitional buffer stock employees in the same way, even though we are proposing that the transitionally employed labor buffer stock be managed directly by the ECB as an additional tool for meeting their price stability mandate.

The additional costs per member will be partially offset by savings on various transfer payments previously paid to unemployed workers who opt for transitional buffer stock employment, with any additional net cost adding to current spending. To prevent the additional expense from

reducing the stated capital of the ECB (again, assuming reduced capital would be a political obstacle) member nations could issue transferable tax credits to the ECB equal to ECB expenses with regard to wages and associated costs of the transitional buffer stock workers. These tax credits would be assets on the ECB's balance sheet and the euro balances credited to member banks as payment for said wages and expenses would be the (equal) liabilities. Should it be deemed necessary for the ECB to convert the tax credits to euro (something we cannot foresee under any circumstances), the tax credits could be sold to ECB member banks at face value, and the member banks could then use them on behalf of their depositors as they make tax payments to the member nations.

8. FURTHER CONSIDERATIONS

a. Exchange Rates and Competitiveness

The euro area is an open economy with a floating exchange rate policy, where domestic demand as well as domestic pricing is subject to continuous influence by forces originating in the foreign sector. Shifting domestic policy from an unemployed labor buffer stock to an employed labor buffer stock is not expected to materially alter these forces or the challenges they present. However, some general conclusions can be drawn, indicating that outcomes can be expected to be no worse and arguably better by shifting to an employed labor buffer stock policy.

The first implied benefit is that the superior price stability over the long term should equate to superior currency stability as well, which is presumed to render real benefits. Additionally, a more fluid labor force standing by in transitional jobs enhances the flexibility of private-sector businesses; it also reduces the cost of hiring when reacting to opportunities to expand through additional employment. These types of efficiency gains tend to enhance “competitiveness” and, ultimately, real terms of trade.

b. Foreign Direct Investment (FDI)

FDI tends to support a currency and fundamentally is largely a function of profitability of those investments. Historically, FDI is either directed toward cost savings or it is directed towards countries where the profit outlook from domestic demand is favorable. The transitional workers supported by the employed labor buffer stock policy address both of these: first by providing a ready labor force at a known wage and secondly by providing employed workers who are also consumers with superior access to credit that can support more aggregate demand than that of unemployed consumers.

c. Policy Implementation

Implementation of an employed labor buffer stock is worthy of intense discussion and debate. We offer our proposal as an example of how it can be done.

We begin by setting a non-disruptive wage of €7 per hour for a 35-hour per week transitional job for anyone willing and able to work. We then further propose that the member nations first go to their various ministries and departments and announce that they have unlimited budgets to add any person willing to work as transitional job workers at the prescribed fixed rate of pay. These people could work as assistants in the police departments, educational facilities, and any of the various administrative offices. They would not be meant to displace “normal” government workers to save costs. After 30 days we would extend this program to the various regional governments and city governments, and 30 days later extend the program to non-profit and charitable organizations. This would allow the unemployed seeking paid work to be able to find it regionally, and this makes them more attractive to private-sector employers.

The organization, monitoring, and evaluation of this labor buffer stock policy could be implemented interactively between member countries and the European Commission in a similar way to which current structural policies are implemented, but maintaining ECB independence to establish the terms and conditions of the employment of the transitional workers as well as the authority to monitor the policy for fraud and abuse.

Additionally, we recommend that the transitional wage initially be set at a non-disruptive level, so as not to cause workers already employed to leave their current employment in favor of the new transitional job. This prevents the transitional job from creating an initial, inflationary wage shock that might adversely disrupt commercial arrangements and what's generically called the "competitiveness" of the business community.⁸ And while the transitional job wage does function as a general wage floor, initially setting it at a non-disruptive level subsequently works to prevent deflation while not promoting inflation. This also means that the transitional job wage offered to anyone willing and able to work, as a point of logic, obviates the need for minimum wage legislation.

Again, and as previously described, should the ECB desire to promote, for example, a 2% rate of inflation and again assuming 0% productivity growth, the transitional job wage can be increased 2% annually from its initial setting.

9. COSTS AND BENEFITS OF A LABOR BUFFER STOCK POLICY

The aim of this section is to shed some light on the possible costs of a labor buffer stock policy and the likely effects of this policy on inflation and real GDP growth in the euro area.

What would be the cost for the ECB to implement such a program of transitional jobs? The direct cost is related to two indicators: the minimum wage fixed by the ECB, and the number of workers involved in the transitional jobs. Currently, the minimum monthly wage in the euro area countries ranges from €300 in Lithuania to €1,500 in Belgium and €1,923 in Luxembourg. As before, assume the ECB establishes transitional jobs requiring 35 hours per week at a salary of €7 per hour.⁹ The ECB or the member countries would bear the cost of implementation of the program. However, there are additional costs the ECB or the member countries would bear in implementing the program. These additional costs are related to the expenditure on new

⁸ Our proposal, although in line with the very recent Blanchard and Posen (2015) proposal, differs from the latter of these authors in some respect. These authors (referring to Japan) suggest that to get out from deflationary quicksand, Japan would benefit from an income policy in which the state would mandate an across-the-board 5–10 percent increase in salaries, in order to generate a spiral in which high wages drive up prices which drive up wages. We suggest transitional jobs would play a similar role without direct interference with firms' management decisions.

⁹ This corresponds to a monthly wage of €1,052.

equipment and other capital and intermediate goods necessary to support the transitional workers. In October 2015 in the nineteen countries of the euro area there were 17,240,000 unemployed people. Assuming all the unemployed would like to work at this wage, the maximum direct cost for the ECB to implement this policy is €18.14 billion per month. In the euro area, an individual country's government expenditure on gross capital formation is about 11.34% of total public expenditure. Assuming the same proportion between capital and labor holds also for this program, it follows that we must add a monthly expenditure of €2.1 billion for new equipment.

However, transitional jobs would allow the euro area countries to immediately save €12.3 billion per month on income maintenance and support expenditures currently being spent on those opting for transitional jobs. This savings, net of the additional capital expenditure, would be remitted to the ECB, thereby reducing gross ECB expenditures for the transitional jobs.

Therefore, the total expenditure for implementing the transitional job program would be about €8 billion per month (€18.14–10.2 billion).

Next we estimate the impact of €8 billion per month by the ECB on nominal GDP in the euro area.

In the first quarter of 2016, the increase in nominal GDP is equal to €24 billion, which is the net amount necessary to implement the program. In the subsequent period, the ECB expenditure is the same, but the nominal GDP continues to increase due to the multiplier effect. Let us assume the propensity to consume is equal to 0.92%.¹⁰ Even if the ECB expenditure for implementing the labor buffer stock policy remains fixed in the subsequent quarters at €8 billion, nominal GDP continues to increase by the amount reported in column 1 of table 3, due to the aggressive income multiplier effect we selected. Assuming exogenous nominal GDP growth, the results of the forecast analysis for inflation and real GDP growth are reported in columns 2 and 3 of table 3.

¹⁰ This is assumed by the Federal Reserve, and it is also consistent with what was estimated by Lawrence et al. (2010) for the government spending multiplier when the zero interest rate lower bound is effective.

Table 3. Forecast of Inflation (PCONS) and Real GDP Growth (YR) Assuming Exogenous an Increase of the Nominal GDP by €24 Billion in the First Quarter of 2016, and by $0.92 \times \text{GDP}_{t-1}$ in Subsequent Periods

	NOMINAL GDP (million)	$100 * (\text{PCONS}_0 / \text{PCONS}_0(-4)) - 100$	$100 * (\text{YR}_0 / \text{YR}_0(-4)) - 100$
		Inflation	Real GDP growth
2015Q2	2,591,020	0.191652	1.58039
2015Q3	2,606,750	0.454782	1.624601
2015Q4	2,614,623	1.453026	1.434723
2016Q1	2,638,623	2.142802	0.848117
2016Q2	2,660,703	1.875944	0.841399
2016Q3	2,681,016	2.010326	1.022458
2016Q4	2,699,705	1.806927	1.160066
2017Q1	2,716,898	2.084881	1.447849
2017Q2	2,732,716	1.766765	1.277021
2017Q3	2,747,269	1.910983	0.944039
2017Q4	2,760,657	1.650903	0.780207

The results of the forecast show that the expense of funding an employed labor buffer stock policy by the ECB would result in a rate of inflation that hits a high of slightly over 2% before falling back under 2%, and settling back to 1.65% after approximately three years. That is, even with the aggressive assumptions, there is no evidence that the expense of an employed labor buffer stock program would generate unwelcome inflation.

Moreover, with less aggressive assumptions regarding the size of the multiplier, as well as our assertion that an employed labor buffer stock policy is a superior price anchor to today's unemployment policy, the model would show even lower inflation as a result of the ECB's net funding of the transitional jobs.

10. CONCLUDING REMARKS

In this paper we analyzed options for the ECB to achieve its single mandate of price stability. We compared the volatility and liquidity of several buffer stock tools, and we have shown that an employed buffer stock provides a superior price anchor not only to the buffer stocks used in the past (gold, corn, etc.) but also to the current unemployed buffer stock policy.

We conclude that the selection of the employed buffer stock wage directly managed by the ECB as the instrument of price stability as an additional tool of monetary policy will produce superior results with regard to their mandate.

We have also presented proposals for implementation and finance. Additionally, an employed labor buffer stock has been shown to be both the superior option for price stability and to provide other material benefits that further enhance, and not prejudice, the ECB's price stability mandate.

Furthermore, an employed labor buffer stock policy can be said to constitute what are called "structural reforms," which have been advocated for spurring growth, facilitating the hiring and firing of workers, and the switching of the firms from less productive to more productive sectors. In addition, the employed labor buffer stock policy supports the downsizing and the replacement of the hidden economy, and promotes the reduction of economic disparities between euro area countries.

Shifting from an unemployed labor buffer stock to an employed labor buffer stock will provide the ECB with a superior price anchor as well as a useful tool for achieving its price stability mandate. The ECB will be both setting the wage of the transitional job workers and enacting policy to alter the size of the employed labor buffer stock, as well as monitoring the policy for fraud and abuse. This policy is entirely in accordance to the ECB mandate of price stability.

Enacting the transitional job for anyone willing and able to work, without prejudice to price stability, also delivers additional benefits, including eliminating the need for minimum wage legislation and the improvement of the quality (as well as quantity) of public-sector services.

Employed as transitional workers, those previously unemployed will be maintaining and enhancing their human capital in the process of working and producing useful output. This is in sharp contrast to the deterioration of human capital during periods of unemployment.

Finally, we stress that this plan is qualitatively very different from a policy that aims to guarantee a minimum income be paid to every citizen. Indeed, what are called “basic income” proposals risk functioning as the antithesis of a price anchor. Those policy proposals do not require beneficiaries to sell their time (work) to earn their compensation, and therefore projected outcomes are entirely different.

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