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FISCAL STABILISATION PLANS AND THE OUTLOOK FOR THE WORLD ECONOMY

DO COUNTER-CYCLICAL FISCAL MEASURES OFFER ANY HOPE OF RECOVERY FOR THE WORLD ECONOMY? AN EVALUATION OF FISCAL POLICY EFFECTIVENESS IN THE FACE OF A GLOBAL RECESSION

PATRICK VAN BRUSSELEN

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Fiscal Stabilisation Plans and the Outlook for the World Economy

Do counter-cyclical fiscal measures offer any hope of recovery for the world economy? An evaluation of fiscal policy effectiveness in the face of a global recession

ENEPRI Working Paper No. 55/August 2009

Patrick Van Brusselen*

Abstract

Since August 2007, the world economy has fallen into recession and been confronted by a severe financial crisis. In the midst of this global recession, what hope can we place in the fiscal stimulus plans that have been announced? This Working Paper evaluates whether the measures implemented in the euro area and the US will be adequate responses. It indicates that while these measures will undoubtedly prove useful in limiting the scale and duration of the downturn, they will not be sufficient by themselves to prevent a lengthy recession followed by a tepid recovery. The paper argues that to maximise the effectiveness of the stimulus plans, they should be accompanied by accommodative monetary policy. Furthermore, to accelerate and underpin a recovery in global economic activity, fiscal and monetary policies should also be supplemented by measures aimed at re-establishing banking and financial sectors that function properly.

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Do counter-cyclical fiscal measures offer any hope of recovery for the world economy? An evaluation of fiscal policy effectiveness in the face of a global recession

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The topic of counter-cyclical fiscal policies has been put squarely in the spotlight since the outbreak of the current global financial and economic crisis in August 2007. As governments worldwide have devised billion dollar stimulus packages, debates have raged in both the media and academia surrounding the effectiveness of such measures. This Working Paper attempts to provide an overview of the theory and empirical evidence on the effects of fiscal policies, in the present context of global recession and financial distress.

The paper is structured as follows. In section 1, the basic theoretical elements underlying the concept of fiscal multipliers are presented. Section 2 reviews the literature concerning fiscal stabilisation policy in times of liquidity traps and credit crunches. Section 3 outlines the core principles governing efficient fiscal stimulus programmes. Section 4 surveys the evidence in the literature on the size of fiscal multipliers in alternative methodological frameworks. Section 5 gives evidence from NIME, the Federal Planning Bureau's macroeconometric world model, on the size of fiscal multipliers in the euro area for four different types of stimulus measures. Evaluations carried out with the NIME model of the fiscal stimulus plans put in place in the euro area and the US are presented in sections 6 and 7, respectively. Finally, section 8 provides the reader with a macroeconomic projection for the world economy integrating the fiscal stimulus plans for the euro area and the US. This last section also provides a brief discussion of the risks and uncertainties surrounding the outlook for the world economy.

1. Basic textbook fiscal multipliers: What do they tell us?

During the Great Depression years of the 1930s, John Maynard Keynes explained that the cause of the high unemployment was insufficient demand. Aggregate demand had fallen to a level below that necessary to ensure the full and optimal utilisation of the economy's productive capacities, in terms of both labour and capital utilisation. Left to themselves, economies could remain in such a state of insufficient demand indefinitely. The answer to this deficiency was for the government to boost demand and bring the level of aggregate demand up to the level of optimal aggregate supply, thus ensuring full employment and stable inflation.

Government intervention in the economy happens through both the expenditure side and the income side. On the expenditure side, government outlays are partly linked to mechanisms laid down in laws. These public expenditures are commonly referred to as non-discretionary or entitlement spending. Spending on other items is called discretionary, because governments can decide to change the level of spending on these items without going through changes in legislation. Most income is usually raised through taxation rates, which are commonly laid down in laws and are thus non-discretionary.

Changes in the business cycle have a direct influence on government income and expenditure levels, even without any changes in discretionary spending. Indeed, in a recession, unemployment levels rise and lead to automatic increases in the unemployment benefits paid out. This in turn tends to mitigate the effect of the cyclical downturn on income and employment. Similarly, a recession can lead to a decline in household incomes and push households into lower average tax brackets. This tends to increase after-tax incomes and mitigate the effect of the cyclical downturn on income and employment, while leading to reduced tax receipts for the government.

Yet, alongside the working of the government's automatic fiscal stabilisers, a government can also intervene directly in the economy through discretionary fiscal policy, enhancing or counter-balancing the effects of automatic stabilisers.

In the standard, two-sector Keynesian expenditure model, a nation's output or aggregate supply is written as AS. The nation's aggregate demand, AD, is the sum of private consumption expenditure, C, private investment, I, and government spending, G. Furthermore, aggregate demand is equal to aggregate income, Y:

$$AD = C + I + G = Y . \tag{1}$$

Aggregate private disposable income, YD, is

$$YD = Y - T . \tag{2}$$

In this model, equilibrium is obtained when *ex ante* aggregate income, Y, is equal to *ex post* aggregate supply, AS:

$$AD = C + I + G = AS . \tag{3}$$

Assume also a simple linear consumption function, where aggregate real private-consumption expenditure is a function of disposable income:

$$C = a + c \cdot YD = a + c \cdot (Y - T) \text{ with } 0 \le c \le 1 . \tag{4}$$

Then, substituting (4) into (1), we find

$$Y = a + c \cdot (Y - T) + I + G . \tag{5}$$

Solving for Y, we find

$$Y = \frac{1}{1-c} \cdot [a + I + G] - (\frac{c}{1-c} \cdot T) . \tag{6}$$

Equation (6) states that the multiplier for government expenditure is $\frac{1}{1-c}$ and that the multiplier for (lump-sum) taxation is $\frac{c}{1-c}$, where c is the macroeconomic marginal propensity to consume out of disposable income.

The interpretation of this multiplier is as follows. An increase of 100 euros in government spending would fall into the pocket of a first set of households and firms; these households and firms would spend a fraction, c, of this income, implying that $c \times 100$ euros would once again

fall into the pocket of a second set of households and firms. This mechanism can go on indefinitely, leading to a multiplication of spending induced by the initial government outlay.

Adding up all the spending, we find the following series:

$$100 + (c \cdot 100) + (c \cdot (c \cdot 100)) + (c^2 \cdot 100) + (c^3 \cdot 100) + ... = 100 \cdot (1 + c + c^2 + c^3 + c^4 + ...) . \qquad (7)$$

This infinite geometric series $(1 + c + c^2 + c^3 + c^4 + ...)$ converges to $\frac{1}{1-c}$, which is known as the government spending multiplier. The spending multiplier is given by *the inverse of one minus the slope of the aggregate expenditure equation*.

Similarly, the interpretation of the government tax multiplier is as follows. A reduction of 100 euros in the government's lump-sum tax take would leave a supplement of 100 euros in the pockets of households, raising their disposable income. These households would spend a fraction, c, of this supplemental income, implying that the $c \times 100$ euros they would spend would once again fall into the pocket of a set of households and firms; this second set of households and firms would also spend a fraction, c, of this income, implying that $c \times c \times 100$ euros would fall back into the pocket of a third set of households and firms.

This mechanism can go on indefinitely, leading to a multiplication of spending induced by the initial government tax cut. Adding up all the spending produced by the tax cut, we find the following series:

$$(c \cdot 100) + (c^2 \cdot 100) + (c^3 \cdot 100) + (c^4 \cdot 100) + ... = 100 \cdot c \cdot (1 + c + c^2 + c^3 + c^4 + ...) \qquad (8)$$

which converges to $100 \cdot c \cdot \left(\frac{1}{1-c} \right)$.

Note now that the effect of a tax cut of €100 is equal to the effect of a rise in public spending of €100 *minus* the initial rise in spending made by the government. Hence, the tax multiplier is equal to the negative of the public spending multiplier *minus* 1.

The lump-sum tax multiplier is thus equal to

$$-\left(\frac{1}{1-c} - 1 \right) = -\left(\frac{c}{1-c} \right). \qquad (9)$$

The absolute value of the tax multiplier is necessarily smaller than the public expenditure multiplier. Furthermore, the size of both multipliers clearly depends on the magnitude of the parameter c, which is the macroeconomic marginal propensity to consume out of disposable income. If c tends towards its upper limit of 1, both the spending multiplier and the absolute value of the tax multiplier tend towards $+\infty$; if c tends towards its lower limit of 0, the spending multiplier tends towards 1, while the absolute value of the tax multiplier tends towards 0.

A marginal propensity to consume of 0.6 would lead to a public spending multiplier of 2.50 and a tax multiplier of $-(2.50 - 1) = -1.50$. This means that a public sector economic stimulus of €100 through higher public spending would lead to an overall increase in economic activity of €250, while the same initial stimulus provided through a tax cut would lead to an overall increase in economic activity of €150.

These basic closed-economy multipliers can be refined by taking into account endogenous taxes (i.e. a tax rate) and trade with the rest of the world. Assume that the government's tax receipts are a function of aggregate income:

$$T = T_0 + t \cdot Y \,. \tag{10}$$

Assume that imports are also a function of aggregate disposable income:

$$M = M_0 + m \cdot (Y - T) \tag{11}$$

The open-economy public spending multiplier can be shown to be

$$\frac{1}{1 - \left[c \cdot (1-t) - (m \cdot (1-t))\right]} \tag{12}$$

with $0 \leq t, m \leq 1$, where m is the marginal propensity to consume from imports.

The open-economy tax multiplier becomes

$$\frac{-c + m}{1 - \left[c \cdot (1-t) - (m \cdot (1-t))\right]} \text{ with } 0 \leq t, m \leq 1 \tag{13}$$

Clearly, replacing the assumption of lump-sum taxation with a tax rate and introducing the possibility for households to spend their disposable income on imported goods and services reduces the potency of government intervention in the economy.

Assuming a marginal propensity to consume (c) of 0.60, a tax rate (t) of 0.50 and a marginal propensity to consume out of imports (m) of 0.30, the public spending multiplier falls to 1.18 and the tax multiplier falls to -0.35. Thus, in this case, an initial economic stimulus by the public sector of €100 through higher public spending would lead to an overall increase in economic output and income of €118, while the same initial stimulus provided through a tax cut would lead to an overall increase in economic activity of €35.

2. Economic stabilisation policies in times of credit crunches and liquidity traps

In this section, we discuss the relative effectiveness of monetary and fiscal policy in the context of an open economy. We go on to present the classic case of fiscal policy in the context of a liquidity trap.

2.1 An analysis of the effectiveness of monetary and fiscal policy

2.1.1 A simple analytical framework: Hicksian IS-LM analysis

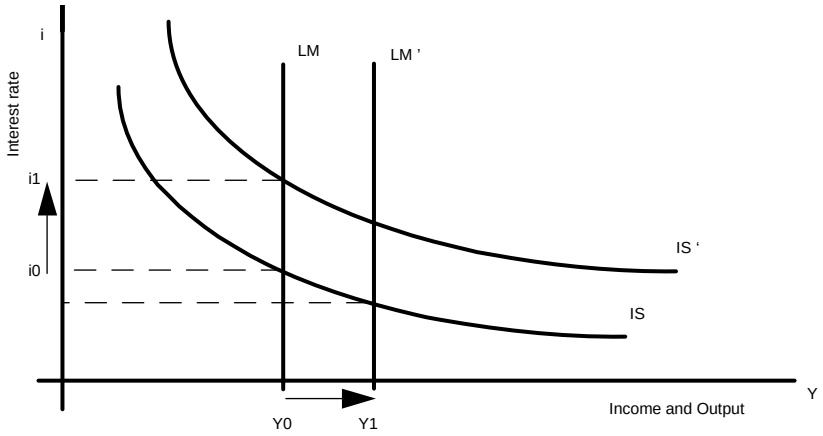
In discussing the effectiveness of monetary and fiscal policy, two polar cases can be analysed in the standard Hicksian IS-LM framework. In this framework, recall that the IS curve or schedule represents the combinations of interest rates and aggregate output levels for which the goods market is in equilibrium. It is negatively sloped because a higher level of the interest rate reduces investment spending. The LM curve represents the combinations of interest rates and aggregate output levels for which real money balances (and the bond market) are in equilibrium.

It is positively sloped because a higher level of the interest rate reduces the demand for real money balances and an increase in aggregate income raises the demand for real money balances.

2.1.2 Monetary policy

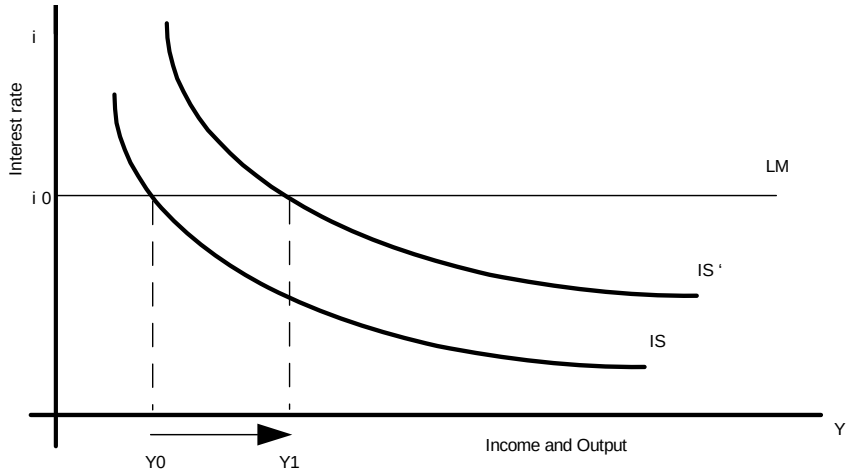
First, there is the *classical case* in which the LM curve becomes a vertical curve. A vertical LM schedule signals that demand for real money balances is completely insensitive to the interest rate. This is called the classical case because it represents the situation where $\overline{M} = \overline{k} \cdot \overline{P} \cdot Y = \overline{k} \cdot GDP$, corresponding to the *quantity theory of money*, which states that for a given price vector, $\overline{P}$, the level of real output is completely determined by the supply of nominal money balances. In this situation, depicted in Figure 1, fiscal policy is completely ineffective in stimulating the economy while monetary policy can have a maximum effect on output. Indeed, an increase in the money supply shifts the LM schedule out to the right, from $Y0$ to $Y1$, leading to a strong increase in output and a parallel decline in the interest rate. An increase in government expenditure, which shifts the IS curve up and to the right, would lead to a complete crowding-out of private spending, thus pushing up the interest rate, from $i0$ to $i1$, and leaving the output level unchanged.

Figure 1. Ineffective fiscal policy in the IS-LM framework



Second, there is the case of the *liquidity trap*, depicted in Figure 2, in which the LM curve becomes horizontal and where changes in the quantity of money are unable to shift it. In this case, households are prepared to hold any amount of real money balances rather than increase their portfolio balance of less liquid bonds. Changes in the stock of money in circulation have no effect on the LM curve, implying that monetary policy no longer affects the interest rate, no longer affects investment or savings decisions, and no longer affects output or income. This is the situation that presents itself when nominal interest rates fall to their zero lower bound. Households then prefer to hold cash balances rather than invest in less liquid bonds that yield zero interest. Note that an economy can also find itself in a liquidity trap with a positive interest rate, as in the case of a seizing-up of credit linked to increased perceptions of market or counterparty risk. If this situation leads to lower private final demand, fiscal policy can be relatively potent, as an increase in government spending will not lead to any significant crowding-out of private consumption or investment.

Figure 2. Ineffective monetary policy in the IS-LM framework

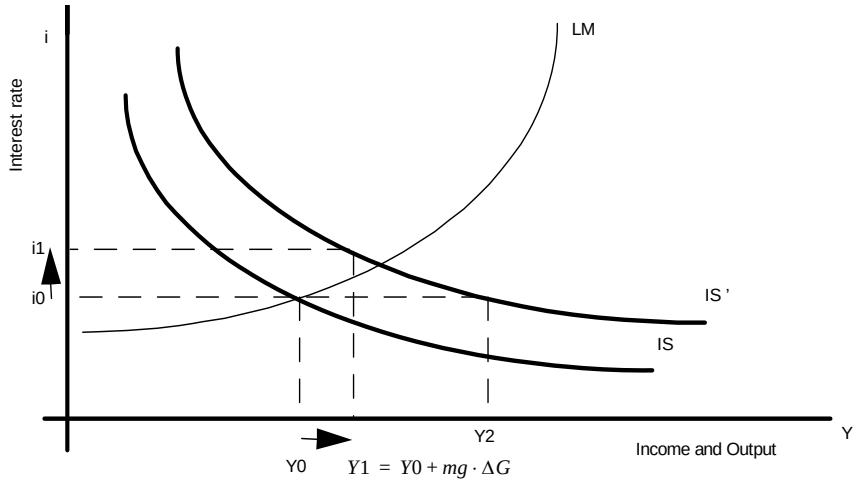


2.1.3 Fiscal policy

Having already reviewed the potential for economic stimulus through fiscal policy in the case of the *classical model* and in the case of a *liquidity trap*, we now turn to a summary analysis of fiscal policy in the usual IS-LM framework.

Figure 3 indicates that an increase in government spending or a decline in taxation pushes the IS schedule to the right, bringing about an increase in both output, which rises from $Y0$ to $Y1$, and the interest rate, which rises from $i0$ to $i1$. For any ΔG rise in public spending, equilibrium output must rise by $mg \cdot \Delta G$, where mg is the fiscal spending multiplier. In an open economy operating in a flexible exchange rate regime, the rise in the interest rate would lead to a rise in the external value of the country's currency and to a deterioration in the country's current account balance. In the absence of any crowding-out or upward pressure on the interest rate, the economy's equilibrium output would rise from $Y0$ to $Y2$.

Figure 3. Fiscal policy effectiveness in the IS-LM framework



2.2 Monetary and fiscal policy effectiveness in a liquidity trap

The US has recently entered the universe of the liquidity trap as the rate for both the target federal funds and the effective Fed funds fell to near-zero levels in early 2009. Japan has been in this situation for more than a decade, with the problem of deflation adding to its predicament. In the UK and the euro area, both headline and core measures of inflation rates are moderating. The reaction of the Bank of England has been to make large cuts in its short-term interest rate target (the minimum bid rate for money market 3-month sterling), which is now rapidly approaching the zero lower bound. The European Central Bank (ECB) has cut its main policy rate (since October 2008, a fixed rate on the ECB's main refinancing operations) rather less rapidly, but seems to be on the verge of following the general downward trend towards near-zero policy rates.

It appears that the US, the UK and the euro area are all swiftly moving into the territory of zero interest rates and possibly deflation. If economic conditions continue to deteriorate and these major world economies do end up with zero rates and falling prices, what policies can be implemented to return to trend real GDP growth, along with 'normal', positive, nominal policy rates and rising prices? The Japanese example sheds some light on these policy issues.

At the end of the 1990s, Japan appeared to be effectively mired in a deflationary and liquidity trap, where the general price level was declining and where the nominal policy rate was effectively at its zero lower bound. This situation led to renewed research on the causes of liquidity traps and on the policy options that could help economies to emerge from such traps.

Ever since the end of World War II, the Japanese government has stressed the overwhelming importance of domestic saving as a way to economic growth. This promotion of thrift has persisted ever since, leading to rapid investment- and export-led economic growth; it has, however, also provided the underpinnings for the financial asset and property bubbles that emerged in the 1980s. By the early 1990s, these two asset bubbles had burst. The structurally weak private-consumption growth on the domestic front could not pick up the slack, while the country's export growth was adversely affected by a rapid currency appreciation (IMF, 1998). At the same time, the country began to suffer from a decline in productivity growth, just as awareness increased about the future effects of Japan's population dynamics on potential economic growth. The economy plunged into a combination of low output growth and falling prices, which were still largely prevalent in early 2009.

Japanese monetary policy rates have been at their lower bound for many years now, to no effect on the country's deflationary spiral. The effectiveness of fiscal policy in pulling an economy out of stagnation also appears to be limited, judged on a cursory examination of Japan's fiscal policy record over the 1990s. Nevertheless, it has been shown that even in the case of the Japanese economy, expansionary fiscal policy did, in fact, have a positive impact on growth (Posen, 1998). The disappointing results stem from the fact that the fiscal stimulus packages implemented in Japan proved to be too small and were implemented in such a stop-and-go manner as to finally lead to little overall economic stimulus.

Claims that the Japanese government has spent in excess of ¥75 trillion over the 1990s in efforts to boost growth and end deflation appear to be largely exaggerated, as no more than one-third of this amount is thought to have been effectively injected into the economy. In 1995, a large effective stimulus package was adopted, leading to a significant rise in real GDP growth in 1996. This growth momentum was then undercut by contractionary fiscal positions in 1996 and 1997. On balance, it is estimated that Japan's fiscal stance was only marginally expansionary over the 1990s; the discretionary, cyclically-adjusted budgetary position was barely negative over the decade. Hence, it appears that when fiscal policy was implemented in a significant way in Japan, the effects on short-term output growth were manifest.

Turning to standard economic theory, the IS-LM framework indicates that when an economy finds itself in deflation and in a liquidity trap, the LM schedule is horizontal. Attempts by monetary authorities to boost economic growth through increases in the monetary base are ineffective, as the nominal interest rate cannot fall below zero. Attempts to use monetary policy are then likened to 'pushing on a string'. The result of the simple IS-LM model holds even in models where prices are fully flexible and where complete, intertemporal budget constraints apply (Krugman, 1998b). At the same time, it has been shown that although monetary expansion is by itself ineffective, credible commitments to increase the money supply and generate current and future inflation can be an effective policy response. An effective monetary policy for pulling an economy out of a deflationary liquidity trap should be based on quantitative easing and unconventional open-market operations targeting longer maturities of the yield curve, as well as actions and announcements aimed at increasing market expectations of current and future inflation (Krugman, 2000). In particular, monetary policy should adopt an explicit inflation target, with the target rate set high enough to produce a zero or negative real interest rate.

Furthermore, in the IS-LM model, fiscal policies could in principle bootstrap the economy out of its liquidity trap. In practice, however, this would require either that the fiscal stimulus be massive and sustained (leading to credibility issues regarding the long-term sustainability of public finances with a possible increased risk of sovereign default) or that the economy is trapped in a 'low-level equilibrium'. In a multiple equilibrium framework, an economy's equilibrium can be durably modified by temporary policies such as a short-term fiscal boost. It appears more likely that Japan's liquidity trap had a structural origin, linked to population dynamics and declining multifactor productivity growth, rather than the economy falling by chance into such a low-level equilibrium.

Hence, escaping from a deflationary liquidity trap requires a combination of a credible and sufficiently high, permanent inflation target and accompanying expansionary fiscal policies. Fiscal measures are all the more appropriate for a low-growth liquidity trap because the shadow price of marginal government spending is then particularly low (Blinder, 2004). It has further been argued that an exchange rate policy aiming at a temporary currency devaluation/depreciation can also help in providing additional economic stimulus by increasing price competitiveness and raising exports (Svensson, 2004). Japan's current predicament seems rooted in the inability of the country's monetary authorities to generate expectations of sufficiently high and permanent inflation and from the absence of a significant and sustained fiscal stimulus.

2.3 Policy responses in a risk-related liquidity trap

The traditional view of the liquidity trap is one in which an economy's nominal interest rates have fallen to their zero lower bound. Yet, such a trap need not always present itself with effective nominal zero rates. The more general characterisation of the liquidity trap is a situation in which monetary policy is unable to boost economic activity by changing the money base. This may be the case because nominal interest rates are down against their lower bound: in this situation, economic agents have no incentive to exchange base money balances for interest-bearing bonds and prefer to hoard money rather than boost investment. Monetary policy may lose its effectiveness against a background of high-risk aversion. In such a case, the transmission channel can break down, implying that monetary policy aiming at a specific interest rate target for a specific set of securities would be unable to affect rates on other securities of similar maturities or to affect securities carrying other maturities. In such

circumstances, significant spreads can appear between the risk-free yield on government debt and the yield on more risky private-sector debt. This is the case that presents itself in a credit crunch.

In situations where the supply of credit seizes up, the effectiveness of fiscal stimulus and of monetary policy through the usual open market operations is limited, implying that it is necessary for the government to take measures to restore the normal functioning of credit markets (Spilimbergo et al., 2008; IMF, 2009b). This is all the more so if the flow of credit is impaired by the appearance of uncertainty in markets, in which case the usual means of risk evaluation break down (Knight, 1921). If it is market liquidity that disappears, the central bank can play the role of market maker of last resort. If a financial institution is unable to finance itself in the open market because of liquidity constraints, the central bank could also play the role of lender of last resort (Buiter, 2008). Still, both traditional and unconventional intervention by central banks in financial markets could prove to be ineffective in stimulating the wider economy if financial institutions hoard liquidity rather than passing it on through lending.

The hoarding of liquidity is particularly observed in cases where banks – defined as all institutions that borrow short and lend long – are heavily exposed to uncertainty linked to possible write-downs in the value of some of their assets. In such cases, banks may be tempted to build up precautionary cash balances to enable them to deal with liquidity problems stemming from their inability to sell impaired or toxic assets in order to meet their liabilities. Furthermore, financial markets have also become wary of counterparty solvency risks. These factors have led to exceptional increases in rates charged on corporate credit. By the end of the first quarter of 2009, the spread on lending to US financial corporates[1] was about 100 basis points; the spread on investment-grade, US non-financial corporate credit[2] was around 300 basis points, while high-yield spreads were around 2,500 basis points. Credit conditions have remained tight and spreads high in the euro area too, where bank loans remain the dominant form of credit to corporations.

In such an environment, the monetary and fiscal channels of economic stabilisation by themselves will be insufficient or ineffective. These policies could then be accompanied by

- a mandatory clean-up of bank balance sheets taking the form of outright temporary nationalisation of insolvent banks;
- the mandatory creation of a “bad bank” (Bulow and Klemperer, 2009) or a “good bank” (Buiter, 2009b) to clean up the banking sector;
- a government-backed credit insurance scheme intended to reduce private-sector risk premia and to ensure a renewed flow of credit (Blanchard, 2009; Duy and Magud, 2009); and
- an improved macro-prudential framework geared towards minimising systemic risk and moral hazard, which may require a break-up of financial institutions that are proven to have become too big or too connected to fail (Wyplosz, 2008).

[1] The TED spread measures the difference between the 3-month eurodollar Libor rate and the 3-month Treasury bill rate.

[2] More specifically, this refers to the yield spread between the average investment-grade corporate bond and the 10-year constant maturity Treasury note.

3. Optimal design of fiscal stabilisation programmes

Standard economic theory indicates that in situations with developed and functioning financial markets and an independent central bank with the appropriate know-how, monetary policy is usually the best response to an effective or anticipated downturn in economic activity, due to the speed with which monetary authorities can modify market interest rates. Even though it may take several quarters before the full impact of a change in the monetary policy stance is felt in the economy, the first effects materialise quite rapidly and implementation lags are, in any case, shorter than those usually associated with budgetary processes (Wieland, 2008).

In all cases, an economic downturn will also lead to an autonomous counter-cyclical fiscal policy through the working of the automatic fiscal stabilisers. But if the expected downturn appears to be particularly sudden and large, a case can be made for an accompanying expansionary and discretionary fiscal policy. This is particularly relevant in circumstances in which monetary authorities have all but exhausted the scope for conventional monetary policy intervention through reductions in nominal interest rates. It has also been shown to be the optimal response in the face of uncertainty as to the true impact of monetary and fiscal policy options (Brainard, 1967). Furthermore, recent research indicates that an active discretionary fiscal policy based on counter-cyclical public spending can be more important for growth than a fiscal policy solely based on automatic fiscal stabilisers (Aghion and Kharroubi, 2008).

When monetary policy is deemed insufficient to stabilise the economy on its own, or in the case of a liquidity trap, an expansionary fiscal policy should be devised in a manner that corresponds to a number of basic principles. There are the now well-known three ‘Ts’: an expansionary fiscal policy should be timely, targeted and temporary (Elmendorf and Furman, 2008). Then, there are the three ‘Cs’: an expansionary fiscal policy should also be contingent, credible and coordinated.

Timeliness means that the inside and outside implementation lags of fiscal policy should be minimal. Inside lags are those linked to the administrative and legislative processes. Outside lags are those linked to the effective implementation of policy decisions, such as the time necessary for work on an infrastructure project to begin. Note that the outside lags of spending projects can be relatively long, while the outside lags of tax rebates can be quasi nil. A fiscal stimulus package should be articulated so that it does not begin to affect the economy too early, nor affect it too late in the economic downturn.

Targeted means that an optimal fiscal stimulus should affect only those components of aggregate demand – through either spending increases or tax cuts – that would provide the greatest overall boost to the economy. For instance, in the case of tax cuts or rebates, targeting these measures on lower-income and liquidity-constrained households ensures a greater impact on household consumption expenditure than targeting them on higher-income households. In liquidity trap or deflationary conditions, economic theory further suggests that a discretionary, public stabilisation policy should be geared towards increased public spending rather than towards tax cuts. Tax cuts could even prove to be counter-productive in deflationary situations (Eggertsson, 2009).

Temporary means that the fiscal stimulus package should, in principle, not be open-ended – as this could pave the way to ever-increasing fiscal intervention and an exponential build-up of government deficits. Fiscal stimulus programmes should seek to raise output and close output gaps as quickly as possible and not lead to long-term and unsustainable deficits. Furthermore, as stabilisation packages, they should not endeavour to exceed their role by mixing together measures for economic stabilisation and longer-term measures to enhance growth.

To these three Ts, one can add the three Cs: contingency, credibility and coordination. The first of these additional principles is contingency. *Contingency* means that when devising a fiscal stimulus package, the government should prepare for additional stimulus measures in case the initial package proves to be too limited to achieve its goal. Without prejudice to the principle of implementing temporary measures, the fiscal boost must *in fine* prove to be effective, lest the initial measures lead only to an increase in public deficits.

The second additional principle is credibility. *Credibility* means that when devising a fiscal stimulus package, the government should tailor its package to the effective needs of the economy. A package that is too small to provide a significant boost to the economy or that would provide too temporary a boost would lead to a build-up of public deficits and debt without leading to a sustained recovery. In particular, a credible stimulus plan must be big enough to stabilise – or even close – an economy's output gap, underpinning output growth so that the economy's labour and capital resources remain as fully utilised as possible. This is necessary because an economy that is functioning below its potential output level and that is caught in a liquidity trap is naturally inclined to exhibit declining prices and sub-par output growth.

The third and final additional principle is coordination. *Coordination* means that when devising a fiscal stimulus package, the government should minimise potential losses due to 'leakages'. Economic stimulus plans implemented in increasingly open economies suffer from a heightened risk of import leakages, whereby increased domestic demand in one country allows a neighbouring country to increase its own output and exports. A country can thus benefit from another neighbouring country's fiscal stimulus without having to increase its own public spending, paving the way for 'free-riding' and 'beggar-thy-neighbour' attitudes. These behaviours can be circumvented through international policy coordination, which can increase the effectiveness of policy responses for all concerned (Beetsma et al., 2001). Coordination should not be taken to mean an identical amount of fiscal stimulus in every country. Rather, fiscal packages should be tailored to individual countries, reflecting their 'fiscal space', i.e. the budgetary room available to governments after accounting for their individual public deficits and debt, current account positions and their ability to meet their commitments relative to future demographic challenges (Corsetti and Müller, 2008; Heller, 2005). The alternative to coordination could be a protectionist backlash, where countries implementing fiscal packages adopt the second-best solution of restricting trade flows to stem import leakages (Rodrik, 2008a).

All in all, poorly crafted fiscal stabilisation packages might result in too little economic boost coming too late, and lead only to rising interest rates and increased public borrowing and debt. In this case, having no fiscal stimulus could be better than a badly thought-out stimulus plan, in limiting the present value of the sum of current and future output losses.

4. Empirical evaluations of fiscal multipliers

The following section presents the values of fiscal multipliers that are found through the historical narrative-record method, through the analysis of the impulse responses of variable auto regressive models and through simulation experiments of macroeconomic models.

4.1 A practical note on the presentation of empirical results

Fiscal multipliers provide a measure of the absolute effect of a change in one 'independent' variable, x (e.g. public spending), on another 'dependant' variable, y (e.g. the level of real GDP). The multiplier may thus vary according to the choice that is made as to the independent

and dependant variables and the relative sizes of these two variables. Indeed, the multiplier has been defined as $\Delta y \big/ \Delta x$ and therefore the variations of the numerator and denominator are not unit-independent.

$$Multiplier = \frac{\Delta y}{\Delta x} \quad \text{where} \quad \Delta y = y_1 - y_0 \,,\ \Delta x = x_1 - x_0 \,. \tag{14}$$

Another possible presentation of the effect of a change in one independent variable on another dependant variable is provided by the measure of 'elasticity'. Elasticity is defined as the percentage change in a dependant variable, y, produced by a percentage change in an independent variable, x:

$$Elasticity = \frac{\Delta y}{y} \Big/ \frac{\Delta x}{x} \,. \tag{15}$$

Hence, it also appears that the concept of elasticity and 'multiplier' are linked but distinct: the elasticity is equal to the multiplier multiplied by the ratio of the independent variable x to the dependant variable y:

$$Elasticity = \left(\frac{\Delta y}{y} \Big/ \frac{\Delta x}{x} \right) = \frac{\Delta y}{\Delta x} \Big/ \frac{x}{y} = Multiplier \cdot \left(\frac{x}{y} \right). \tag{16}$$

Studies of the effects of discretionary fiscal policy present results in a variety of ways. They are sometimes presented in the form of multipliers, sometimes in the form of elasticities and sometimes in yet another manner. Indeed, results are often presented in terms of the dependant variable's (y) percentage deviation from a baseline value, following a shock on an independent variable (x), where the shock on the independent variable (x) is expressed in terms of its size relative to (or as a percentage of) a country's GDP in the baseline and for a reference year. (For example, GDP increases by α% from its baseline level following an increase in variable x equal to 1% of baseline GDP in year T.) This result should not be misconstrued to be a conventional measure of the elasticity of the dependant variable y to the independent variable x, as it only represents a type of 'semi-elasticity'.

$$Semi\ Elasticity = \left(\frac{\Delta y}{y} \right) \Big/ \Delta x = \frac{\Delta y}{\Delta x} \Big/ \frac{1}{y} \quad \text{where} \quad \Delta x = \alpha \cdot y \,, \quad \alpha \in (0, 0.01) \tag{17}$$

$$Semi\ Elasticity = \left(\frac{\Delta y}{\Delta x} \cdot \frac{1}{y} \right) = Elasticity \cdot \left(\frac{1}{x} \right) = Multiplier \cdot \left(\frac{1}{y} \right). \tag{18}$$

In the studies that are surveyed below, the term 'multiplier' is sometimes used to refer to an actual multiplier, sometimes to an elasticity and other times to a semi-elasticity. The ambiguities surrounding the form in which the results are given are removed wherever possible, but the reader will have to take care in the interpretation of multiplier results.

4.2 The narrative record method of evaluating fiscal multipliers

The narrative record method attempts to discriminate between automatic and discretionary changes in spending or taxation (or both) on the basis of available historical information

regarding discretionary changes in fiscal stances. This analysis is then combined with an analysis of the observed historical changes in output, so as to obtain a measure of the effects of discretionary fiscal policy.

These methods, recently applied to the analysis of taxation for the US economy, indicate that tax cuts have large and persistent effects on output. Traditional measures of tax multipliers are suggested to be excessively small owing to an "omitted variables" bias (Romer and Romer, 2007). Estimates derived from this method also suggest that the impact of tax changes on the US economy has declined over time. The size of the effect on output largely stems from a large reaction in private investment rather than consumption expenditure (Table 1).

Table 1. Maximum effects of an increase in taxes on US economic activity

	Effects
Private consumption	-2.6
Private gross investment	-12.6
GDP	-3.0

Note: Impact of a tax increase equivalent to 1 percentage point of GDP (in %).

Source: Results from Romer and Romer (2007).

This narrative study of the effects of tax cuts indicates that the effects of fiscal multipliers (the tax cut multipliers and by extension the public spending multipliers as well) could be remarkably high.

Other narrative studies, based on the identification of autonomous changes in public spending, arrive at the conclusion that an increase in public spending in the US can have positive effects on real GDP while leading to significant negative effects on private consumption expenditure and real wages. The GDP to public spending multiplier could lie between 1 and 1.4 (Ramey, 2008; Ramey and Shapiro, 1998). Note, however, that these last results are based on wartime or defence spending data, covering periods that present very particular methodological difficulties.

4.3 Multiplier estimates from selected VAR models

Alongside the approach of macroeconometric model simulation, there is now extensive empirical literature on the application of time series techniques to the question of the impact of fiscal policy. Vector autoregressions (VARs) allow for relatively little prior specification of dynamics, which is an interesting feature for the investigation of the multivariate properties of time series data. The application of VAR techniques to the study of fiscal policy usually implies using a dummy variable approach for identifying discretionary fiscal shocks, or the structural VAR approach relying on institutional information for identifying the endogenous responses of fiscal variables to changes in overall activity from which the discretionary fiscal shocks are then inferred (Perotti, 2000).

The standard dummy VAR approach for the US economy usually indicates little response of activity (private consumption) to an autonomous increase in fiscal outlays (Edelberg et al., 1999). Still, the nature of the fiscal dummy variable can lead to difficulties in interpreting the impulse responses and these results are often judged unconvincing.

The structural VAR (SVAR) approach indicates that activity can be positively and sizably affected in the medium term by an autonomous increase in public spending (Blanchard and Perotti, 1999).

Yet VAR estimates of the effects of fiscal stimulus measures have also been shown to produce negative responses to autonomous increases in public spending. This strain of evaluation stems from observations of the evolution of activity and cyclically-adjusted fiscal positions in a number of EU countries that underwent significant fiscal consolidation in the 1990s. VAR estimates allowing for varying parameter values over periods of low and high deficit and debt ratios indicate that an increase in public spending raises activity in periods of low deficit and debt ratios, but reduces activity in periods of high deficit and debt ratios (Perotti, 1999).

More recent and detailed VAR estimates of impulse responses to shocks on government spending and taxation continue to give very mixed messages as to the effects of fiscal policies, both across time and countries (Perotti, 2005).

As Tables 2 and 3 show, it would appear that the effects of fiscal policy on GDP are generally small, that tax cuts do not have a more rapid impact on the economy than increases in public spending, and that fiscal policy has tended to become less effective over the period 1960–2001.

Recent research indicates that the robustness of the traditional VAR results, showing a positive effect of public spending on private consumption and output in the US, could suffer from a number of identification, aggregation and timing problems. Correcting for these methodological issues, VAR results show negative effects of public spending increases on private consumption (Ramey, 2008). It is also suggested that these last results are themselves biased by the type of public spending (US defence spending) they cover and by their failure to control for the effects of tax increases and wartime rationing of private consumption.

Table 2. Effects of a shock to government spending on private consumption

	On-impact effect	**Long-term effect**	**Maximum effect**
Fiscal dummy VAR	0.1	0.0	0.1
Non-varying structural VAR	0.5	0.9	1.2
Varying structural VAR			
High deficit case	-0.4	–	–
Low deficit case	0.7	–	–

Note: Impact of an increase in public spending of 1 percentage point (p.p.) of GDP; response of private consumption (in p.p. of GDP).

Sources: Edelberg et al. (1999); Blanchard and Perotti (1999); Perotti (1999).

Table 3. Effects of a rise in public spending on GDP (cumulative responses)

	US		**(West) Germany**		**UK**	
	1 year	**3 years**	**1 year**	**3 years**	**1 year**	**3 years**
Period 1960–2001*	-0.82	-3.77	-0.01	-1.27	-0.70	-1.33
Sub-period 1: 1960–79*	1.13	3.68	0.41	-0.11	0.48	0.10
Sub-period 2: 1980–2001*	0.31	0.10	0.40	-1.38	-0.22	-1.23

* (West) Germany: Sample period is 1960–89; sub-period 1: 1960–74; sub-period 2: 1975–89.

Note: Impact of an increase in public spending equivalent to 1 p.p. of GDP; annualised cumulative response of GDP (in p.p. of GDP).

Source: Perotti (2005).

Table 4. Effects of a decline in taxes on GDP (cumulative responses)

	US		(West) Germany		UK	
	1 year	**3 years**	**1 year**	**3 years**	**1 year**	**3 years**
Period 1960–2001*	-1.12	-4.75	0.24	-0.36	-0.33	-1.07
Sub-period 1: 1960–79*	0.69	2.64	-0.22	0.07	0.10	0.16
Sub-period 2: 1980–2001*	-0.43	-2.11	0.02	-0.29	-0.23	-0.91

* (West) Germany: Sample period is 1960–89; sub-period 1: 1960–74; sub-period 2: 1975–89.

Note: Impact of a tax cut equivalent to 1 p.p. of GDP; annualised cumulative response of GDP (in p.p. of GDP).

Source: Perotti (2005).

4.4 Multiplier estimates from selected macroeconometric models

Another empirical approach to estimating the effect of fiscal policies on economic activity is the use of macroeconomic models. A difficulty that presents itself in this approach is that different kinds of models produce diverse results. Differences in theoretical specifications, in the definition of fiscal shocks and in the implementation of these shocks in the model simulation sometimes lead to large variations in the outcomes (Hemming et al., 2002). Crucial to the outcomes are the initial level of government deficits and debt, the way the model handles such variables as monetary policy and exchange rates, the modelling of liquidity constraints that agents may face, the way agents build their expectations about future fiscal policy, inflation and income growth, the duration of the shocks and the expected or unexpected nature of these shocks.

A number of results are given in Table 5. The table presents government spending and tax multipliers from the well-known multi-country econometric models of the IMF (Multimod), the OECD (Interlink) and the European Commission (Quest II). These results are additionally accompanied by estimates that have been produced by other models for major countries and economic areas.

To provide a basis for comparison, the table shows results for four different areas and two different timeframes. The short run is defined as either the first-period impact (the first-year effect for annual models and the first-quarter effect for quarterly models) or the corresponding cumulative, two-period impact. The first column of the table provides information on the model used to produce the multiplier estimate, the institution to which the model belongs, the publication year of the document in which the multipliers were presented, an indication as to the specific conditions under which the multipliers were obtained and a reference to the relevant source in the literature.

Table 5 indicates that, in accordance with what one finds from deriving the textbook open-economy fiscal multipliers, the public spending multipliers are generally greater than the tax cut multipliers.

Table 5. Fiscal multiplier estimates from selected macroeconometric models

Institution, model name, publication year of reference, kind of fiscal policy evaluated	US		Germany		Japan		Euro area	
	Short run	Long run	Short run	Long run	Short run	Long run	Short run	Long run
IMF, Multimod, 2001, higher spending [1/]	–	–	1.2	-0.2	–	–	–	–
IMF, Multimod, 1998, higher spending, exch. rate target [2/]	–	–	–	–	1.5	-0.5	–	–
IMF, Multimod, 1998, higher spending, money target [2/]	–	–	–	–	0.6	-0.3	–	–
IMF, Multimod, 1998, higher spending, inflation target [2/]	–	–	–	–	0.4	-0.2	–	–
IMF, Multimod, 1998, lower taxes [2/]	0.4	-0.1	–	–	–	–	–	–
IMF, Multimod, 1996, higher spending, money target [3/]	1.1	-0.6	–	–	–	–	–	–
IMF, Multimod, 1996, lower taxes, money target [3/]	0.7	-0.2	–	–	–	–	–	–
OECD, Interlink, 2004, specific, higher spending [4/]	–	–	0.9	–	–	–	1.0	–
OECD, Interlink, 2001, specific, higher spending [5/]	1.1	0.1	1.1	-0.2	1.7	0.5	1.2	0.1
OECD, Interlink, 2001, coordinated, higher spending [6/]	1.5	0.2	–	–	2.6	1.0	1.9	0.3
OECD, Interlink, 2001, specific, lower taxes [7/]	0.4	0.4	0.8	-0.1	1.1	0.5	0.5	0.2
European Commission, Quest II, 2004, higher spending [8/]	–	–	0.7	–	–	–	–	–
European Commission, Quest II, 2002, lower spending [9/]	–	–	-0.9	0.0	–	–	–	–
European Commission, Quest II, 2002, lower spending [10/]	–	–	-0.7	0.0	–	–	–	–
European Commission, Quest II, 2001, lower taxes [1/]	–	–	0.4	-0.0	–	–	–	–
European Commission, Quest II, 1997, higher spending [11/]	–	–	0.5	–	–	–	0.9	–
NIESR, NiGEM, 2004, higher taxes [12/]	–	–	-0.7	–	–	–	–	–
NIESR, NiGEM, 2001, lower taxes [1/]	–	–	1.0	0.3	–	–	–	–
ECB, area-wide model, 2004, higher spending [13/]	–	–	–	–	–	–	1.1	–
ECB, area-wide model, 2001, higher spending [14/]	–	–	–	–	–	–	0.9	–
FED, FRB/US, 2002, higher spending [15/]	1.0	–	–	–	–	–	–	–
FED, FRB/US, 2002, lower taxes [16/]	0.4	–	–	–	–	–	–	–
Moody's, 2009, higher spending [17/]	1.6	–	–	–	–	–	–	–
Moody's, 2009, higher spending [18/]	1.4	–	–	–	–	–	–	–
Moody's, 2009, lower taxes [19/]	1.3	–	–	–	–	–	–	–
ESRI, 2001, higher spending [20/]	–	–	–	–	1.1	–	–	–
ESRI, 2001, lower taxes [21/]	–	–	–	–	0.6	–	–	–

Table 5. cont'd

FPB, NIME, 2009, higher spending, Taylor rule [22/]	1.1	-0.5	–	–	0.9	0.5	0.9	0.0
FPB, NIME, 2009, higher spending, interest rate rule [22/]	1.2	0.3	–	–	1.0	0.6	1.0	0.6
FPB, NIME, 2009, lower taxes, Taylor rule [23/]	1.0	-0.4	–	–	0.8	0.3	0.9	0.0
FPB, NIME, 2009, lower taxes, interest rate rule [23/]	1.1	-0.1	–	–	0.9	0.4	1.0	0.6
FPB, NIME, 2009, higher spending, Taylor rule [24/]	1.2	-0.4	–	–	1.1	0.9	1.1	0.3
FPB, NIME, 2009, lower taxes, Taylor rule [25/]	1.1	-0.4	–	–	1.0	0.5	1.0	0.1

Sources:

[1/] As reported in Gros and Hobza (2001).

[2/] Laxton et al. (1998).

[3/] As reported in Hemming et al. (2002).

[4/] As reported in Henry et al. (2004); permanent 1 p.p. of GDP increase of government consumption with respect to the baseline.

[5/] Dalsgaard et al. (2001); country-specific shock; permanent 1 p.p. of GDP increase of government consumption of goods & services with respect to the baseline; constant real interest rates; constant nominal exchange rates.

[6/] Dalsgaard et al. (2001); worldwide coordinated shock; permanent 1 p.p. of GDP increase of government consumption of goods & services with respect to the baseline; constant real interest rates; constant nominal exchange rates.

[7/] Dalsgaard et al. (2001); country-specific shock; permanent 1 p.p. of GDP cut in taxes on labour income with respect to the baseline; constant real interest rates; constant nominal exchange rates.

[8/] As reported in Henry et al. (2004); permanent 1 p.p. of GDP increase of government consumption with respect to the baseline.

[9/] Roeger and in 't Veld (2002); temporary 1 p.p. of GDP decline of government consumption of goods & services with respect to the baseline; restrictive monetary policy.

[10/] Roeger et al. (2002); temporary 1 p.p. of GDP decline of government consumption of goods & services with respect to the baseline; accommodative monetary policy.

[11/] Roeger and in 't Veld (1997); temporary 1 p.p. of GDP increase of government consumption of goods & services with respect to the baseline; EMU interest-rate targeting.

[12/] Al-Eyd and Barrell (2004); temporary 1 p.p. of GDP increase of taxes on labour income with respect to the baseline; no fiscal solvency rule; autonomous monetary policy.

[13/] As reported in Henry et al. (2004); permanent 1 p.p. of GDP increase of government consumption with respect to the baseline.

[14/] Fagan et al. (2001); permanent 1 p.p. of GDP increase of government consumption with respect to the baseline.

[15/] Elmendorf and Reifschneider (2002); permanent 1 p.p. of GDP increase of government consumption of goods & services.

[16/] Elmendorf et al. (2002); permanent 1 p.p. of GDP tax cut on wage income.

[17/] Zandi (2009); multiplier of a temporary increase of government spending on infrastructure.

[18/] Zandi (2009); multiplier of a temporary increase of government spending on aid to state governments.

[19/] Zandi (2009); multiplier of a temporary payroll tax cut.

[20/] Hori et al. (2001); permanent 1 p.p. of GDP increase of government investment with respect to the baseline.

[21/] Hori et al. (2001); permanent 1 p.p. of GDP cut in taxes on labour income with respect to the baseline.

[22/] Belgian Federal Planning Bureau (2009, unpublished); country-specific shock; permanent 1 p.p. of GDP increase of government consumption of goods & services with respect to the baseline; no fiscal solvency rule.

[23/] Belgian Federal Planning Bureau (2009, unpublished); country-specific shock; permanent 1 p.p. of GDP cut in taxes on labour income with respect to the baseline; no fiscal solvency rule.

[24/] Belgian Federal Planning Bureau (2009, unpublished); worldwide coordinated shock; permanent 1 p.p. of GDP increase of government consumption of goods & services with respect to the baseline; no fiscal solvency rule.

[25/] Belgian Federal Planning Bureau (2009, unpublished); worldwide coordinated shock; permanent 1 p.p. of GDP cut in taxes on labour income with respect to the baseline; no fiscal solvency rule.

For the US, short-term spending multipliers lie between 1 and 1.6 and short-term tax cut multipliers lie between 0.4 and 1.3. For the euro area, the textbook open-economy spending multiplier can be expected to be around 1.2 and the tax cut multiplier around 0.4. Macroeconometric model estimates of short-term spending multipliers for the euro area appear to lie between 0.9 and 1.9, while the short-term tax cut multiplier estimates generally lie between 0.5 and 1.0. Hence, notwithstanding the wide degree of variation in the model estimates of fiscal multipliers, the basic textbook multipliers appear to correspond relatively well to the average of multiplier estimates produced by standard macroeconometric models.

Table 5 also shows that government spending multipliers are always positive in the short run but can be negative in the long run. Spending multipliers fall into a relatively wide range. The highest reported spending multiplier is 2.6 in the short run for Japan and 1.6 in the long run for the US. The lowest spending multiplier is 0.4 in the short run for Japan and -0.6 in the long run for the US. The highest reported short-term tax cut multiplier is 1.3 for the US; the highest long-term tax cut multiplier is 0.6 for the euro area. The lowest tax cut multipliers are for the US: the lowest short-term estimate is 0.4, while the lowest long-term estimate is -0.4.

The table indicates that the estimates of a multiplier can vary widely, depending notably on the underlying simulation assumptions. Results from the IMF's Multimod model show that the public spending multiplier can fall from 1.5 in the case of an exchange rate-targeting rule, to just 0.4 in the case of an inflation-targeting rule. Results have also been shown to be sensitive to assumptions regarding international fiscal policy coordination. Indeed, results from the OECD's Interlink model indicate that the public spending multiplier can fall from 1.5 under international policy coordination to 1.1 in the case of country-specific measures.

4.5 Multiplier estimates from selected DSGE and general equilibrium models

The European Commission's new Quest III model, which is a dynamic stochastic general equilibrium (DSGE) model for the euro area, indicates that in the short run and under favourable conditions of highly liquidity-constrained agents, a permanent 1 percentage point (p.p.) of GDP increase in government consumption of goods and services with respect to the baseline raises euro area GDP by 0.9%. A permanent 1 p.p. of GDP increase in government investment in relation to the baseline raises GDP by 1.1%, while a permanent 1 p.p. of GDP cut in taxes on labour income from the baseline raises GDP by 0.6% (Ratto et al., 2008) (Table 6).

Table 6. Multiplier estimates from the European Commission's Quest III model

	Short run	**Long run**
Government consumption	0.89	-0.05
Government investment	1.05	0.24
Transfers	0.59	-0.04
Investment tax credit	1.66	0.37
Cut in labour taxes	0.60	0.00
Cut in consumption taxes	0.68	-0.04

Source: Ratto et al. (2008).

Simulations carried out with the IMF's New Keynesian Global Integrated Monetary and Fiscal Model indicate that a worldwide coordinated increase in government consumption has a short-term GDP multiplier of 3.9 under the assumption of monetary accommodation and of 1.6

assuming no monetary accommodation (Freedman et al., 2009). Increases in transfers targeted at liquidity-constrained households have a short-term GDP multiplier of 1.7 under the assumption of monetary accommodation and of 0.5 assuming no monetary accommodation.

For the US, an increase in government investment has a short-term GDP multiplier of 3.9 in the case of a worldwide coordinated measure; the multiplier falls to 2.4 if the US is alone in implementing the stimulus measure. For Japan, an increase in targeted transfers from government has a short-term GDP multiplier of 1.5 under worldwide coordination; the multiplier falls to just 0.5 if Japan is alone in implementing the measure. The model results thus appear to be very sensitive to various assumptions, especially on expectations as to long-term fiscal sustainability, liquidity constraints, policy coordination and monetary policy.

Other simulations carried out with the IMF's general equilibrium Global Fiscal Model indicate that a temporary tax cut leads to a long-term fall in GDP of -1.25% for a large economy and to a long-term fall in GDP of -0.33% for a small economy (Botman and Kumar, 2006). These results, however, are very sensitive to assumptions concerning the planning horizon of consumers, liquidity constraints and the characteristics of the production functions. Indeed, a longer planning horizon leads to a decline in GDP of -0.23% for a large economy and a lower intertemporal elasticity of substitution leads to a decline in GDP of -2.63% for a large economy.

Still other results indicate that the coordination of fiscal and monetary policies is crucial to the evaluation of multipliers (Eggertsson, 2006). Under policy coordination, the public spending multiplier lies between 3.4 and 3.8; in the absence of coordination, the public spending multiplier is measured to be between 0 and 3.4.

4.6 What conclusions can be drawn from model-based multiplier analyses?

Evidence on multipliers from empirical macroeconomic models leads to a number of important conclusions. Looking at all the results compiled from narrative records, VAR impulse responses, econometric models and general equilibrium models, the range of multipliers is very wide indeed. Government spending multipliers vary between -3.8 and +3.8; tax cut multipliers vary between -4.8 and +3.0 (Table 7).

Table 7. Range of fiscal multiplier estimates for the US

	Narrative record models		VAR/SVAR models		Econometric models		GE / DSGE models	
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Public spending multipliers	1.0	1.4	-3.77	3.68	-0.6	1.6	0.0	3.9
Tax cut multipliers	–	3.0	-4.75	2.64	-0.4	1.3	-2.63*	-0.23*

* Results for a large economy from the IMF's Global Fiscal Model – see Botman and Kumar (2006).

Source: Author's compilation.

Results vary most widely for the multiplier estimates derived from VAR models. Nevertheless, it has been shown that estimates are very sensitive to specifications and assumptions in all kinds of empirical models. Studies have highlighted the important role of the monetary-policy reaction function in multiplier evaluations, underscoring the necessity of coordination between fiscal and monetary policies.

Results also indicate that exchange rates play a crucial role in open-economy models, underscoring here the importance of international policy coordination. Finally, another set of

model features or assumptions are found to be critical in deriving multiplier estimates – more specifically those linked to the way the model handles liquidity constraints, credibility issues regarding long-term fiscal balance, forward-looking behaviour and rationality issues.

Given these wide-ranging results and their high sensitivity to models and assumptions, it is difficult to object to Perotti (2000) when he notes, "Contrary to what the policy discussion seems to take for granted, there is clearly no consensus even on the basic effects of government spending on output and its components. …In light of these results, what is perhaps most surprising is the apparent confidence that inspires policymakers – and many economists – when evaluating and proposing fiscal policy measures."

5. An empirical evaluation of the effectiveness of selected fiscal stimulus measures in the euro area

> *Our criticism of the accepted classical theory of economics has consisted not so much in finding logical flaws in its analysis as in pointing out that its tacit assumptions are seldom or never satisfied, with the result that it cannot solve the economic problems of the actual world.*
>
> John Maynard Keynes (1936)

In this section, we present results from simulations carried out with the Federal Planning Bureau's world macroeconometric model with a view to testing the effects of various fiscal stimulus measures in the euro area.

Notwithstanding the controversies surrounding the effectiveness of fiscal policy and the diverse results of numerous kinds of models functioning under complex and varied assumptions, it is still useful in terms of policy discussion and implementation to have at least tentative evaluations of policy options. In view of this, a choice of tools is necessary. In the evaluation that is presented below of the currently planned fiscal-stabilisation packages of various national governments, results are produced using the Federal Planning Bureau's NIME model. NIME is a relatively standard macroeconometric model of the world economy, which is demand-driven in the short run but fully supply side-determined in the long run (Meyermans and Van Brusselen, 2001). Grounded in Paul A. Samuelson's "neoclassical synthesis" tradition of macroeconomics, the model is a straightforward macroeconometric model, dispensing with the raft of strong assumptions (e.g. perfect foresight, rational expectations, complete and efficient markets) that are commonly found in both real business cycle (RBC) and DSGE models grounded in New Classical and New Keynesian macroeconomics (Buiter, 2009a; Krugman, 1998a).

5.1 Evaluation of various economic stimulus measures

The European Commission's European economic recovery plan (European Commission, 2008) of 26 November 2008 called for the swift implementation of a public spending increase and tax reduction programme in order to mitigate the effects of the current economic downturn on European output and employment. Various possible policy options could be chosen from a 'menu', and consist of either aid for enterprise investments (e.g. through direct aid and loan guarantees), other public works programmes, tax cuts aimed at boosting consumption expenditure or cuts in social security contributions with a view to increasing demand for labour.

Given the stated desire to obtain the greatest possible effect of the fiscal measures on the euro area's output and employment, it is important to have an idea as to the relative potency of the various stimulus options. The potential macroeconomic effects of the different types of measures available in this open menu were analysed using the Federal Planning Bureau's NIME model.

All of the evaluations were carried out by calibrating the magnitude of the measure so that it would correspond to a temporary increase in net public spending equal to 1% of the euro area GDP of 2008 (estimated at €92.1 billion), solely implemented in the euro area and entirely done so in 2009. Public income and expenditure schedules were assumed to revert to 'business as usual' in terms of their evolution (but not in terms of levels) as of 2010.

Four types of fiscal stimulus policies were evaluated:

1) an increase in the public consumption of goods and services;

2) an increase in subsidies targeting enterprise-sector investment;

3) a reduction in social security contributions; and

4) a reduction in indirect taxation.

All of the variants were run under the assumptions that the net increase in public spending was debt-financed, that this net increase in government outlays was monetised by the ECB (i.e. accommodated through standard open-market operations that allow for an increase in the money base) and that it would not lead to an on-impact (in 2009) rise in market interest rates through the crowding-out of private-sector investment plans. The euro area's monetary policy was left free to operate over the remaining 2010–15 period, however, following the usual Taylor-type rule in which policy interest rates drive the short-term market interest rate in reaction to the area's output gap and to the deviation of actual inflation from the monetary authorities' target rate of inflation.

In these simulations, households determine their consumption expenditure in a "permanent income/life cycle hypothesis" framework, where current consumption is a function of, for example, liquidity constraints on current household disposable income and of expected future income (Meyermans and Van Brusselen, 2001). Furthermore, while the model can be run under the constraint of a long-term fiscal solvency rule, this rule was not implemented in the simulation of the fiscal stimulus measures. The four policy variants were simulated for up to five years after the initial implementation of the shocks, to allow for an evaluation of both their respective short- and medium-term effects.

5.2 Summary analyses of the four variants

5.2.1 Effects of an increase in government consumption

This variant is identified in Tables 8 to 12 in section 5.3 using the label 'GC' for government consumption. The variant consists of a €92 billion increase in government consumption of goods and services in 2009, compared with the baseline level. The measure simulated is a one-year level increase: the level of government consumption is raised significantly in 2009, without any matching reduction in levels in the following years.

In 2009, the variant leads to a 9.8% increase in real public spending relative to the baseline. Real GDP increases by 1%, while real private consumption rises by 0.3%. Employment rises by 0.18% (i.e. about 265,000 new jobs). The measure deteriorates the euro area's net budgetary position (as a percentage of euro area GDP) by about 0.7 percentage points. After 2009, real

GDP gradually falls back towards the baseline level. Real GDP is just 0.25% above the baseline in 2014, while real private consumption falls 0.25% below the baseline in 2014. The net budgetary position continues to worsen, falling to 1.2 p.p. below the baseline in 2014. Consumer price inflation rises to 0.27 p.p. above the baseline in 2011 and then declines.

Over the medium run, the initial positive impact on real output and employment is gradually eroded. Indeed, consumer prices rise throughout the simulation period, even though the inflation rate tends to fall back gradually towards its baseline level as unemployment rises above the baseline. Private-sector unit labour costs, which are initially reduced, tend to rise slowly back towards their baseline level. The rise in domestic prices is accompanied by a nominal effective appreciation of the euro, leading to regular losses of export volumes and increases in the area's current account deficit.

5.2.2 Effects of an increase in government-subsidised private investment

This variant is identified in Tables 8 to 12 by the label 'IP' for investment by the private sector. The variant consists of a €92 billion increase in government subsidies granted for private sector investment in 2009 compared with the baseline level. This could be seen as the public sector deciding on a public works programme and paying private sector firms to carry out the investment plan. The measure that is simulated corresponds to a one-year level increase in private sector investment: the level of private sector investment is raised significantly in 2009 but this rise is not followed by any matching reduction in the level in later years.

In 2009, the variant leads to a 7.0% increase in real private-sector investment relative to the baseline. Real GDP increases by 1.2%, while real private consumption rises by 0.8%. Employment grows by 0.25% (i.e. about 357,000 new jobs). The measure deteriorates the euro area's net budgetary position (as a percentage of euro area GDP) by about 0.5 percentage points. After 2009, real GDP declines gradually, ending up below the baseline level in the medium term. Real GDP falls -0.2% below the baseline level in 2014, while real private consumption falls -0.9% below the baseline in 2014. The net budgetary position continues to worsen, reducing to 1.0 p.p. below the baseline in 2014. Consumer price inflation drops on impact by 0.44 p.p., rises to 0.49 p.p. above the baseline in 2010 and subsequently declines to just 0.09 p.p. above the baseline rate by 2014.

Over the medium term, the initial positive impact on real output and employment gradually diminishes. There is a rise in consumer prices throughout the simulation period, despite the gradual fall in the inflation rate towards its baseline level as unemployment surges above the baseline. After an initial decline, private-sector unit labour costs also tend to creep back towards their baseline level. Alongside the growth in domestic prices is a nominal effective appreciation of the euro, leading to regular losses of export volumes and increases in the area's current account deficit.

5.2.3 Effects of a reduction in social security contributions

This variant is identified in Tables 8 to 12 by the label 'SS' for social security contributions. The variant consists of a reduction in the model's implicit macroeconomic rate of social security contributions, allowing for an *ex ante* €92 billion decline in social contributions in 2009 compared with the baseline level. The simulated measure corresponds to a one-year level decline in the rate of social contributions: the social contributions rate is reduced in 2009 but this reduction is not followed by any matching hike in its level in subsequent years.

In 2009, the variant leads to a 0.7% increase in real GDP, while real private consumption rises by 1.1% and employment by 0.15% (i.e. about 225,000 new jobs). The measure deteriorates the

euro area's net budgetary position (as a percentage of euro area GDP) by about 0.7 percentage points. After 2009, real GDP gradually falls, reaching just 0.2% above the baseline by 2014. Real private consumption holds up, reaching 1.0% above the baseline in 2014. Employment progressively declines and falls to 0.06% below the baseline in 2014. The net budgetary position continues to worsen, falling to 1.0 p.p. below the baseline in 2014. Consumer price inflation rises to 0.19 p.p. above the baseline in 2011 but subsequently declines to just 0.15 p.p. above the baseline rate by 2014.

Over the medium term, the initial positive impact on real output and employment deteriorates, although household incomes and consumption benefit from a more persistent boost. Consumer prices rise throughout the simulation period, even though the inflation rate tends to fall back gradually towards its baseline level as unemployment slowly rises above the baseline. Private-sector unit labour costs, which fall sharply at first, give up a large part of their initial reduction. The rise in domestic prices is accompanied by a nominal effective appreciation of the euro, leading to regular losses of export volumes and increases in the area's current account deficit.

5.2.4 Effects of a reduction in indirect taxation

This variant is identified in Tables 8 to 12 by the label 'IT' for indirect taxation. The variant consists of a reduction in the NIME model's implicit macroeconomic rate of indirect taxation, allowing for an *ex ante* €92 billion decline in indirect tax receipts in 2009, compared with the baseline level. The simulated measure corresponds to a one-year level decline in the implicit indirect tax rate: the implicit indirect tax rate is reduced in 2009 but this reduction is not followed by any matching hike in its level in subsequent years.

In 2009, the variant leads to a 0.3% increase in real GDP, while real private consumption rises by 0.6% and employment by 0.10% (i.e. about 143,000 new jobs). The measure deteriorates the euro area's net budgetary position (as a percentage of euro area GDP) by about 0.7 percentage points. After 2009, real GDP immediately falls below the baseline, reaching 0.3% below the baseline in 2014. Real private consumption also declines, reaching 0.7% below the baseline in 2014. Employment gradually falls to 0.06% below the baseline in 2014. The net budgetary position continues to worsen, falling to 1.0 p.p. below the baseline in 2014. Consumer price inflation reduces on impact by 0.45 p.p., rises to 0.30 p.p. above the baseline in 2010 and subsequently declines to 0.03 p.p. below the baseline in 2014.

The initial positive but limited impact on real output is lost as of the year following the implementation of the indirect tax cut. The initial employment gains are gradually eroded over the medium run. There are steep falls in consumer prices on impact but prices return to the baseline after three years. The measure reduces real private-sector wage costs and unit labour costs. Unemployment declines initially but rises above the baseline in the medium term. After an initial effective appreciation of the euro, the area's currency steadily depreciates over the medium term. The gradual decrease in real domestic demand and the effective currency depreciation lead to a significant drop in import volumes and a parallel increase in exports, which limit the deterioration of the area's current account to GDP ratio.

5.3 Comparison of the simulation results for the various stimulus options

In this section, we highlight the main effects of the above four fiscal stimulus variants on the euro area economy in terms of impacts on GDP, employment level, inflation rate and the euro area's consolidated fiscal position as a percentage of GDP, as well as the area's current account balance as a percentage of GDP.

Table 8 shows that on impact (in 2009), an increase in government-financed investment projects (IP) produces the greatest rise in euro area GDP. Cuts in indirect taxes (IT) produce the smallest effect. Generally, we observe that public spending increases have greater effects than reductions in taxation. But reductions in labour costs through cuts in social contributions (SS) tend to have relatively positive and persistent effects on output.

Table 9 indicates that on impact, an increase in government-financed investment (IP) produces the greatest rise in euro area employment. Cuts in indirect taxes (IT) produce the smallest short-term effect. All of the stimulus measures lead to employment falling below the baseline level in the long run, but the long-term decline is smallest in the case of reductions in social contributions (SS).

Table 10 shows that by the second year of implementation, an increase in government-financed investment projects (IP) produces the greatest rise in euro area inflation, pushing the inflation rate above the baseline rate by 0.49 percentage points. Cuts in indirect taxes (IT) produce only a modest uptick in short-term inflation, but lead to a decline in inflation in the long run.

Table 11 reveals that all of the fiscal stimulus measures lead to a persistent deterioration in the consolidated, government fiscal position of the euro area. The short-term impact is smallest in the case of an increase in government-financed investment projects (IP), and is largest in the case of an increase in government consumption of goods and services.

Table 12 shows that all of the fiscal stimulus measures lead to a deterioration in the euro area's current account balance. In the short run, the effect is largest in the case of an increase in government-financed investment projects (IP) and is smallest in the case of a cut in indirect taxes (IT). Increased government consumption (GC) leads to steeper declines, while the reductions brought about by cuts in indirect taxes (IT) disappear in the longer run.

Table 8. Impacts on real GDP (deviation from the baseline, in %)

	2009	**2010**	**2011**	**2012**	**2013**	**2014**
GDPO_GC	1.0	0.9	0.6	0.5	0.3	0.2
GDPO_IP	1.2	0.6	0.3	0.0	-0.1	-0.2
GDPO_SS	0.7	0.6	0.5	0.4	0.3	0.2
GDPO_IT	0.3	-0.1	-0.2	-0.3	-0.3	-0.3

Source: NIME model, Belgian Federal Planning Bureau.

Table 9. Impacts on employment (deviation from the baseline, in %)

	2009	**2010**	**2011**	**2012**	**2013**	**2014**
N_GC	0.18	0.16	0.09	-0.01	-0.08	-0.11
N_IP	0.25	0.25	0.14	0.01	-0.10	-0.17
N_SS	0.15	0.24	0.22	0.13	0.02	-0.06
N_IT	0.10	0.13	0.10	0.04	-0.01	-0.06

Source: NIME model, Belgian Federal Planning Bureau.

Table 10. Impacts on the inflation rate (deviation from the baseline, in p.p.)

	2009	2010	2011	2012	2013	2014
PCHR_GC	0.01	0.23	0.27	0.25	0.22	0.19
PCHR_IP	-0.44	0.49	0.35	0.23	0.15	0.09
PCHR_SS	0.01	0.15	0.19	0.18	0.16	0.15
PCHR_IT	-0.45	0.30	0.14	0.04	0.00	-0.03

Source: NIME model, Belgian Federal Planning Bureau.

Table 11. Impacts on the net lending position of (consolidated) government in the euro area (deviation from the baseline, in p.p. of GDP)

	2009	2010	2011	2012	2013	2014
NLGR_GC	-0.7	-0.8	-0.9	-1.1	-1.1	-1.2
NLGR_IP	-0.5	-0.6	-0.8	-0.9	-1.0	-1.0
NLGR_SS	-0.7	-0.7	-0.8	-0.9	-0.9	-1.0
NLGR_IT	-0.7	-0.8	-0.9	-0.9	-1.0	-1.0

Source: NIME model, Belgian Federal Planning Bureau.

Table 12. Impacts on the current account position (deviation from the baseline, in p.p. of GDP)

	2009	2010	2011	2012	2013	2014
CAR_GC	-0.22	-0.19	-0.25	-0.35	-0.44	-0.53
CAR_IP	-0.30	-0.31	-0.32	-0.38	-0.42	-0.43
CAR_SS	-0.15	-0.15	-0.19	-0.26	-0.33	-0.39
CAR_IT	-0.11	-0.16	-0.13	-0.13	-0.11	-0.07

Source: NIME model, Belgian Federal Planning Bureau.

5.4 Fiscal policy effectiveness: Aligning policy objectives with instruments

Table 13 allows for a comparison of the four fiscal stimulus variants that were simulated for the euro area with the NIME model, indicating with an 'X' those instruments that appear to be the most effective in relation to selected policy objectives. The instruments are evaluated with respect to both their short-term (ST) and medium-term (MT) impacts.

The European EcoFin Council of 2 December 2008 reaffirmed the view that a European-wide economic stimulus plan should aim at maximising its short-term effect on real GDP (Council of the European Union, 2008).

Table 13 indicates that if a government's objective is indeed to maximise the short-term impact of its stimulus package on real GDP, then the optimal policy instrument should consist of a government-financed increase in private sector investment. In the medium term, however, it is an increase in government consumption of goods and services that would provide the greatest effectiveness.

Table 13. Policy objectives and instrument optimality

	GDP		Employment		Inflation		Fiscal balance		External balance	
	ST	**MT**	**ST**	**MT**	**ST**	**MT**	**ST**	**MT**	**ST**	**MT**
Increased public consumption		X								
Public-financed investment	X		X				X	X		
Social contributions cuts				X	X	X				
Indirect tax cuts									X	X

Note: 'X' identifies the variant exhibiting the best relative performance in relation to each specific objective.
Source: Author's compilation.

If the objective were to maximise the short-term impact of the measures on employment, then the optimal policy would consist of an increase in government subsidies to private sector investment.

All four policy variants simulated with the NIME model exhibit similar negative effects on the consolidated net budgetary position of the euro area. Government subsidies aimed at increasing private sector investment would lead to only marginally less negative results.

All of the policy variants that were tested also generate negative effects on the euro area's consolidated current account position. Higher public investment produces the largest initial deterioration in the area's external account, but increased government consumption of goods and services appears to have a somewhat more negative long-term impact. Cuts in indirect taxes also lead to a deterioration in the euro area's current account balance, but these negative short-term effects are more limited than for the three other variants. Furthermore, these negative effects tend to dissipate in the long run.

6. Potential effects of a euro area-wide economic recovery plan

This section presents a tentative evaluation of the size of the national recovery plans put forward by individual EU governments in the wake of the European Commission's recovery plan proposal. The macroeconomic effects of the effective implementation of these plans have been evaluated with the NIME model. The main effects of the implied recovery plan for the euro area and of the American Recovery and Reinvestment Act of 2009 for the US are presented in terms of deviations from a baseline scenario that does not include these measures.

5.5 The European economic recovery plan

In its European economic recovery plan of 26 November 2008, the European Commission called for the swift implementation of a public spending or tax cut programme (or both) of roughly 1.5% of the EU's GDP (European Commission, 2008). This would come in the form of various channels of aid for business investments (e.g. through direct aid and loan guarantees), other public works programmes, tax cuts aimed at boosting consumption expenditure and cuts in social security contributions to stimulate labour demand. The recovery plans could allow EU member states to engage in temporary fiscal stabilisation (deficit spending) and increase their budget deficits without violating the terms of the EU's revised stability and growth pact. More specifically, the clause on "exceptional circumstances" in the pact allows countries to post

temporary and limited budget deficits[3] as long as their medium-term, cyclically-adjusted budgetary position is projected to return to balance or surplus.

Even though the EcoFin Council of 2 December 2008 approved the Commission's proposed recovery plan, it still seems unlikely that the Commission's proposal of an EU-wide, fiscal stimulus package of 1.5% of GDP overall will be implemented in full. Indeed, by late February 2009, the sum of fiscal stimulus (public spending and tax cut) measures put forward by EU governments was estimated to have reached €106 billion at the level of the 27 EU member states (Saha and von Weisäcker, 2009). If one adds to this figure the €263.8 billion in measures put forward in the form of government loan and credit guarantees for non-financial enterprises, one comes up with a total EU-wide commitment of €369.8 billion. For the euro area[4] (euro-12), direct fiscal measures are estimated to total €73 billion. Additional credit and loan guarantees to non-financial corporates could provide another €169.9 billion, leading to a grand total of €271.6 billion or 3% of the estimated nominal GDP of 2008 at the euro-12 level.

6.1 The macroeconomic effects of fiscal stabilisation plans in the euro area

Although the total figure of €369.8 billion budgeted in the framework of the economic recovery plans of the 27 EU member states is impressive, a large share of this sum consists of credit and loan guarantees extended by national governments to the non-financial corporate sector. These guarantees and credit lines constitute large contingent liabilities for governments; however, a figure for an effective fiscal stimulus that includes this support most likely overestimates the true impact of the stimulus plans in terms of their potential effects on real economic output and employment (Rodrik, 2009; Truman, 2009).

In view of assessing the potential real output effects of these plans, we assume that the effective stimulus will consist of the fiscal spending and tax cut measures announced, to which we add half of the amount budgeted under the heading of credit lines and loan guarantees to the non-financial business sector. For the euro-12 area, this would produce a total effective economic stimulus package of €157.9 billion, representing 1.7% of the euro-12's nominal GDP of 2008.

Automatic fiscal stabilisers will of course also provide significant boosts to growth. Even so, these endogenous impulses will not be the object of the evaluation of fiscal packages. As Table 14 shows, the role of automatic fiscal stabilisers is often important, sometimes providing support to the economy that is equal to or greater than that of the discretionary impulses. Given the size of the support provided by the automatic stabilisers and the limited 'fiscal space' they have, governments in some EU member states have concluded that implementing large discretionary fiscal stabilisation plans would pose too great a risk to the longer-term sustainability of their fiscal balance (IMF, 2009b).

Table 14 shows that while the US may have put in place a fiscal stimulus package that is significantly larger than the aggregate fiscal stimulus plan of the major euro-area countries, the latter countries have allowed for a substantial counter-cyclical stimulus from their automatic fiscal stabilisers. This latter approach can be viewed as an explanation (or compensation) for the more modest efforts geared towards large, discretionary, fiscal stabilisation packages.

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[3] See Article 1 of Council Regulation (EC) No. 1056/2005 on exceptional excessive deficits.

[4] The 'euro area' in the NIME model comprises the following 12 countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Spain and Portugal.

Table 14. Effects of automatic fiscal stabilisers on the fiscal balance (average annual change in 2008–10 compared with 2007, in % of GDP)

	Change in the overall fiscal balance due to a change in automatic fiscal stabilisers	**Change in the overall fiscal balance due to a change in discretionary measures**
France	-2.4	-0.4
Germany	-1.6	-1.1
Italy	-2.6	-0.1
Japan	-2.2	-0.7
UK	-2.5	-0.5
US	-1.6	-1.6

Source: IMF (2009a).

In evaluating the macroeconomic effects of the euro-area economic recovery package, we assume the presence of both inside and outside implementation lags, leading to a spend-out schedule in which half of the package impacts the euro-12 economy in 2009 and the remaining half does so in 2010. For the sake of simplicity, we assume that the entire increase in public spending comes in the form of increased consumption of goods and services and that the reductions in taxes take the form of temporarily lower taxes on labour income. In both cases, we opt for policy measures that are associated with what can be viewed as relatively high short-term multiplier effects; the simulation thus arguably provides an upper bound on the macroeconomic effects that can be expected from the NIME model for the euro-12 economic stabilisation plans.

Finally, the recovery plans are simulated using a baseline projection that corresponds to a projection of the world economy in the current economic environment. This allows the macroeconomic effects of the stimulus plan to capture possible state-dependent effects from prevailing low inflation, low – but still positive – nominal short-term interest rates, rising unemployment and rising household saving rates in the euro-12 area.

The main macroeconomic effects of the euro-area fiscal stabilisation plan are presented in Table 15. In the first year of its implementation, the plan would raise euro-12 GDP by 0.77% with respect to the baseline. The initial effect of the euro-12 recovery plan would be to increase private sector output, creating about 200,000 jobs in response to the rise in public consumption. The ensuing rise in household income then goes on to raise private consumption expenditure.

The second half of the stimulus package affects the economy in 2010, raising GDP by 0.62%. This lesser impact stems from a number of factors. First, the somewhat higher inflation reduces the size of the real amount of stimulus in 2010. Second, a larger part of the stimulus package leaks out in the form of higher real imports, which produce a deterioration in the area's current account balance. Finally, the fiscal stimulus leads to a slight increase in nominal interest rates as the area's negative output gap is reduced and as inflation picks up.

Over the period 2011–15, the effects of the stimulus package on output decline and real GDP gradually falls back towards its baseline level. As of 2012, higher inflation, higher interest rates and import leakages reverse the initial employment gains. The area's fiscal position deteriorates by a full percentage point of GDP while the area's current account deteriorates by 0.58 p.p. of GDP.

Table 15. Main effects of the euro-area economic recovery plan (deviations from the baseline level in %, except where otherwise noted)

	2009	2010	2011	2012	2013	2014	2015
Real GDP	0.77	0.62	0.45	0.31	0.19	0.11	0.06
Real private consumption	0.23	0.18	0.10	0.05	0.00	-0.04	-0.08
Employment	0.14	0.11	0.06	-0.02	-0.07	-0.10	-0.10
Employment (difference, in thousands of persons)	200	163	84	-25	-107	-150	-149
Consumer price inflation rate (difference, in p.p.)	0.00	0.22	0.50	0.76	0.99	1.19	1.35
Nominal short-term interest rate (difference, in p.p. of GDP)	0.17	0.34	0.44	0.47	0.44	0.39	0.33
Nominal effective exchange rate	-0.20	-0.58	-1.00	-1.49	-1.90	-2.18	-2.35
Fiscal position (difference, in p.p. of GDP)	-0.60	-0.67	-0.75	-0.85	-0.92	-0.98	-1.03
Current account position (difference, in p.p. of GDP)	-0.19	-0.21	-0.28	-0.37	-0.46	-0.53	-0.58

Notes: No international fiscal policy coordination: the fiscal stimulus is simulated solely for the euro-12 area.

Short-term interest rates are endogenously determined by a Taylor-type rule.

Exchange rates are endogenously determined by an uncovered interest parity condition; a minus (-) sign indicates currency appreciation.

No long-term fiscal solvency rule is imposed.

Source: NIME model, Belgian Federal Planning Bureau.

6.2 Alternative evaluations of the euro-area fiscal stimulus plan

To date, unfortunately, few alternative evaluations of the fiscal packages of EU countries have been made public. There are a number of evaluations of the budgetary size of the government fiscal and financial plans announced, but usually without an evaluation of the macroeconomic effects of these packages.

There is an initial difficulty associated with obtaining a reasonable evaluation of the effective size of a package, as a percentage of GDP. This is problematic because many of the national stabilisation plans bundle tax, public spending and contingent, "below-the-line" financial market measures (Rodrik, 2009; Truman, 2009). A second difficulty lies in the evaluation of the direct and indirect effects of the 'true' economic stimulus measures on the various economies.

The European Commission has proposed guidelines for a potential, coordinated, EU-wide fiscal stabilisation plan. But the Commission has not proposed a macroeconomic assessment of the national plans that have been announced in this framework.

An analysis that provides a comparison for the NIME results was published by the IMF in preparation for the London meeting of the Group of 20 on 2 April 2009 (IMF, 2009b). The IMF's study is based on a fiscal-multiplier approach and it makes use of the national economic recovery plans that had been announced and made available in late January 2009. It indicates that the euro-12 stimulus packages contain provisions for fiscal boosts equivalent to 0.90% of euro-12 GDP for 2009 and 0.76% of euro-12 GDP for 2010. These plans are expected to effectively raise euro area GDP by 0.26% to 0.74% in 2009 and by 0.05% to 0.33% in 2010 (Table 16).

Table 16. An IMF evaluation of the GDP effects of euro-area stimulus plans

	2009	2010
Real GDP level: Low estimate (% change from the baseline)	0.26	0.05
Real GDP level: High estimate (% change from the baseline)	0.74	0.33

Note: GDP-weighted average of results for France, Germany, Italy and Spain.

Source: Own computations based on IMF data.

The overall size of the fiscal packages that were evaluated in the IMF and NIME analyses are quite similar; the results are also relatively close, as the NIME analysis estimates that the fiscal measures will raise euro-12 GDP by about 0.77% in 2009 and by 0.62% in 2010.

In another IMF publication (Freedman et al., 2009), the size of the euro-area fiscal stimulus package is estimated at 0.9% of GDP in 2009 and at 0.8% of GDP in 2010. This is roughly equal to the stimulus package that was simulated with the Federal Planning Bureau's NIME model. The measures affecting the economy in 2009 would lead to a rise in the level of euro-area real GDP of 0.5% relative to a 'no stimulus' scenario; the measures affecting 2010 would raise the level of euro-area real GDP by 0.3% relative to a 'no stimulus' baseline. These results are significantly smaller than those produced with the NIME model.

7. Potential effects of the US economic recovery plan

This section first presents the American Recovery and Reinvestment Act of 2009. The macroeconomic effects of the implementation of this stimulus plan were evaluated with the NIME model. The model results are presented in terms of deviations from a baseline scenario that does not include the plan's public spending or tax cuts.

7.1 The American Recovery and Reinvestment Act of 2009

Only days after taking office, President Barack Obama's new administration drafted an economic stimulus plan that, it was hoped, would limit the scale of the recession the US had tipped into in December 2007. A large fiscal stimulus plan, the American Recovery and Reinvestment Act (ARRA) of 2009 (Public Law 111-5), was signed into law on 17 February 2009. The ARRA called for the swift implementation of a public spending and tax cuts programme that would inject a net $787 billion into the country's economy, which corresponds to 5.52% of the estimated US GDP of 2008.

The ARRA devotes $288 billion (37% of the total package) to tax cuts, with the rest of the fiscal measures coming in the form of higher public spending. The package aims at boosting public spending on infrastructure, education, health, investment in energy efficiency and on block grants for state and local fiscal relief. It also contains tax cuts designed to raise consumption expenditure and cuts in payroll taxes to stimulate labour demand. The implementation of the ARRA will span the period 2009–19, but the brunt of the measures (about 90% of the package) is set to affect the economy over the period 2009–11.

7.2 The macroeconomic effects of fiscal stabilisation plans in the US

The main macroeconomic effects of the US fiscal stabilisation plan are presented in Table 17. By the end of 2009, the ARRA will have provided a net *ex ante* fiscal boost of about $185 billion, raising US GDP by 1.16% for the year relative to the baseline level. The initial effect of the recovery plan would be to increase private sector output, creating about 454,000 jobs in

response to the rise in public consumption and to the tax cuts. The ensuing rise in household income would then raise private consumption expenditure.

Table 17. Main effects of the US economic recovery plan (deviations from the baseline level in %, except where otherwise noted)

	2009	2010	2011	2012	2013	2014	2015
Real GDP	1.16	2.25	0.08	-0.90	-0.97	-0.65	-0.29
Real private consumption	0.68	1.51	-0.33	-0.99	-1.17	-0.87	-0.32
Employment	0.30	0.54	-0.06	-0.38	-0.46	-0.33	-0.14
Employment (difference, in thousands of persons)	454	809	-93	-585	-708	-514	-225
Consumer price inflation rate (difference, in p.p.)	-0.01	0.16	0.74	1.24	1.49	1.48	1.34
Nominal short-term interest rate (difference, in p.p. of GDP)	0.29	0.81	0.77	0.46	0.14	-0.09	-0.19
Nominal effective exchange rate	-0.29	-1.44	-2.15	-2.37	-2.08	-1.83	-1.70
Fiscal position (difference, in p.p. of GDP)	-0.82	-1.87	-1.03	-0.72	-0.67	-0.53	-0.30
Current account position (difference, in p.p. of GDP)	-0.18	-0.38	-0.21	-0.20	-0.22	-0.23	-0.26

Notes: No international fiscal policy coordination: the fiscal stimulus is simulated solely for the US.

Short-term interest rates are endogenously determined by a Taylor-type rule.

Exchange rates are endogenously determined by an uncovered interest parity condition; a minus (-) sign indicates currency appreciation.

No long-term fiscal solvency rule is imposed.

Source: NIME model, Belgian Federal Planning Bureau.

Another very significant portion of the US stimulus plan is expected to affect the US economy in 2010, boosting GDP for the year by 2.25% relative to the baseline. This massive impact is due to the scale of the measures that will take effect in 2010. Indeed, these measures represent a net injection of about $399 billion into the economy in 2010, which is about 51% of the entire stimulus package. Part of the stimulus leaks out of the US economy in the form of increased imports, which produces a deterioration in the country's current account position. The size of the stimulus also tends to be somewhat reduced by an 'inflation leakage', as higher prices will reduce the real size of the fiscal boost. Finally, the fiscal stimulus will lead to a noticeable uptick in nominal interest rates as the US economy's negative output gap diminishes and as inflation tends to pick up.

In 2011, the US economy is set to receive another net injection of $134 billion. GDP is projected to rise by no more than 0.08% above the baseline level, as real private-consumption expenditure will be curtailed by both higher prices and nominal interest rates, and as cheaper imports will raise real import volumes, thereby deteriorating the current account position in the US.

Over the remaining period 2012–15, the effects of the stimulus package are expected to push real GDP down below the baseline level. The initial employment gains will give way to net job losses owing to higher prices, higher nominal interest rates and increased imports. The initial jump in prices will be gradually reversed but inflation will fall back towards the baseline levels

only slowly. US nominal short-term interest rates will also fall back and eventually undershoot the baseline level because of the decline in real GDP relative to the baseline. The nominal effective exchange rate of the US will exhibit some stickiness, returning towards the baseline only slowly. The country's fiscal position will deteriorate by a maximum of 1.9 p.p. of GDP in 2010 but the fiscal shortfall will then decline in line with the rapid reduction in the size of the net fiscal boosts after 2011. The country's current account position will deteriorate by 0.38 p.p. of GDP in 2010 and the adverse trade effects will continue to develop through 2015.

7.3 What do alternative evaluations of the US fiscal stimulus plan indicate?

The US Congressional Budget Office (CBO) evaluated the potential macroeconomic effects of the ARRA in March 2009 (Elmendorf, 2009a). The assessment of the short-term macroeconomic effects is based on the timetable of the anticipated spend-out of the public spending measures and on the year in which the tax changes are estimated to affect income. Using a detailed series of spending and tax-cut multiplier estimates, the CBO evaluated the GDP and employment effects of the measures adopted in the ARRA. The values of the various multipliers are wide-ranging, going from a high estimate of 2.5 for government spending on goods and services, to a low estimate of zero for tax cuts affecting business cash flows. The long-term effects depend on the impacts of the measures on the determinants of long-term US economic growth, i.e. the capital stock, the labour supply and productivity.

The CBO's evaluation reveals that the ARRA could increase US GDP by anywhere between 1.4% and 3.8% relative to a baseline level (in 4Q/4Q terms) by the end of 2009, by between 1.1% and 3.4% in 2010 and by between 0.4% and 1.2% in 2011 (Table 18).

Table 18. The CBO's evaluation of the macroeconomic effects of the ARRA

	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Real GDP level: Low estimate (% change from the baseline)	1.4	1.1	0.4	0.1	0.0	0.0	-0.1
Real GDP level: High estimate (% change from the baseline)	3.8	3.4	1.2	0.5	0.3	0.2	0.1
Employment: Low estimate (difference from the baseline, millions of jobs)	0.8	1.2	0.6	0.3	0.1	0.0	0.1
Employment: High estimate (difference from the baseline, millions of jobs)	2.3	3.6	1.8	0.7	0.3	0.2	0.1

Source: Elmendorf (2009a).

Another evaluation of the US fiscal stimulus plan also finds significant positive effects from public spending and tax cuts (Leduc, 2009). Using a set of fiscal multipliers estimated by a private forecasting firm, a fiscal stimulus plan of measures worth $816 billion was estimated to raise the US GDP growth rate by 1.2 p.p. in 2009 (in 4Q/4Q terms) and by 0.7 p.p. in 2010.

Both of these alternative evaluations of the ARRA were carried out using estimated fiscal multipliers. The two multiplier-based studies indicate that there is great uncertainty surrounding the results. Both studies indicate clear, positive, short-term effects on real GDP, but the size of these effects on the level of real GDP in 2009 range from +1.2% to +3.8%, while the effects on real GDP in 2010 range from +1.1% to +3.4%.

The IMF's own multiplier-based analysis (IMF, 2009a) indicates that the US stimulus package amounts to fiscal boosts of about 2.0% of GDP in 2009 and 1.8% of GDP in 2010. This plan could increase US GDP by between 0.6% and 1.4% in 2009 and by between 0.4% and 1.2% of GDP in 2010 (IMF, 2009b) (Table 19).

Table 19. An IMF evaluation of the GDP effects of the US stimulus plan

	2009	**2010**
Real GDP level: Low estimate (% change from the baseline)	0.6	0.4
Real GDP level: High estimate (% change from the baseline)	1.4	1.2

Source: IMF (2009b).

Further comparison of these results, e.g. with the results from a macroeconometric model such as NIME, are not easy because of fundamental differences in the methodological approaches. That being stated, it appears that the macroeconometric model results are identical in terms of whether the effects on real GDP are positive or negative, while clearly lying on the lower bound of the range of effects on GDP that are presented in the multiplier analyses.

In another IMF study (Freedman et al., 2009), the size of the US fiscal stimulus package was estimated at 1.9% of GDP in 2009 and at 2.9% of GDP in 2010. This is equal to the stimulus package that was simulated with the Federal Planning Bureau's NIME model. The IMF study finds that the measures affecting the economy in 2009 would lead to a rise in the level of US real GDP of 1.3% relative to a 'no stimulus' scenario. The measures affecting 2010 would raise the level of US real GDP by 2.7% relative to a 'no stimulus' baseline. These results are slightly greater than are those produced with NIME (1.2% in 2009 and 2.3% in 2010).

8. Where is the world economy headed? Insights from a model-based medium-term projection

In this section, a tentative projection for the world economy is proposed for the period 2009–15. Although there are an unusually high number of risks and uncertainties surrounding the unwinding of the global financial and economic crises, the NIME model is used to project a baseline scenario for the world economy over the coming years, conditional to a number of technical assumptions. As noted earlier, NIME is a macroeconometric model grounded in the neoclassical synthesis tradition, with microeconomic foundations for consumption and investment decisions, short-term wage and price stickiness and a long-term 'steady-state' equilibrium. The projection indicates that although fiscal stimulus plans will undoubtedly provide a temporary boost to world output, they will also most likely prove to be insufficient to prevent a sharp decline in real GDP growth rates and will not allow the major economies of the world to escape falling into a period of dangerously low rates of inflation.

8.1 Assumptions underlying the model and projection exercise

The version of the NIME model that was used to produce the projection presented in Table 20 (in section 8.2 below) was estimated using historical annual data covering the period 1970–2007. The core data set comes from the European Commission's AMECO database of October 2008. The sample period used for estimating the model parameters implies that parameter estimates affecting the short-term dynamics of crucial behavioural equations such as private consumption, as well as the long-term equations determining the model's 'equilibrium' values,

are affected by the strong growth in consumption and low saving behaviour of the period 2002–07. It is nonetheless to be expected that the financial and economic crisis that unfolded in the summer of 2007 will have induced changes in the values of a number of crucial parameters, and two kinds of corrections have been made to the model to reflect these likely modifications.

The first change that was brought into the model was the addition of an expectations term in consumer price equations, to reflect agents' expectations that central banks will be able to maintain effective inflation in positive territory and thus allow the major economies to avoid falling into prolonged periods of deflation. The second modification was made to the model's long-term (equilibrium) output growth estimates for the major world economies: these were reduced over the projection period to reflect the negative effect of the financial crisis and recession on capital accumulation trends, on natural rates of unemployment and on labour productivity growth.[5] Over the 2009–10 period, potential output growth was set to an average of 0.9% per annum for the euro area, 1.5% per annum for the US and 0.7% per annum for Japan. Over the remainder of the projection horizon, potential output growth was set to an average of 1.2% per annum for the euro area, 2.1% per annum for the US and 1.3% per annum for Japan. Without these changes to price expectations and to expected future potential output, the model would have projected significantly larger output gaps, associated with persistent and heightened deflationary pressures, in all of the major economies of the world.

The results presented for 2009 are partly exogenous, reflecting information from the latest available forecasts from the European Commission, the OECD, the IMF, the World Bank and various other, private economic research and forecasting institutions. The short-term projection results for interest and exchange rates reflect market data (from financial and commodity futures markets) available up to 13 March 2009. Specifically, futures data are retained for interest rates and nominal exchange rates for 2009. Oil prices correspond to commodity futures data for 2009 and 2010. As of 2010, the model's representative short-term nominal interest rates are determined by Taylor-type rules, while nominal effective exchange rates are determined by 'uncovered interest parity' rules. As of 2011, world oil prices are assumed to follow an index of world inflation, thus remaining constant in real terms.

The cost of credit and the state of credit conditions are proxied in NIME by the level of two market interest rates. The representative short-term market interest rate that appears in the model is the 3-month Euribor rate for the euro area and the 3-month Libor eurodollar rate for the US. The long-term rate is approximated by the average interest rate on 10-year government bonds for the euro area and by the 10-year constant maturity Treasury note for the US. In the current financial crisis, however, it is no longer possible to view these rates as representative indicators of the cost and availability of credit, as access to credit has been tightened, spreads have risen between yields on long-term government debt and long-term corporate bonds, large spreads have appeared between financial and non-financial corporate bond rates, and raising funds on equity markets has become more difficult. In order to reflect firms' current difficulties in meeting their financing requirements, an 'exceptional capital-cost premium' reflecting current risk, term and liquidity premia has been added to the values of the nominal interest rates that affect the model results for 2009. In all of the model's economic areas, the exceptional capital-cost premium has been set at 300 basis points for the short-term cost of credit and at 450 basis points for the long-term cost of credit. It is further assumed that financial market stress and opacity will disappear by the end of 2009, so that the model's usual short- and long-term interest rates will once again become meaningful indicators of the cost of credit for

[5] The potential output growth over the projection period is based on recent evaluations of the effects of financial crises on potential output (Furceri and Mourougane, 2009a).

corporations. Hence, as of 2010, it is no longer necessary to add any exceptional capital-cost premium to the representative market interest rates generated by the model.

The projection integrates publicly available information on the economic stimulus plans drawn up and implemented in both the euro-12 area and in the US. For practical reasons, no special consideration has been given to integrating stimulus plans from other countries of the world. In this respect, recent evaluations indicate that the stimulus plans announced by Japan since 2008 would have only a very limited impact on world growth. Although the magnitude of the measures announced by China is considerable, the size of the Chinese economy[6] would also preclude its fiscal stimulus from having a significant impact on the growth rate of the world economy. Indeed, if China's growth were to be a 'robust' 8% instead of a 'low' 6% in 2009, it would raise world GDP by a supplement of about 0.1%, which is well below measurement errors for aggregate world real GDP.

Regarding the euro-12 economic recovery plan, the projection makes use of the analysis of national fiscal stimulus plans provided by the Bruegel think tank (Saha and von Weisäcker, 2009). The stimulus effort that is taken into account from the Bruegel analysis is the amount that Bruegel calls "additional fiscal spending", plus half of the value of what Bruegel labels as additional "credit and similar measures" extended to the non-financial business sector. On this basis, the fiscal stimulus effectively implemented in the projection exercise reaches €157.9 billion, or 1.7% of the euro area's GDP of 2008. The total stimulus package is assumed to be fully implemented, with half its effects on the EU economy expected to appear in 2009 and the remaining half occurring in 2010. No further stimulus measures are assumed after 2010.

Regarding the fiscal stimulus contained in the ARRA of 2009, the projection integrates a fiscal stimulus of $787 billion, as proposed in the law enacted on 17 February 2009. The US stimulus package is assumed to be fully implemented and to affect the US economy following the spend-out timetable that was estimated by the US Congressional Budget Office (Elmendorf, 2009a), which affects the US economy over the entire 2009–15 projection period. Regarding the more general US fiscal-policy stance, the usual assumption of unchanged policy and legislation is made. This implies that fiscal revenue will rise significantly over 2010–12 following the expiration of the cuts in individual income and estate taxes enacted in 2001 and 2003. Finally, with respect to the simulation of the future stance of fiscal policy, no long-term fiscal solvency rule is imposed in the projection exercise.

8.2 A medium-term baseline scenario for the world economy

This section presents a medium-term baseline scenario for the world economy. The projection is simulated assuming that potential output growth over the projection period is reduced compared with estimates of potential output growth covering the pre-August 2007 period, that current laws and fiscal policy measures are effectively and fully implemented, and that inflation expectations remain well anchored and positive, allowing central banks to counter any prolonged deflationary pressures. Table 20 indicates how a relatively standard macroeconometric model can be used to assess the medium- to long-term dynamics of the current worldwide recession.

[6] China accounted for approximately 6% of world GDP in 2007, measured in terms of US dollars; the US and euro area accounted for about 25% and 22% of world output, respectively.

Table 20. A world baseline projection for the period 2009–15 (including the fiscal stabilisation plans of the US and euro area)

	2008	2009	2010	2011	2012	2013	2014	2015	Avg. 1971 2007	Avg. 2009 2015
Euro area										
1. Real gross domestic product	0.8	-3.9	-0.9	1.6	1.3	1.8	1.9	1.8	2.6	0.5
2. Deflator of private consumption	3.3	0.4	0.6	0.4	0.8	1.1	1.3	1.5	4.9	0.9
3. Unemployment rate (level, % of civilian labour force)	7.6	9.9	10.6	10.6	10.1	9.3	8.5	8.0	7.7	9.6
4. Short-term interest rate (level)	4.6	1.7	1.0	1.0	0.4	0.3	0.6	1.1	7.6	0.9
5. Nominal effective exchange rate (+: depreciation)	-5.9	-5.2	-2.0	-2.2	-1.6	-1.8	-2.7	-3.6	-9.4	-2.7
6. Government net lending (level, % of GDP)	-1.7	-4.3	-5.5	-4.3	-4.2	-3.9	-3.7	-3.6	-3.2	-4.2
7. Current account (level, % of GDP)	-0.2	-0.8	-0.2	0.7	1.6	2.3	2.8	3.1	0.1	1.4
US										
1. Real gross domestic product	1.1	-4.1	-0.0	-0.6	0.3	2.4	2.9	2.9	3.1	0.5
2. Deflator of private consumption	3.3	-0.4	1.1	0.9	0.7	0.6	0.6	0.7	4.1	0.6
3. Unemployment rate (level, % of civilian labour force)	5.7	8.9	8.5	9.0	8.5	7.5	6.7	6.1	6.1	7.9
4. Short-term interest rate (level)	3.3	1.5	0.7	0.1	0.1	0.1	0.1	0.1	6.3	0.4
5. Nominal effective exchange rate (+: depreciation)	2.7	-14.1	-0.9	-1.2	-1.6	-1.9	-1.9	-1.7	-8.4	-3.3
6. Government net lending (level, % of GDP)	-4.5	-11.2	-13.6	-10.8	-10.1	-10.1	-9.9	-9.6	-2.8	-10.8
7. Current account (level, % of GDP)	-4.6	-3.8	-5.9	-4.7	-4.2	-4.1	-4.2	-4.2	-1.8	-4.4
Japan										
1. Real gross domestic product	-0.7	-6.5	-3.5	-0.2	-0.2	-0.4	-0.4	-0.3	2.9	-1.6
2. Deflator of private consumption	1.5	-1.1	-0.8	-1.7	-2.1	-2.3	-2.5	-2.6	2.9	-1.9
3. Unemployment rate (level, % of civilian labour force)	4.1	4.9	6.2	7.1	7.6	8.2	8.7	9.2	2.9	7.4
4. Short-term interest rate (level)	0.9	0.8	0.1	0.1	0.1	0.1	0.1	0.1	4.4	0.2
5. Nominal effective exchange rate (+: depreciation)	-10.6	-17.4	-5.7	-7.7	-9.6	-9.6	-9.6	-9.5	-9.0	-9.9
6. Government net lending (level, % of GDP)	-5.6	-9.9	-5.0	-3.9	-4.7	-5.6	-6.5	-7.2	-3.1	-6.1
7. Current account (level, % of GDP)	4.0	1.8	-0.3	0.5	0.0	-0.3	-0.9	-1.7	2.1	-0.1

Table 20. cont'd

World (US$, GDP weights)										
1. Real GDP	2.8	-3.5	0.7	2.7	2.9	3.6	3.7	3.6	3.7	2.0
2. Real GDP per capita	1.6	-4.6	-0.5	1.5	1.7	2.4	2.6	2.4	2.1	0.8
3. Real exports	3.5	-4.3	1.8	2.5	4.0	4.6	4.7	4.4	5.9	2.5
4. GDP deflator	4.1	-0.1	1.3	1.4	1.2	1.1	1.0	1.0	8.9	1.0
5. Price of oil (Brent, US$/bbl)	96.9	46.6	53.8	54.9	55.6	56.1	56.6	57.3	24.0	54.4
6. World population (in billions)	6.7	6.8	6.9	6.9	7.0	7.1	7.2	7.3	5.2	7.0
7. World population (growth rate, in %)	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.6	1.2

Note: The euro-area nominal short-term interest rate represents the 3-month Euribor rate; the US nominal short-term interest rate represents the 3-month Eurodollar (Libor) rate; the Japanese nominal short-term interest rate represents the 3-month money-market rate.

Source: NIME model, Belgian Federal Planning Bureau.

The projection results indicate that although the model's potential output growth declines, effective output falls off much more sharply in the short term, producing large and relatively persistent negative output gaps and leading to sluggish recoveries in all major economic areas. The output gaps signal the presence of un- or under-utilised resources in the economy, such as idle machinery and non-frictional unemployment. These idle resources have a direct effect on the economy's dynamic equilibrium: rising unemployment reduces firms' pricing power; this, in turn, tends to reduce consumer price inflation, which tends to increase households' purchasing power and consumption, bringing the economy back towards a situation of full employment of productive resources.

The model simulation indicates that the initial 2008–09 downturn leads to a marked decline in aggregate final demand, which is accompanied by a decline in the rates of consumer price inflation in the euro area and the US. In Japan, the downturn plunges the country back into persistent deflation over the period 2009–15. As the recession sets in, it is assumed to bring about a fall in potential output, thus limiting the demand for labour and fixed capital investment, and raising both the equilibrium and effective rate of unemployment. As the size of the pool of the unemployed swells, nominal wage growth only barely manages to outpace inflation, bringing about a stagnation in real wages and limiting the growth in households' real disposable income.

As output decreases in 2009 and 2010, the Taylor rule that is posited for the monetary-policy reaction function leads to significant reductions in nominal interest rates, which fall towards their zero lower bound. As of 2010, it is also assumed that the normal functioning of financial markets is restored and that the unusually large premia raising the cost of credit will disappear.

The lower rates of consumer price inflation in the major economic areas also produce changes in nominal effective exchange rates: those countries that face the lowest inflationary pressures see their currency appreciate, at least in nominal effective terms. As the table indicates, the US, the euro area and Japan all face falling inflationary pressures and it is thus the residual aggregate representing the 'rest of the world' that sees its nominal effective exchange rate depreciate.[7]

[7] The 25 largest countries (or economic areas) that are included in the NIME model's 'rest of the world' area are the following, by decreasing size of GDP in US$: PR China (mainland), Canada, Brazil, Russia, South Korea, India, Mexico, Australia, Turkey, Switzerland, Indonesia, Saudi Arabia, Norway,

The onset of the current economic and financial crisis has led governments in the US and the EU to put in place relatively large, counter-cyclical, discretionary fiscal packages, which come as supplementary boosts to the autonomous effects of countries' automatic fiscal stabilisers. These deficit-spending packages have the merit of limiting the scale of the short-term cyclical downturn, but appear to be too limited to effectively offset the massive declines in private sector demand that are expected in 2009 and 2010. Hence, notwithstanding the expected fall in potential output growth, significant negative output gaps are projected up to the end of the projection period. These discretionary fiscal stimulus measures and automatic stabilisers will nevertheless produce a very significant increase in public deficits and debt. As the downturn continues and unemployment rises, public deficits will be raised further by increases in entitlements such as unemployment benefits.

The projection indicates that although the fiscal stabilisation packages will help to limit the depth of the worldwide recession, the world economy faces a real risk that the scale of the downturn could lead to widespread stagnation in a low-inflation environment. Although only Japan is projected to experience continued deflation, the risk of more prevalent and persistent deflation would be exacerbated if governments were to scale back public spending while private demand remained weak; this situation could surface in the US in 2011 and 2012, when current laws and fiscal policies should bring about significant fiscal consolidation. This scenario presents governments with a difficult trade-off between attempting to stave off a protracted recession through large and sustained fiscal stimulus plans and ensuring fiscal solvency. It is also possible that the threat of deflation will lead central banks to implement unconventional monetary policies that bring about a rapid return to inflation rates that are more in line with long-term inflation targets. The need to resort to further strategies to forestall deflation will ultimately depend on the stability of inflation expectations in an economy. These expectations are directly linked to the credibility of central banks in achieving their long-term inflation objectives (Krugman, 2008). If central banks' commitments to price stability with positive rates of inflation are seen to be weak, this could force monetary authorities to resort to new and creative unconventional methods to restore and ensure stable positive inflation (Williams, 2009).

Over the first quarter of 2009, major central banks have actively assumed their roles of lenders of last resort and market makers of last resort, massively expanding their balance sheets and the 'M0' monetary base. The counterpart of this increase in base money has mostly been a build-up of 'excess reserves' held by financial institutions with their central bank and has not fuelled increased transactions and inflation. Yet here is now a risk not of deflation but of strong future inflation if central banks do not reabsorb all excess liquidity quickly enough once transactions increase and the economy picks up.

Even in the face of significantly lower growth of future potential output, a return of effective output to potential output levels will most likely require years rather than quarters, as has been the case in most of the recent recessions. The current downturn is highly synchronised throughout the world economy, and no country seems to be in a position to play the role of importer of last resort that the US has played until recently. Indeed, at least since the early 2000s, world output has been largely underpinned by exceptionally robust and resilient US household spending. But now it seems very likely that US households will significantly increase their saving rate over the coming years (Godley et al., 2008). If US domestic demand is to progress at a less rapid rate over 2009–15 than over recent years, the world economy will have

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Argentina, South Africa, Iran, Thailand, Hong Kong PRC, Venezuela, United Arab Emirates, Malaysia, Chile, Israel, Colombia and Singapore.

to turn to other sources of final demand growth to pick up the slack that will accompany the rebalancing of the US economy. Where might this new source of demand come from?

Looking at the world's major current account imbalances over the last years, it appears that the main beneficiaries of strong external demand were Middle Eastern oil-exporting countries and Asian economies, whose GDP growth was underpinned by exports to the more advanced economies of the US and Western Europe. This was the case for both Japan and China, whose GDP growth was largely export-driven. If oil-exporting countries and major Asian economies were to reorient their economic growth towards greater dependence on components of domestic demand, this could boost domestic income levels and help with a smooth unwinding of global current account and income/saving imbalances.

Regarding China in particular, it has long been noted that China suffers from large income inequalities between a relatively rich urban population benefiting from export-oriented economic activities and a poorer countryside, trailing in income and lacking in social safety nets (Huang, 2008). This situation leads to large parts of China's rural population choosing to limit their consumption levels in view of ensuring basic precautionary saving. Even though the current relative size of China's economy would not allow it to ensure the rebalancing of the global economy by itself, China could still ensure greater and more widespread domestic prosperity while assuming a greater role in world affairs.

8.3 Lingering uncertainties surrounding the dynamics of output growth

The resources of nature and men's devices are just as fertile and productive as they were. The rate of our progress towards solving the material problems of life is not less rapid. We are as capable as before of affording for everyone a high standard of life. ...But today we have involved ourselves in a colossal muddle, having blundered in the control of a delicate machine, the working of which we do not understand.

John Maynard Keynes (1936)

8.3.1 The short-term unknowns

Risks and uncertainties are now particularly large for short-term GDP growth (i.e. growth over the period 2009–10), as is attested by the rapid and continued downward revisions made by short-term forecasters for economic growth in the major economic areas of the world economy. The uncertainties are manifest as forecasters appear to be adjusting their forecasts with the flow of economic data, and seem to be at a loss in determining possible future turning points and the effects of the current crisis on future output growth and levels. Table 21 shows how *The Economist*'s monthly "Poll of Forecasters" has evolved since early 2008. The current worldwide economic and financial crisis unfolded in August 2007. In the US, the Business Cycle Dating Committee of the National Bureau of Economic Research (NBER) declared that the present recession began in December 2007. Nevertheless, through October 2008 forecasters were still predicting positive annual growth for the US in 2009. Indeed, forecasters were revising their forecasts downward only slowly, reacting to the flow of incoming data.

Short-term forecasts rely on historical data, the most recent of which are highly unreliable: paraphrasing former British Chancellor of the Exchequer, Denis Healey, carrying out short-term forecasts on the basis of the incoming data flow has never been more like steering a car while looking only into the rear-view mirror. The most recent forecasts are now announcing sharp year-on-year average declines in GDP in 2009, but the magnitude of the downturn and the timing of future turning points remain unknown.

Table 21. The Economist's *"Poll of Forecasters" (real GDP, average of point forecasts)*

	Forecasts for 2009	
Date of Release	**Euro area**	**US**
10 January 2008	2.0	2.6
7 February 2008	1.9	2.5
6 March 2008	1.8	2.2
3 April 2008	1.6	1.7
8 May 2008	1.5	1.7
5 June 2008	1.5	1.5
3 July 2008	1.3	1.3
7 August 2008	1.2	1.2
4 September 2008	0.9	1.3
3 October 2008	0.6	0.6
6 November 2008	-0.1	-0.2
4 December 2008	-0.9	-1.0
8 January 2009	-1.4	-1.2
5 February 2009	-2.1	-2.0
5 March 2009	-2.4	-2.2
2 April 2009	-3.4	-2.7

Source: *The Economist.*

The main unknowns that weigh on and obscure current short-term economic forecasts pertain to such considerations as the size and duration of the downturn that the global economy has already undergone since the summer of 2007. This opens up a number of upside uncertainties surrounding

- the possible re-emergence of pent-up demand and upswings in both consumer and investor sentiment that could rapidly materialise and produce an upswing in economic activity;
- the short-term support to real incomes and final demand that could spring from the recent sharp reductions in energy and other commodity prices for net importers of these products;
- the rapid emergence of a significant upturn in activity based on the large fiscal stimulus packages that have been put in place in many areas of the world economy; and finally,
- the emergence of a floor under bank losses and write-downs, leading to clean bank balance sheets, renewed confidence in financial markets and an increase in the flow of credit to currently liquidity-constrained households and non-financial corporations.

On the downside, however, one could also point to uncertainties linked to continued downward pressure on US house prices, increasing difficulties in commercial real estate, and lingering confusion over unresolved liquidity and solvency issues in major financial sectors of the world economy.

8.3.2 The long-term unknowns

Much of today's discussion on economic projections and forecasts focuses on what can be expected in terms of the future behaviour of real GDP growth and potential output growth. Many forecasting or projection methods assume that shocks lead to only temporary deviations from long-term 'equilibrium' values, with economic aggregates converging towards levels or growth rates on their long-term path. Given the magnitude and the worldwide synchronised scope of the economic and financial downturn, it has sometimes been suggested that the current headwinds could permanently alter long-term GDP growth. Thus, even assuming that real GDP will converge towards a trend or potential level, this level of future, potential real output might not coincide with the mappings that existed before the outbreak of the present economic and financial crisis.

Figure 4 presents four scenarios regarding how this might play out:

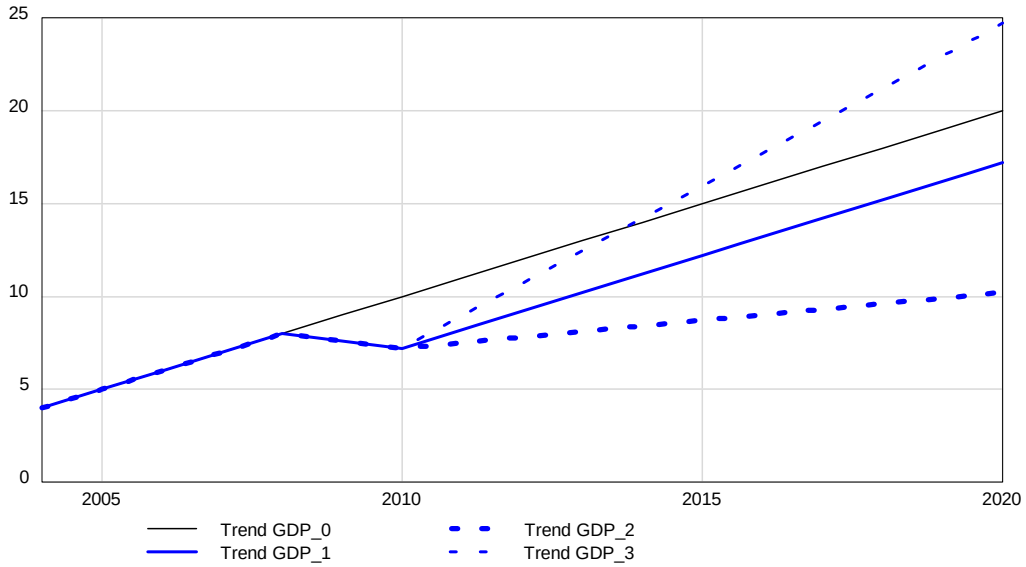
1) The trend output level could remain unchanged, inasmuch as it is determined only by demographic changes and changes in productivity, which could be insensitive to transitory changes in effective output and relative prices (*Trend GDP_0*).

2) The trend output level could fall initially owing to the crisis and then return to its previous trend growth rate, implying a permanent loss in output relative to pre-crisis trend output levels (*Trend GDP_1*).

3) The trend output level could fall owing to the crisis and then embark upon a new, lower trend growth rate, implying a larger permanent loss in output relative to pre-crisis trend output levels (*Trend GDP_2*).

4) The trend output level could initially fall owing to the crisis and then embark upon a new, higher trend growth rate, implying a long-term permanent gain in output relative to pre-crisis trend output levels (*Trend GDP_3*).

Figure 4. Potential real GDP: A shift to a new and uncertain trend?



A first comment is that potential or 'equilibrium' output is not a directly observable aggregate. Potential output is primarily a theoretical concept and the question remains as to whether it corresponds to any existing phenomenon. As potential output is not observable, it is often substituted – and confused – with a measure of 'trend' output that is generated by 'fitting', usually linearly, a data series of historical real GDP. Hence, an often-used but still ad hoc procedure for fleshing out the concept of potential output is generating a proximate series for it using statistical time series approaches (Koske and Pain, 2008; European Central Bank, 2000) without explicitly linking this derived measure to any formal theoretical framework.

There are also alternative methods for computing an economy's potential output level, based on more specific theoretical frameworks and their associated production functions. Indeed, the views as to the evolution of potential output are directly linked to the general representation one has of the functioning of the economy. In the classical world of RBC models, where output is fixed at the full employment output level, an economy's potential output is naturally viewed to be equal to effective output. In the New Keynesian DSGE world of sticky prices and wages and imperfect competition, a country's potential output level can deviate from its effective output level in the short term, returning to it in a theoretically-defined 'long run'. Furthermore, potential output can itself lie below what is defined as the economy's natural output level, which is the level of output consistent with perfect competition and fully flexible prices.

In the neoclassical synthesis models, potential output is based on the choice of a functional form for the production technology, which then serves to provide estimates of equilibrium demand for inputs such as capital services and labour. Other 'deep' parameters such as labour productivity, the non-accelerating inflation rate of unemployment (or NAIRU) and natural rate of inflation are usually estimated using statistical filtering techniques such as the Hodrick-Prescott (univariate) or Kalman filters (multivariate).

Since the early 1980s, the standard view has been that the unit-root null hypothesis could not be rejected by statistical tests on US GNP data (Nelson and Plosser, 1982) and that a series' trend function was itself durably affected by shocks (i.e. the presence of stochastic trends). Since then, these results have been challenged as they appear to be biased by structural breaks and because the power of the standard ADF tests they rely on is now considered low. Recent time series analyses of US data do provide some interesting results concerning the long-term properties of real GDP data. Very long-term, historical real GDP data for the US, covering the period 1867–2008, has been shown to closely follow a stationary trend expansion. Indeed, the (natural) logarithm of real GDP has been estimated to follow a linear trend such that the usual statistical tests either reject the hypothesis of the presence of a unit root or fail to reject the hypothesis of trend stationarity, at conventional confidence levels (Chinn, 2009; Cheung and Chinn, 1996). Over the long run, the log of US real GDP exhibits a clear behaviour of reversion to trend. Even major real shocks such as the Great Depression do not appear to have modified the long-term trend-stationarity property of this series. Results also suggest that the original real GDP series follows an exponential trend and that the first difference of the log of real US GDP (i.e. the growth rate of real GDP) follows a stationary process.

Based on US results and further international evidence (Hegwood and Papell, 2007; Alba and Papell, 2006; Fleissig and Strauss, 2002), it appears reasonable to assume that the long-term, historical real GDP of other major market economies such as the euro area, the UK and Japan do not follow unit root processes. Historical evidence suggests that even though the current shocks from the worldwide economic and financial crisis may lead to more or less persistent deviations of real GDP from its long-term equilibrium or trend values, GDP will eventually return to its trend level and growth rate (Haugh et al., 2009).

The long-term behaviour of a country's GDP series is of considerable importance for economic policy prescriptions. If economic processes are seen to be trend stationary, economic policy decision-makers know that the economy will eventually return to its trend level even without discretionary policy measures. Only the rate of a shock's decay is uncertain. Policy is then reduced to a question of optimal stabilisation, for instance in terms of minimising output losses and unemployment (i.e. minimising an aggregate welfare-loss function) stemming from the cyclical component of output. Furthermore, policy can also be framed in such a way that concerns as to the long-term, such as long-term productivity growth and fiscal solvency issues, are also addressed.

If economic processes are difference stationary, however (and have only a stochastic trend), random shocks have permanent effects on future output levels and there is no return to any meaningful deterministic trend. In this case, economic stabilisation policy loses all of its relevance and economic policy can no longer be geared towards stabilisation. Here, policy should be implemented in view of attaining policy-makers' specific objectives (e.g. specific rates of long-term output growth and unemployment) totally irrespective of the occurrence of short-term exogenous shocks. Policy thus becomes structural, focusing on the long-term instead of aiming at short-term stabilisation around an inexistent solid trend.

The NIME model, like many modern macroeconometric models, builds on the unrejected hypothesis (or the assumption) that major economic aggregates such as real GDP can be modelled as (trend) stationary processes. This means that there are cointegrating vectors such that the behaviour of these economic aggregates can be modelled in the form of behavioural equations containing error correction terms that lead the aggregates to converge towards a trend (level or growth rate). Conversely, this implies that these economic relationships are not modelled as unit root processes and do not possess random walk components. Even if most modern macroeconometric models function with behavioural equations that are built and estimated along the lines of long-term cointegration principles, the computation of core equilibrium (trend) variables is often still largely based on the use of ad hoc statistical filters, which usually allow for some degree of covariance between the source data and the filtered data. Hence, a cyclical downturn in real GDP data will show up as a decline in measured potential output.

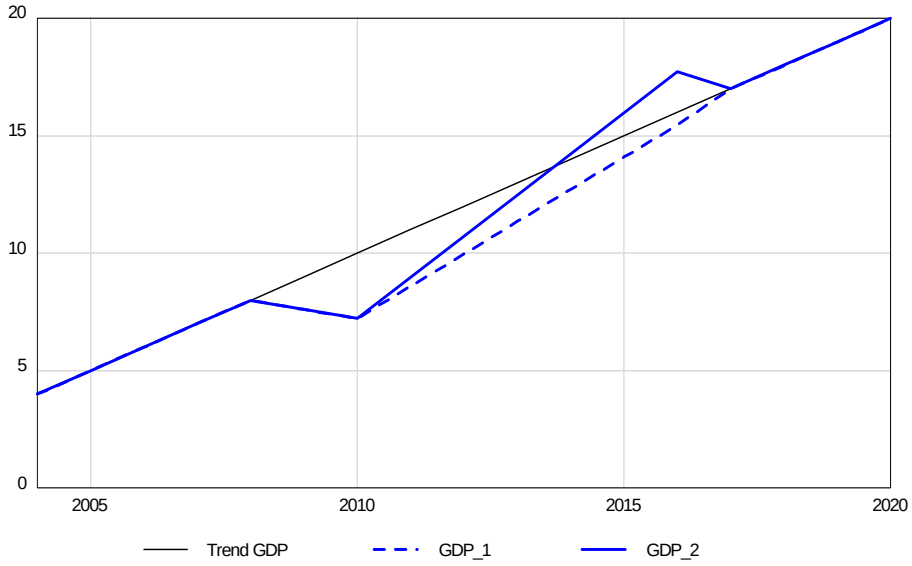
Even when models exhibit mean-reversion properties, the exact speed of adjustment to shocks is still very much an empirical question. The insights that can be gained from the half-lives of AR(1) regression coefficients do not necessarily reflect the 'true' convergence speeds that will ultimately be observed in the context of the current highly synchronised worldwide economic and financial crisis. Thus, establishing the existence of a trend-stationary process does not go very far in providing for the exact dynamics of the return to trend that can be expected in the present economic downturn: Will the convergence process materialise in the form of a quick V-shaped rebound or a longer U-shaped rebound? Will it come with a double-dip W-shaped rebound or follow a much more protracted L-shaped path to recovery? Will the rebound come with growth rates that are well above trend growth rates, leading to an initial "overshooting" of the trend level or will the convergence be smooth and from below (Morley, 2009)?

Figure 5 suggests two possible paths for a return to trend (in levels) for real GDP. In a first case (GDP_1), the economy's level of real GDP initially falls below a trend level and then gradually returns to the trend output level without overshoot; during the convergence period, real GDP growth rates exceed trend growth rates.

In a second case (GDP_2), the economy's level of real GDP falls below a trend level, then returns to the trend output level with an overshoot; during the convergence period, real GDP growth rates exceed the trend growth rate. As effective output catches up with its corresponding

potential level of output, effective growth rates begin to fall back to the trend growth rates. After an overshoot, the decline in growth rates brings effective output into line with potential output.

Figure 5. Real GDP growth after a shock: What path for a reversion to trend?



Recent studies of the effects of financial crises (Reinhart and Rogoff, 2008a and 2008b) indicate that severe financial crises have historically led to sharp declines in real per capita GDP, which falls by 9.3% from pre-crisis peak to crisis trough. After the outbreak of the crisis, real per capita GDP requires about 1.9 years (i.e. 23 months) to return to trend levels. Still, these results are average results for both developed and emerging market economies and are based on data reaching as far back as the Norwegian financial crisis of 1899. The declines in real GDP are usually significantly smaller for developed economies than for emerging market economies, most likely owing to sudden sharp disruptions in capital flows.

The long-term trends of econometric models, when based on the Hodrick-Prescott filter (which has been shown to suffer from 'end-sample bias') and applied to historical data only, could lead to an overestimation of future, potential output levels. Conversely, the Hodrick-Prescott filter, when applied to historical data extended by short-term forecasts, could lead to an underestimation of future, potential output levels. This would then lead to a failure to recognise that the current downturn is most likely temporary, even if it proves to be particularly protracted.

8.3.3 What do uncertainties about past GDP growth rates portend for current macroeconomic forecasts?

The uncertainties we have regarding future rates of economic growth can also be entertained concerning past economic performance. Indeed, as the current financial crisis and seizing up of the financial sector leads to massive write-downs and expected write-downs, discussion has reopened concerning measurement issues regarding the contribution of the financial sector to a country's GDP. These discussions are not merely interesting from a statistical or accounting standpoint, but also for their implications in terms of economic policy and of what we can expect in terms of future GDP growth and inflation.

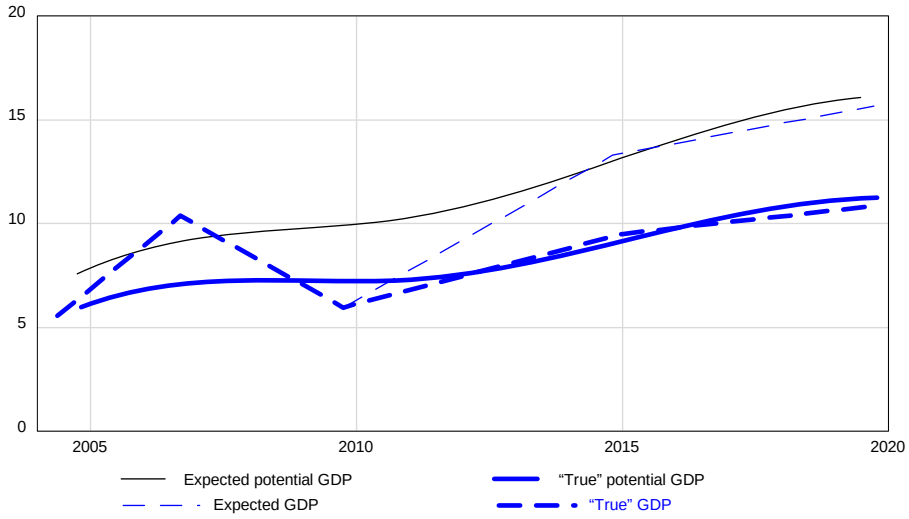
The measurement of the manufacturing industry's contribution to GDP involves a relatively simple determination of the market value of its real output and of intermediate consumption. Matters are much less clear when one attempts to measure the value added by services, in particular of financial and business services, where one must disentangle the real and price components of both explicit and implicit service charges. Conventional methodologies that are used to draw up US national accounts base the measure of the GDP contribution of financial services at least in part on indices of transactions. This implies that a significant share of the measured GDP contribution of financial services is directly linked to the number of cheques that are cleared and to the number of transactions that are conducted at ATM machines (Moulton, 2000). These difficulties in the appraisal of the 'true' contribution of the financial services industry to a country's real GDP have led to renewed speculation that the resurgence in productivity growth in the US over the period 1995–2005 was in fact partly owing to a statistical artefact.

Recent research suggests that a large part of the apparent gap in real GDP growth between the US and other industrialised countries has stemmed from high multifactor productivity growth in US financial and business services (van Ark et al., 2008). Yet, attempts at correcting the official measures of value added by US financial services lead to the conclusion that 'usable productivity growth' was probably no higher than that observed in other major industrialised economic areas of the world. Indeed, adjusting for capital consumption, for the effects of changes in consumer prices on real output and for the current account deficit, usable productivity growth in the US has been shown to have been lower by 0.4 percentage points than the average rate of productivity growth of other OECD countries over the period 1995–2005 (Baker and Rosnick, 2007).

The implications of the difficulty in correctly appraising the value added contribution of financial and business services are large in terms of the conclusions they could lead to as regards macroeconomic projections. Current and future forecasts for such crucial indicators as output gaps are based on measures of past real GDP. It has always been acknowledged that the evaluation of the present level of real GDP – or of its growth rate – is surrounded by relatively large uncertainties, showing up in revisions to the historical data that are made over the following quarters and years. Even so, the growing weight of the services sector in modern economies and the difficulty in measuring its true contribution to overall GDP add to the complexity of estimating contemporaneous output.

One characteristic of the world projections presented above is that major economic areas appear to face significant risks of falling into low, and even deflationary, growth trends as of the last quarters of 2009. This is the direct consequence of the relatively large and persistent real output gap projections, which themselves stem from the assumptions that underlie the model's estimates of potential output. But could it be that these levels of potential output have been systematically overestimated over the past years? If this were indeed the case, major economies such as the US and the euro area would have been operating with lower, 'true' potential output levels and with 'true' output gaps that were both more frequently positive and more greatly positive than has been realised until now. As illustrated in Figure 6, this would imply that the projected declines in effective real output would push the future levels of real GDP less further down below the true potential output levels than what is currently expected, meaning that the risks of deflation could well be overstated. At the same time, this comforting news regarding deflation prospects would bode ill for the prospects of future employment and long-term real income growth.

Figure 6. Effective real GDP and potential real GDP levels: What will the true scale of output gaps turn out to be?



8.4 Final notes of caution with respect to forecasts and projections

One should view these projection results with due circumspection. Indeed, model results are generally fraught with risk and uncertainty, covering both the known and the unknown unknowns.

In this projection, significant uncertainty can be expected to reside in

1) the future 'true' response of interest rates to the demand-pull component of inflation, linked to the fiscal stimulus plans;

2) the future 'true' cost-push inflation that will materialise in relation to the future 'true' potential output level;

3) the future effective reactions of world interest rates and exchange rates to a rapid and worldwide increase in public deficits and debt; and

4) the future 'true' path of world real oil prices.

Indeed, the model results could overestimate the positive short-term effects of the fiscal stimulus measures. Inflation could turn out to be lower than suggested by the simulation owing to the present recessionary context, characterised by the lack of consumer willingness to spend and the more general lack of 'animal spirits' that would otherwise raise private sector demand for loanable funds and raise nominal interest rates.

On the other hand, the results could also understate future inflationary pressures as the current recession reduces private sector investment and could produce accelerated capital depreciation through 'use, decay and obsolescence'. Low or even negative net investment could temporarily lower potential output levels, as evaluated by standard filtering techniques, and heighten the inflationary effects of the fiscal stabilisation packages.

The projection could significantly overstate the real output effects of the stimulus packages inasmuch as their potential to increase real output could be constrained by sharp increases in interest rates, widespread currency realignments and heightened volatility of capital flows linked to significantly higher risk premia on government debt associated with fears about long-

term sovereign insolvency. These fears could be all the more justified since major central banks have recently begun to play quasi-fiscal roles in the financing of government purchases of impaired and toxic financial assets and have turned to the monetisation of newly issued government debts.

Finally, recent studies suggest that the current recession was not only precipitated by the outbreak of the financial crisis in August 2007, but that the rise in world oil prices over the period 2002–08 also had a major role in initiating the downturn (Hamilton, 2009). World oil prices are usually thought to change in order to balance worldwide supply and demand. Growth in world demand for oil has now fallen, in line with the widespread decline in real output. The accompanying fall in oil prices has certainly already provided some relief in the form of increased household purchasing power. This world projection assumes that oil prices will remain constant in real terms over the period 2010–15. A decline oil demand and supply, however, could lead to major delays in investment projects linked to new oil extraction and refining, which could drive up world oil prices above those assumed in the projection.

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