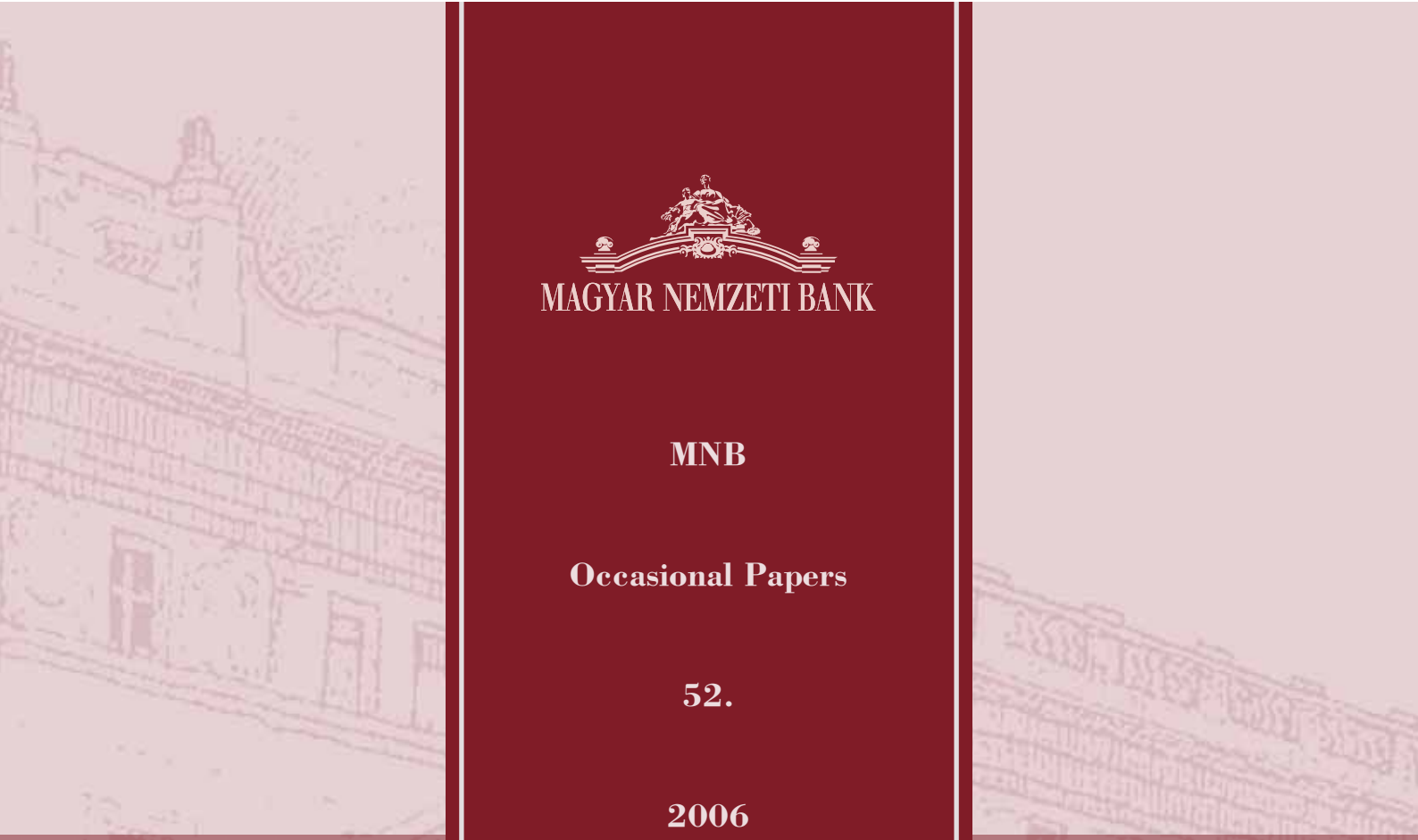

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ÁGNES HORVÁTH–ZOLTÁN M. JAKAB–
GÁBOR P. KISS–BALÁZS PÁRKÁNYI

Myths and Maths: Macroeconomic Effects of Fiscal Adjustments in Hungary

Ágnes Horváth–Zoltán M. Jakab–
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Myths and Maths: Macroeconomic Effects of Fiscal Adjustments in Hungary*

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Ágnes Horváth, Economist, e-mail: horvatha@mnb.hu

Zoltán M. Jakab, Principal economist, e-mail: jakabz@mnb.hu (corresponding author)

Gábor, P. Kiss, Principal economist, e-mail: kissg@mnb.hu

Balázs Párkányi, Economist, e-mail: parkanyib@mnb.hu

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Contents

Abstract

In this paper we investigate the possible effects of fiscal tightening in Hungary from two perspectives. First, simulations in an estimated neo-Keynesian model are used to characterise the effects of different scenarios for fiscal consolidations. We show that the composition of fiscal shocks is important for both the economic outcome and monetary policy. These simulations suggest a modest output cost of fiscal consolidation. Then we take a closer look at the non-Keynesian effects and their relevance for Hungary in a qualitative way. In our review of non-Keynesian channels of fiscal adjustments we conclude that expansionary effects are likely to become evident only in the medium or long run, rather than immediately after measures are taken.

JEL: E17, E52, E61, E62, E63, E65, H30.
Keywords: Keynesian, non-Keynesian effects, expansionary fiscal adjustment, Monetary policy reactions, Model simulations.

Összefoglaló

Tanulmányunkban a fiskális kiigazítások lehetséges magyarországi hatásait két nézőpontból elemezzük. Először, különböző típusú fiskális kiigazítások hatásait szimuláljuk egy becsült neokeynesiánus modellel. Bemutatjuk, hogy a makrogazdasági hatások és azok monetáris politikai következményei jelentősen függenek attól, hogy a fiskális kiigazítás milyen szerkezetben valósul meg. A szimulációk a legtöbb esetben mérsékelt rövid távú GDP-visszaesést valószínűsítenek. Ezek után azt vizsgáljuk részletesebben, hogy az ún. nem-keynesi csatornák mennyiben lehetnek fontosak Magyarországon. Áttekintésünk alapján arra a következtetésre jutottunk, hogy a növekedést élénkítő hatások leginkább közép- és hosszabb távon játszhatnak jelentős szerepet.

1. Introduction

The present paper aims to consider both our quantitative and qualitative knowledge of the possible effects of a fiscal adjustment in Hungary. It assesses both the standard channels of fiscal adjustments and those operating through credibility and expectations (non-Keynesian channels) in addition to surveying the theoretical and the empirical literature. As an illustration of the former, we carry out model simulations, while regarding the latter, we also analyse mostly non-Keynesian effects of fiscal adjustments in Hungary.

Traditional, Keynesian economists believe that fiscal loosening brings about an upswing, whereas a tightening is followed by a downturn. The example of Denmark (1983-86) and Ireland (1987-90) gave rise to the popularity of so called non-Keynesian theories, since in both cases fiscal consolidations were followed by a boom in activity. The on-going debate goes to the heart of economic policy as it not only questions the size of a fiscal shock but the sign of the effect as well. Several studies have attempted to point out the most important factors, such as the size, composition and timing of the fiscal shock, in producing non-Keynesian effects. Most recent papers emphasise the importance of additional factors, other than fiscal policy, in generating a negative fiscal multiplier.

Fiscal adjustments may have immediate expansionary effects if standard, mostly Keynesian effects are moderate, while mostly non-Keynesian effects are significantly large in the short run.[1] The implications of having a negative fiscal multiplier instead of the standard positive one is undoubtedly momentous for both fiscal and monetary policy. Fiscal adjustments with outright non-Keynesian effects have in theory no real costs[2] and hence they will leave every agent in the economy better off, including future generations.

For our simulation exercises we use the macroeconometric model of the Magyar Nemzeti Bank, the NEM. NEM is an estimated, backward-looking neo-Keynesian model with a relatively detailed fiscal block inside. In our view, the major channels through which fiscal adjustments affect demand and prices are well captured in the model. However, there are (mostly non-Keynesian) channels of fiscal adjustments which are not modelled, and thus model simulations can be interpreted as an important starting point of our analysis. One should mention that models with more micro foundations – such as recent Dynamic Stochastic General Equilibrium (DSGE) models – may capture some of the non-Keynesian effects left out during our model simulations. However, fitting these types of models to Hungarian data is still on the research agenda. Hence, future research is required to capture non-Keynesian effects in model simulations.

Our model simulations show the magnitudes and the relative importance of different compositions of fiscal adjustments and how monetary policy might change the output and price responses of the economy when standard channels of fiscal transmission are operative. We present detailed, shock-dependent fiscal multipliers for Hungary on a 4-year-long time horizon. This, so far unique experiment for Hungary shows that not only the effect of a fiscal consolidation is determined by, but also the role of monetary policy may depend on the composition of fiscal adjustment. Nevertheless, it should be stressed that our results are not intended to be used as a 'cookbook' for designing an optimal fiscal adjustment package, because our model is not able to rank the outcomes with respect to their welfare implications or their feasibility.

Investigating the relevance and possibility of credibility and expectations related (for simplicity we refer to them as non-Keynesian) channels of fiscal transmission in Hungary completes our analysis. We will argue that the possibility for non-Keynesian effects in the short run is rather small in Hungary, and hence it is unlikely that the overall fiscal multiplier on output would be negative in the short run. Under these circumstances the role and responsibility of other economic policies, in particular monetary policy, becomes crucial. Without endangering its primary goal of price stability, the central bank might indeed lessen the output loss of a fiscal adjustment by monetary easing, depending on the type of fiscal shock.

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[1] In the remaining part of the study we simply use the term 'Keynesian effects' instead of these standard effects.

[2] Since such a fiscal measure would enhance growth and reduce the debt burden at the same time, there would remain more resources to be reallocated between agents alive or not yet born. Hence with appropriate taxes and inflation, welfare could be improved for all generations.

Following this logic, first we will define and make a distinction between Keynesian and non-Keynesian channels of a fiscal consolidation in section 2. In section 3, we will look at the international experience of fiscal contractions and draw some lessons from the 1995-96 Hungarian 'Bokros package'. In section 4, we will quantify the extent of standard channels in Hungary using model simulations and analyse the possible monetary policy strategy responses. Finally, taking these results as a starting point, in section 5, we will determine the conditions under which non-Keynesian channels of fiscal contraction can have expansionary effects in Hungary. The last section concludes with our main findings.

2. Concepts and definitions

Fiscal policy controls the most versatile set of instruments among the economic agents. It directly affects the output of the economy by the selection and amount of products it purchases and also by choosing what public service it provides. It influences labour market outcomes as well, through demanding labour input and distorting incentives by levying taxes and granting transfers. Last but not least, taxes, subsidies and regulated prices are used to manipulate disposable income and profitability.

Given the complex ways the government is involved in the economy, numerous channels will contribute to the overall impact of any change in its decisions. By describing a particular mechanism we will assess the partial effects. These in turn will add up to the overall effect, which will be a non-Keynesian type if the Keynesian partial effects are sufficiently moderated and offsetting, non-Keynesian partial effects are sufficiently strong.

2.1. TRANSMISSION CHANNELS

In order to understand the various mechanisms and effects fiscal policy has on the economic aggregates we will illustrate in this section each of the above mentioned roles of the government. To begin with, we have in mind the simplest static model of a closed economy with both the private and the public sector using only labour as input in their production. To be more realistic, we will also discuss more complex channels through which private agents might react to a fiscal shock.

In our example economy the government produces public services by hiring labour and purchasing consumer goods, and it collects taxes to finance that. In what follows we investigate what would happen if the government decided to realise a consolidation by buying fewer units of consumer goods, for instance.

2.1.1. The primary effect

Let us first consider the case where the prices of consumer goods and public services are kept fixed. Then, purely for accounting reasons, GDP would drop by the same amount as the decline in government purchases, since demand and therefore supply had been reduced. Hence for statistical reasons – no matter what additional channels are invoked – the change in government policy will have to be directly reflected in the overall effect via its primary impact on output.

With foreign trade however, the primary effect can be mitigated. Part of the change in demand for consumer goods will be put across to the foreign market and only the rest to the domestic market. If, for instance, the import content of government purchases is 20 per cent, then the above first round effect will only be 80 per cent of the original fiscal shock. Hence, in a small open economy import leakage may considerably downscale the impact of fiscal policy changes.

2.1.2. Second round effects

Income effect

As the above shock to demand propagates through the economy several responses of the private sector come into play. First of all, the reduction in production will also mean that less labour input is needed and thus the income of households and consequently their consumption will also decrease. Hence output declines by more than just the primary impact of the change in government policy. This is the multiplier effect à la Keynes.

Price effect

When allowing prices to adjust, the decrease in the demand for consumer goods will also lead to their price declining. Consumers (and possibly the government as well) will in turn increase consumption compared to the fixed price case. Thus flexible prices and intense competition will counteract the primary effect and may contribute to the overall multiplier even as a negative term. Of course, this and similar mechanisms are advocated by the Classical theory.

As the above two arguments nicely illustrate, those effects which rely on some flexibility or perfection assumption will in general reduce the fiscal multiplier, whereas those effects which build on some rigidity or imperfection will increase it. Hence the sign and magnitude of the overall fiscal multiplier will depend on how close or how far the economy is from the ideal, Classical case.

With a richer structure for our example economy, the above discussed price effect can take several forms. For instance, the often mentioned risk premium channel works in the following way. With an unanticipated and credible fiscal consolidation, risk premium and consequently the interest rate might drop suddenly, which could lead to a significant increase in investments. Alternatively, lower interest rates might lead to cheaper consumer credits and higher consumption.

Yet another example might be institutional reforms and improving efficiency in the public sector. Inefficiency in our simple economy can be captured by high public service prices, since this would mean that the public sector produces one unit of GDP at a higher cost than private firms.[3] Therefore improving public sector efficiency would lead to lower public service prices, which would leave more income to be spent on other goods. Thus supply side reforms or any abolition of wasteful government activities can be classified as a negative term within the overall multiplier.

In an open economy exchange rate fluctuations change relative prices as well. So in the case of a credible fiscal tightening the price effect could take the form of currency appreciation, which would also lead to increased consumption. Although foreign trade would attenuate all the above effects as well, it is important to see that import leakage only reduces the magnitude of the fiscal multiplier, but it may not change its sign.

Expectational view and wealth effect

If we introduce time and forward-looking agents into our imaginary economy, then the way the government affects future states also becomes important in determining current economic outcome. For instance, if consumers – who plan for several periods ahead when deciding on current consumption – reckon on lower taxes or cheaper public services in the future, then they may reduce savings and raise present consumption. Hence an unanticipated and credible fiscal consolidation that foreshadows a healthier public finance and therefore lower taxes could lead to higher consumption today or, alternatively, if, for the above reasons, an increase in profitability is foreseen, then this could induce firms to undertake larger investments.

To recapitulate, we conclude that several partial effects make up the overall fiscal multiplier. A portion of these partial effects are of the Keynesian type – mostly income effects – and the rest, what one might call non-Keynesian effects, are of the Classical type – basically price and wealth effects. Depending on what type the dominant effects are, the overall effect may also become Keynesian (positive multiplier) or non-Keynesian (negative multiplier).

This also suggests that the closer the economy to the fixed price case the stronger the Keynesian effects will be, whereas the closer to flexibility and perfection non-Keynesian effects might become prevalent. Real economies are far from being perfect and prices are neither fixed nor flexible; therefore estimated macroeconometric models are, in most cases, neo-Keynesian (assuming, for example, price and wage rigidity). Moreover, the way agents base their current decisions on expected future events is really hard to incorporate in such a model. Hence, the fiscal multiplier in most estimated models is positive and less than one.[4] Most recent Dynamic Stochastic General Equilibrium (DSGE) models might capture non-Keynesian effects in a more well-founded way. However, the empirical fit of these models (at least for Hungary) is still on the research agenda. Future research might help in this respect.

There is one often mentioned channel for non-Keynesian effects that does not seem to fit the above classification. With strong collective bargaining on the labour market together with an effective social dialogue, agents may circumvent market forces to minimize the output loss brought about by fiscal measures. Such an agreement between employers and

[3] One might also say that the public sector uses the same technology and thus encounters the same costs as the private sector, but the profit generated by higher prices is wasted instead of being redistributed to consumers.
[4] Section 4 addresses the modelling issue in detail.

employees could ensure that costs are somehow distributed among the agents, and hence neither consumption nor production declines too much.

Dynamic set-up

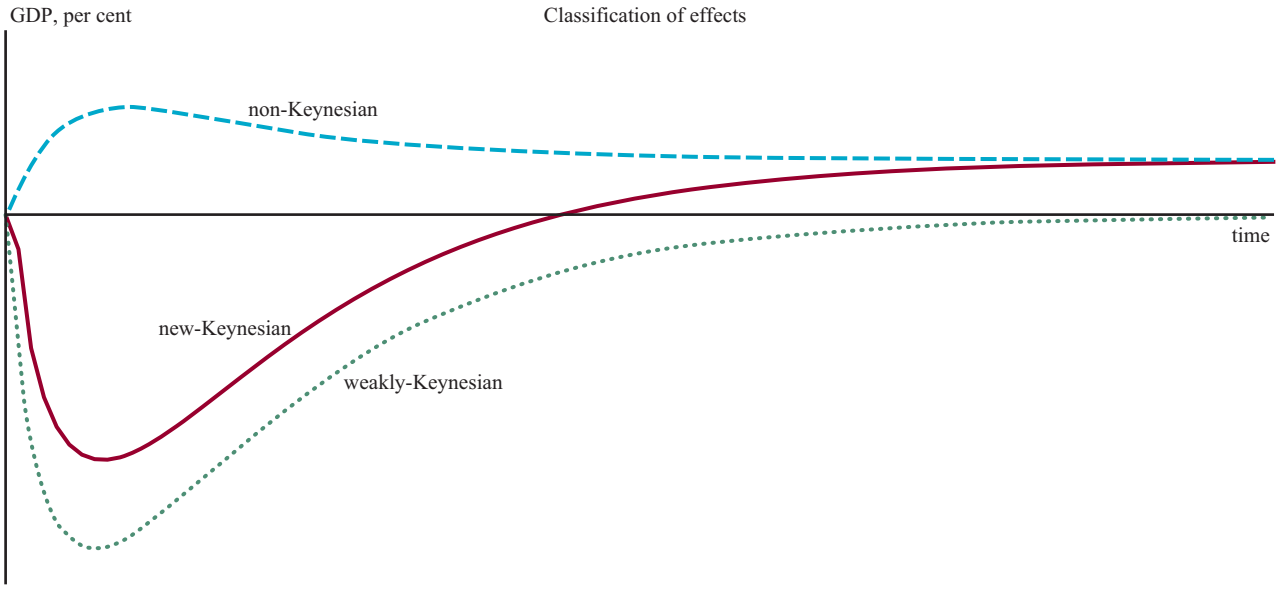
So far our description of the various potential effects of fiscal policy has been static, and hence valid for a given period. Naturally, the above mentioned channels may gain or loose strength over time, making the overall fiscal multiplier vary as the economy evolves after the shock. Hence, it will also be important to differentiate between short-term, medium-term and long-run multipliers. We define short, medium and long term as effects within the first year, between 2 and 5 years and after 5 years respectively.

Chart 1 below shows an example of how the effects of a fiscal tightening (tax hike or decrease in government expenditure) might evolve over time. The lower dashed line represents the weakly-Keynesian case, where both the short-term and the long-run effect are positive.

According to the heavy line, the Keynesian effects are gradually overcome by effects coming from non-Keynesian channels. Typical for this case is when a fiscal consolidation encounters large short-run costs via a drop in actual output, but at the same time it raises potential output via a more effective public sector or lower cost of capital (due to lower risk premium, for instance). Therefore, effects in the short term are not a good indicator of the true welfare gain or loss. Eventually non-Keynesian effects dominate and the overall effect becomes negative. This is the most widely accepted case, where effects are neo-Keynesian in the short run, while neo-Classical in the long run. The upper dotted line is the hypothetical impulse response of a purely non-Keynesian fiscal shock. Here the multiplier is negative even in the very short run.

Chart 1

Examples of the evolution of effects of a fiscal consolidation



2.2. FRAMEWORK FOR OUR ANALYSIS

As already mentioned, short-run effects do not necessarily signal well the long-run welfare effects of a fiscal consolidation, as changes in the potential output only become evident after some time. Moreover, the alternative to most fiscal adjustments is a macroeconomic instability or a crisis, which is most likely to be more costly than a painful but timely fiscal consolidation. For these reasons and for the lack of an 'all-inclusive' model we do not assess the possible effects in welfare terms.

2.2.1. Technical comments

Apparently, theories use abstractions and simplifications that eventually lead to extreme and contradicting results, in support of which it is sometimes hard to find empirical evidence. It becomes even worse when empirical results hinge on statistics like GDP, where measurement error is a major issue.

The problem lies in measuring public sector output. Since there is no market for most of the services provided by the government, public nominal output is approximated by its costs. Then, without prevailing market prices, nominal public GDP has to be broken down to public output and a public sector deflator, while the former will yield public sector productivity as well.

However, this productivity is exactly what tips the balance for either Keynesian or Classical theory. The former states that production in the public sector is just as efficient as in the private sector, whereas the latter likes to label it as mostly waste. Therefore, statistics by itself may generate evidence in support of either theory by the right change in the supposed productivity of the public sector. This means that even if non-Keynesian effects – through improved efficiency of public services – are present, they still may be difficult to detect.

Since it is common practice to base assessment of economic performance on the growth rate of GDP, some of the research into non-Keynesian effects looks at the change in growth rates as an indicator of expansion or contraction. However, this practice is fundamentally false, since in the case of a large and sudden drop in the level of GDP and a subsequent accelerated catch-up process one would record low GDP growth in the first year and a higher than average growth rate starting in the second. Nevertheless, when correctly interpreted one would find that, for an extended period of time, GDP remains lower than what it would have been if there were no shocks. Therefore, in our definition and throughout the paper, contractions (expansions) will mean a lower (higher) output than in the absence of fiscal measures.

2.2.2. Scope of the analysis and data requirements

Finally it should also be stressed that, since the focus of this paper is to investigate whether fiscal effects are more likely to be Keynesian or non-Keynesian, we will not deal with other developments which may seem to yield a negative fiscal multiplier. Business cycle fluctuations may conceal evidence for either competing theory. Hence, as a solution to both the above mentioned causality problem and the business cycle bias, it is important to use cyclically adjusted time series when evaluating the data.[5]

As an example, suppose that an increase in tax revenues has been achieved with a lower tax rate and a broader tax base. At the same time, income (on which the tax is levied) has grown and therefore consumption has risen. These

Table 1

Possible non-Keynesian effects of a fiscal consolidation in a dynamic model

Assumptions	Conditions	Channels	Demand/ Supply
Rational expectations	Permanent change in fiscal policy	Interest rates/ permanent income	Demand/ consumption/ investment
Ricardian consumers (no liquidity constraints, perfect capital market, altruistic agents)	a) Lump-sum taxes (multiplier is zero) b) Distortionary taxes	Permanent income	Demand/ labour supply
Risk premia and credibility	High debt or discrete change in fiscal policy	Interest rates/ wealth effect/ permanent income	Demand/ investment/ consumption
Expectation view of fiscal policy	High initial expenditure/debt	Permanent income/ wealth effect	Demand/ consumption
Unionised labour market	Fiscal tightening through expenditure cuts or tax hikes	Unit labour costs	Supply

Based on: Briotti (2005), Table B, p. 13.

[5] In our assessment of the empirical literature we will elaborate further on this issue.

events may deceive us to think that a tightening fiscal policy (growing tax revenues) has caused output to increase and so the fiscal multiplier is negative. To prevent such a spurious deduction – besides employing cyclically adjusted taxes, which filter out fluctuations in the corresponding tax bases – we interpret fiscal shocks in GDP ratios and not in levels.

Finally, Table 1 summarises the possible non-Keynesian effects, according to the classification of Briotti (2005).

3. International and Hungarian experience

For a better understanding of the possible effects of a fiscal consolidation in Hungary we first briefly review the empirical literature with a special focus on non-Keynesian effects, as successful consolidations should feature effects more of these types. An overview of cross-country analyses is presented in the Appendix.

In this section we also draw lessons from the 1995-96 consolidation package, while the case studies of the two most often cited fiscal episodes of Ireland and Denmark are dealt with in the Appendix.

Although only few cross-country studies found fiscal consolidations with more than complete private offsetting, overall macroeconomic costs of fiscal measures should be compared to potential losses of an adjustment that is forced by the market. The immediate output costs of the Hungarian consolidation (1995-96) are also evident from the figures, just as the Keynesian theory suggests. However, the adjustment, by avoiding a possible financial crisis, shortened the average length of when major output losses declined, from 5 years to only two.

3.1. EMPIRICAL LITERATURE

A vast body of literature has made attempts to evaluate the effectiveness of fiscal policy. What is more, already a number of surveys of this literature are also available. Hence, in the following section we can only focus on the findings of selected studies.

One stylised fact highlighted by these studies is that fiscal adjustments are often accompanied by accelerating economic growth. In contrast, Keynesian economists would expect falling income and output as a result of a cut in the budget deficit. Two questions arise immediately. First, what channels may cause an expansionary or non-Keynesian effect? Second, is the direction of causality unanimous, namely do fiscal adjustments enhance growth in the short run or rather do favourable economic developments contribute to the reduction of the deficit?

These questions cannot be answered easily. Numerous methodological problems arise when it comes to examining the effects of fiscal policy in any economy. Most importantly, fiscal policy can affect economic growth through different channels and these effects cannot be easily disentangled from the effects of monetary policy, labour market developments or the external environment. In addition, a proper, economically meaningful definition of the fiscal deficit itself is difficult to construct. Effects of the cycle on the deficit cannot simply be removed by employing common methods of cyclical adjustment.[6] Apart from filtering out cyclical components, creative accounting measures should also be removed from the deficit. These measures have no significant effect on the economy by definition, and therefore the proper identification of fiscal shocks requires their exclusion.[7] Nevertheless, we will try to answer our questions taking into consideration the above mentioned limitations of the empirical studies.

In the empirical literature two main approaches can be distinguished. The first one examines individual case studies of fiscal episodes; the second one makes cross-country estimations with a sample of countries. An alternative way of looking at the impact of fiscal policy on demand is the cross-country estimation of the response of private saving to public saving.[8]

The most widely accepted view concerning the effectiveness of fiscal policy is that private sector responses offset fiscal adjustments to a certain extent. Only few cross-country studies found fiscal episodes with more than complete private offsetting. These studies support the non-Keynesian view by estimating negative overall fiscal multipliers. However, their evidence seems to be insufficient to reject the standard view of moderate, but still positive fiscal multipliers, which allows for partial private offsetting.

[6] For details see P. Kiss and Vadas (2005). Another specific example of methodological distortion is mentioned by Prammer (2004). Spanish fiscal developments in 1986-87 were mistakenly identified as an 'exceptional episode' by Alesina and Ardagna (1998). In this case part of the changes of the deficit was incorrectly attributed to discretionary fiscal policy, due to methodological problems of cyclical adjustments.

[7] Koen-van den Noord, 2005, Commission, 2004

[8] In the appendix we deal with these studies in more detail.

Another aspect of the empirical observations might be the seemingly weakening effect of fiscal policy in the last decade. Even though this phenomenon is not yet fully understood, among the possible causes one might include the increasing openness of countries or developments in financial intermediaries. Such a tendency for smaller fiscal impact, however, could also imply that non-Keynesian effects are becoming ever stronger or, in the extreme, that they can more than fully offset the standard Keynesian channels.

Nevertheless, we would like to emphasise that focusing on short-term growth performance alone can be misleading. First, even if fiscal consolidation turns out to be costly in the short run in terms of output and unemployment, it can contribute to a higher potential growth rate in the medium to long run. Second, overall macroeconomic costs of fiscal adjustments should be compared to potential losses of an adjustment that is forced by the market. Harmful effects of economic crises are well known, especially with devaluations or large depreciations of the exchange rate; hence the possible losses of a delay of fiscal consolidation may exponentially increase the originally positive but small costs of adjustment.[9]

3.2. THE 1995-96 FISCAL CONSOLIDATION IN HUNGARY

The only major consolidation period – which qualifies as a tightening with all the different criteria used in the literature – was the 1995-96 tightening, which was enforced by the deterioration of the external balance.[10] Confidence in the currency was shaken by the rapid debt accumulation and the Mexican crisis, and thus capital outflow intensified.

In March 1995 a stabilisation programme was launched consisting of a restrictive fiscal policy and an expansive monetary policy. A depreciation of the currency by 9 per cent followed by the adoption of a pre-announced crawling peg system with a band of +/- 2.25 per cent resulted in surprise inflation, but the new system restored the predictability of monetary policy in the following years. Together with effective fiscal measures, surprise inflation contributed to the decrease of public expenditure in real terms; therefore credibility of fiscal policy was also restored gradually.

The adjustment resulted in low GDP growth during 1995-96 and falling private consumption, but recovery came as early as two years after measures were announced. Although gathering fiscal and monetary credibility could have opened non-Keynesian channels, this effect cannot be separated from the more evident impact of growing foreign demand and increasing FDI.[11] This suggests that even if non-Keynesian effects had been present in the years after the consolidation, the immediate effect was Keynesian overall.

Despite similarities of the current economic conditions with those at the beginning of the 1995-96 consolidation – such as a high debt-to-GDP ratio, twin deficit problems and relatively high wage costs – a potential consolidation is not likely to evolve in a parallel manner.

The reason is that lower inflation and more credible monetary policy – with its primary goal now defined to be price stability – reduce the chances of high surprise inflation. Furthermore, with a more tense labour market and much more forward looking employees, wages would react sooner to a surprise inflation than they did during the consolidation years. Furthermore, in contrast to the events a decade ago, devaluation of the domestic currency would have negative wealth effects, due to the increased foreign exchange denominated borrowing of households.

[9] De Gregorio and Lee (2003) found an average output loss of around 8 per cent of GDP in the case of exchange rate crises, which is doubled when accompanied by banking crises. They found that a crisis reduces growth by 1.7 per cent per annum during a five year period. This is consistent with the results of their alternative definition, which focused on a 3-year period. In this case the average output cost per crises from 1970 to 1999 was about 5.8 percentage points for an average developing country. Similar results can be found in Barro (2001) and Tóth (2005) and Report on Financial Stability (April 2006). An important lesson of the ERM crises of 1992-1993 is that exchange rate crises associated with output loss may develop even with sound financial institutional systems and moderate macroeconomic imbalances. For example Finland, Italy, Spain and Sweden had an average output loss of around 2 per cent of GDP per annum during a four year period.

[10] The identification of the fiscal episode is based on the so-called 'augmented SNA deficit', an alternative fiscal indicator calculated by MNB.

[11] FDI inflow might have been also stimulated by more credible policies and better predictability of the economic environment, and therefore parts of FDI might be considered as a non-Keynesian effect.

3.2.1. Measures

The initial fiscal situation was unsustainable in 1994; both deficit and debt were high and had increasing trends. Net interest payments were driven by accumulating debt and increasing risk premium.

Table 2

Fiscal indicators (GDP, per cent)

	1994	1995	1996	1997
Headline (cash-flow) deficit	-8.4	-6.7	-3.1	-4.8
Augmented SNA deficit	-11.8	-8.1	-5.8	-6.6
Cyclically adjusted primary balance	-5.4	0.8	3.6	2.3
Net interest payments	7.3	8.9	8.0	8.0
Gross debt	89.4	87.4	73.7	64.0
Gross debt consolidated with MNB	96.3	99.4	83.7	74.4
Privatisation receipts	0.7	8.6	2.0	4.4
Net seigniorage	0.2	1.6	0.9	1.0

The cyclically adjusted primary balance[12] (CAPB) was around -5.4 per cent of GDP in 1993-94, but improved by 8 per cent of GDP by 1995-96. Before elections it increased again by 1.5 per cent of GDP in 1997-98, but this expansion was reversed in 1999-2000.

In 1995-1996 the fiscal consolidation was achieved on the expenditure side, while cyclically adjusted tax revenue – also adjusted by tax paid by the government sector – remained unchanged. Capital expenditure was decreased from around 9 per cent of GDP to 6.5 per cent of GDP, which represents a cut of 31 per cent (28 per cent in real terms). At the same time, current primary spending as a ratio to GDP was cut by 21 per cent (18 per cent cut in real terms).

It is important to note that higher-than-planned inflation played a major role in these developments, since two-thirds of the decrease in current spending and half of the decrease in capital spending can be attributed to surprise inflation (almost 10 per cent) in 1995 and a deliberately biased official inflation projection (by 4 per cent lower than the outcome) in 1996.

The three main categories of current primary spending (public wages, goods and services, transfers) expressed as a ratio to GDP were cut by almost the same rate, around 20-22 per cent (17-19 per cent in real terms). This reflects the fact that a wide range of additional measures – other than losses in real terms due to higher-than-planned inflation – were implemented.[13] The loss in real terms was not compensated in 1997-2000, but both capital and current primary spending were significantly increased before and after elections in 2001-2002.

3.2.2. Macroeconomic environment

Real GDP decelerated during the consolidation years, due to a rapid fall in consumption and public investment. Although a sudden break in imports and fast growing exports alleviated this down-turn, the immediate costs in terms of GDP growth are evident from the figures, just as the Keynesian theory suggests.

[12] This calculation is based on the so-called 'augmented SNA deficit', an alternative fiscal indicator calculated by MNB. Apart from the fact that ESA figures are not available for that period, the 'augmented SNA deficit' seems to be a more appropriate choice by definition. In fact, the main objective of this indicator is to capture the 'true' size of the deficit by filtering out effects of creative accounting measures and augmenting the deficit with effects of quasi-fiscal activities.

[13] Public employment was reduced in parallel with a reduction in the purchase of goods and services. A number of transfers and subsidies were reduced, for example family support became means-tested, employers had to pay the major part of sick-pay instead of the government, subsidies to agriculture and specific industries were cut.

Nonetheless – what might be seen as non-Keynesian effects kicking in – economic growth quickly gained new momentum after the heavy slow-down during the consolidation period of 1995-96 (see Table 3). However, devaluation of the Forint, steadily growing foreign demand, roaring FDI coming in and overall monetary conditions also served as important factors in the early turn-around of the economy.[14]

Table 3

Macroeconomic indicators (annual growth, per cent)

	Real GDP	Private consumption	Investment	Exports	Imports	Employment
1993	-0.6	1.9	2.0	-10.1	20.2	-6.3
1994	2.9	-0.2	12.5	13.7	8.8	-2.1
1995	1.5	-7.1	-4.3	13.4	-0.7	-1.9
1996	1.3	-3.0	6.7	12.1	9.4	-0.5
1997	4.6	1.7	9.2	22.3	23.1	0.1
1998	4.9	4.7	13.3	17.6	23.8	1.8

Source: Hungarian Central Statistical Office, National Accounts.

Private consumption fell more than real disposable income as backward-looking consumers might have had the perception that high inflation and low real income would be there to stay for a longer period, and therefore they revised their expectations regarding future income accordingly. Despite the fact that the newly introduced crawling peg regime could have led the relatively few forward looking households to anticipate lower inflation and therefore higher real income following the fiscal tightening, underdeveloped financial institutions must have prevented them from adjusting their consumption path accordingly. Hence the positive wealth effect through expectations, an often mentioned channel in non-Keynesian theory, could not have been invoked during the 1995-96 fiscal episode. The decrease in households' income was, however, somewhat mitigated by gains on their foreign exchange assets and the devaluation of the Forint.

As we have already mentioned the output loss of the consolidation should be judged in comparison with the loss encountered during a financial crisis that is brought about by the lack of fiscal adjustment. According to Barro (2001), De Gregorio and Lee (2003), Tóth (2005) and Report on Financial Stability (2006) such a crisis reduces output on average by 1.7-2 per cent annually for around four to five years. Without any rigorous calculations, just by looking at Table 3 one might find that the output growth rate in 1995-96 was lower than a previous trend of recovery by around 1.5-2 per cent, which is similar to what the aforementioned studies found. In this sense, the 1995-96 consolidation package, by avoiding a possible financial crisis, shortened the period when major output losses occur from five years to only two.

Non-Keynesian effects operating through investments are hard to disentangle from effects of other factors. In our view steadily increasing foreign demand and shrinking wage bills in real terms increased profitability of firms and also drove up investment activities. The increase in investment was also due to growing FDI, which more than doubled (expressed in euros) by 1997-98 (see Table 4). This effect, however, might have been induced by improving monetary and fiscal credibility. An up-spring of housing investment was triggered by formerly introduced government housing subsidies.

Table 4

Macroeconomic indicators (annual growth, per cent)

	1993	1994	1995*	1996*	1997*	1998*
Foreign direct investment	2038.8	965.9	3399.1	2143.2	3165.1	2381.0
of which: Privatisation revenue	959.6	38.2	2368.0	460.2	249.7	11.0
FDI excluding privatisation	1079.3	927.7	1031.1	1683.0	2915.4	2370.0

** Including reinvestments.*

[14] Kovács (2005) describes these effects in detail with a specific focus on the role of the exchange rate devaluation.

On the monetary side considerable loosening accompanied the fiscal consolidation. Inflation rose more than expected, which pushed real interest rates lower than previously anticipated. Nevertheless, the business cycle of our trading partners and the Forint devaluation were more likely to be the driving force behind the investment boom rather than low real interest rates.

The trade balance improved dramatically during the fiscal consolidation, which proved to be important in attenuating the slow-down. Although some authors believe that exports can be an important transmission channel for non-Keynesian effects,[15] this improvement was more likely to be caused by the large drop in imports.

[15] See Rzonca and Cizkowicz (2005).

4. Standard channels of fiscal adjustment

In this section, we simulate different compositions of fiscal adjustments to quantify the magnitudes and the relative importance of fiscal shocks. However, simulation results cannot serve as a guideline for constructing an optimal fiscal contraction package for several reasons. First, our simulations are based on standard, mostly Keynesian channels of fiscal policy; consequently there are channels, in particular some non-Keynesian channels, that are not modelled and therefore our results can be interpreted as an important starting point of any fiscal analysis. Section 5 summarises our current knowledge and opinion about the importance of certain non-Keynesian channels in Hungary and hence continues the examination.

Second, fiscal shocks that are simulated represent extreme compositions in the sense that only one type of fiscal measure is shocked during the simulations. In reality, fiscal consolidation packages typically affect a wide spectrum of measures. For this reason, we also simulated a so called 'mixed shock', that is a weighted mixture of our individual shocks where weights were chosen to imitate the feasible consolidation scenario of the *Report on Convergence* published by the Magyar Nemzeti Bank (2005).

Third, we also tried to analyse the situation forward looking monetary policymakers face after the implementation of the different individual shocks. However, the exact reaction of monetary policy would depend – among other factors – on the credibility of fiscal authorities and the sequencing of the fiscal consolidation.

To sum up our results, when interest rates were held fixed, model simulations for Hungary showed a fiscal multiplier less than 1 in the first year and less than or close to 1 in the third year, depending on the composition of fiscal consolidation. In some cases the size of the multipliers might seem somewhat larger than what empirical studies show for small, open economies. There are several factors that can partly explain this difference. First, many empirical studies do not distinguish between different compositions of fiscal adjustment but analyse the effect of the change in headline figures ignoring the possible role of different compositions of these combined shocks. Second, it should not be forgotten that the benchmark case would be an alternative scenario where adjustment is forced by the market through an exchange rate crisis that typically triggers a much larger output loss (see section 3.2.2).

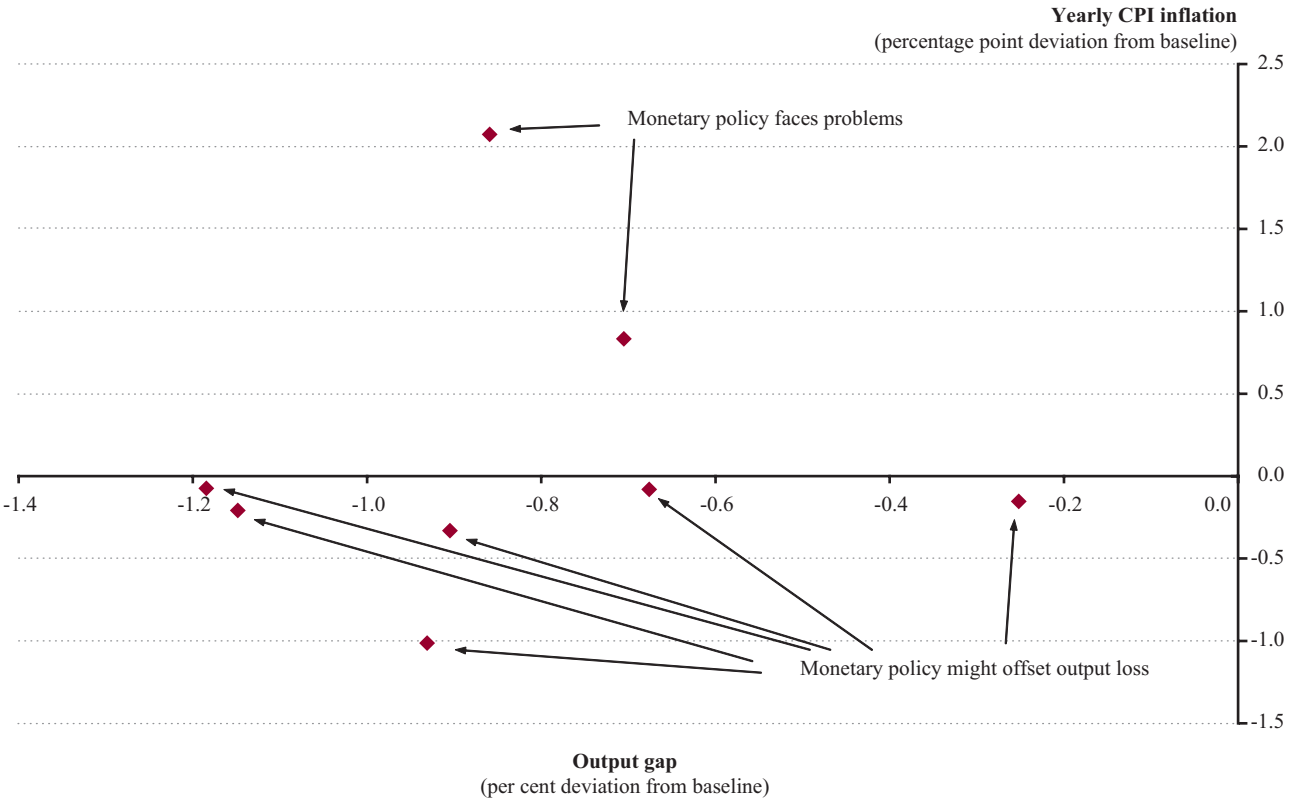
Price responses were also found to be very sensitive to the composition of fiscal restrictions, with some fiscal shocks having inflationary, others having disinflationary effects. As mentioned before, the bulk of (mostly) non-Keynesian effects during these simulations were neglected.

Monetary policy was in a relatively simple situation when output and inflation headed in the same direction. Monetary policy decision makers could reduce the initial output loss and also counteract the disinflationary effect of the adjustments by easing monetary conditions, regardless of the weights given to output and price stabilisation in their reaction function. We also saw the special case of the temporary indirect tax shock that did not trigger any monetary policy response at all.

On the other hand, there were fiscal consolidations when monetary policy found itself in an unpleasant situation – rising inflation was accompanied by a fall in output. These were the cases when fiscal policy persistently relied more on inflation (regulated price shock) or when it significantly affected labour markets (social security contribution hikes). The trade-off problem makes monetary policy chose between different output and inflation combinations, hence the formulation of monetary reaction function is crucial in the outcomes. Chart 2 illustrates this and shows that when inflation and output heads in the same direction monetary policy might help in stabilising both, but there are two scenarios analysed when monetary policy found itself in an inconvenient situation as the two responses have the opposite signs (increasing social security contributions and regulated price shock).

Chart 2

Trade-offs of monetary policy*



** 3rd year output and inflation effects of different fiscal adjustments with constant interest and exchange rate.*

4.1. THE NEM MODEL

The first question we focus on is how Hungarian output and the inflation rate would respond to different fiscal composition packages on different time horizons if economic agents have perfect foresight. In our view, running simulations on the Quarterly Projection Model (NEM)[16] gives a good starting point to the analysis. NEM is a medium sized, estimated neo-Keynesian model with backward looking agents. Similarly to most of the currently used macromodels, this model contains price and wage rigidities in the short run, while it is neo-Classical in the long run.

Box 1. Limitations of our simulations

In our view, the model is detailed enough to show the major channels of the transmission of selected fiscal shocks. The other advantage of using this model is that it matches Hungarian data relatively well. Consequently, secondary effects working through the change in macroeconomic environment are mostly captured. However, there are some possible caveats use of such a model.

As the NEM model is not a well-founded general equilibrium model with full microfoundations, it is not useful to make any kind of a welfare analysis. Hence, we do not intend to analyse what is the optimal structure of fiscal consolidations in welfare terms. In contrast, we investigate what are the major macroeconomic effects of different types of fiscal adjustments and how monetary policy reactions might modify the final macro effects.

[16] For a detailed description of the model see Benk et al. (2006) and Jakab et al. (2004).

Secondly, the model cannot treat credibility or sustainability issues of fiscal consolidations. At first glance, one might compose a fiscal consolidation based on our simulation results which gives the lowest output loss, or has the minimal effect on inflation.[17]

Thirdly, model simulations are not able to assess feasibility issues, either. In practice, one should also take into account the political-economical features of an adjustment. Indeed, some scenarios that might seem to be optimal might not be a wise decision from a welfare or political feasibility point-of-view. Nevertheless, we show one fiscal alternative, which in our view might be feasible (the so called 'mixed shock'). This scenario was based on the central bank's Report on Convergence (2005).

Fourthly, as with most other macromodels, there are strong underlying assumptions when making the simulations. Most importantly, in forward looking simulations we assume uncovered interest rate parity (UIP) and the expectation hypothesis to hold for long-term interest rates. Moreover, there are also strong assumptions about the wage bargaining process – social security contributions (paid by employers) behave differently from personal income taxes.[18] In a perfectly rational bargain this should not be the case.

Fifthly, fiscal policy often has strong distribution effects, and these can have very serious implications for the aggregated outcome, as well. An aggregated macromodel is by construction not able to deal with these issues.

Finally, one should also note that the NEM model is estimated on a sample with only one major fiscal consolidation. The economy might behave differently in comparison to what the model would suggest, if the coefficients change (the usual Lucas critique might hold).

In the model a fiscal contraction leads to lower output in the short run. The magnitude of fiscal multipliers is highly dependent on the speed of nominal wage adjustment, the sensitivity of prices to demand shocks and the import elasticities of different demand components. Nominal wage adjustment is relatively slow in the model – it takes around 2-3 years for changes in unemployment to considerably alter private wages. This implies that there is a long lag for second round effects to work. In addition, it is assumed that the labour market (i.e. nominal wage) response to demand shocks is slower than to price responses. The sensitivity of prices to demand shocks[19] is modelled through the effect of the output gap on the GDP deflator. The short-term elasticity is around the international average. Moreover, the short run fiscal multiplier highly depends on which demand items were influenced. Due to the high-import intensity of investments, any fiscal shock affecting investments results in more modest multipliers than those affecting, for example, government purchases of goods and services with relatively low import intensity.

The responses of GDP (the fiscal multiplier) and prices (CPI) highly depend on the composition of the fiscal contraction as well. We consider four prototypes of fiscal consolidations: those which initially affect goods markets (reduction in government investments or purchases of goods); those which initially alter the real (disposable) income of households (personal income tax measures, reduction in transfers); those which modify the supply side (labour market) of the economy (reduction in government employment and rises in social security contributions paid by employers); and, finally, those with an initial direct impact on prices or inflation (indirect tax hikes or administered price increases). For comparability reasons we have set the initial conditions of the simulations such that each results in the same amount of fiscal saving (1 percentage point of GDP on average).[20]

Fiscal sustainability and credibility issues were not considered throughout the exercise. In the case of credible fiscal consolidations, market participants might perceive that fiscal consolidation helps in avoiding unsustainable fiscal paths or results in lower exchange rate risk. Consequently, multipliers presented are bigger than what we would expect if non-Keynesian channels were not underrepresented. All the above mentioned channels strengthen the probability of an over-

[17] Mathematically, this could be possible by choosing to tighten on items with small multipliers and to ease on items with high ones.

[18] This assumption, however, is quite common in macromodels used in international practice – see Henry et al. (2004).

[19] The key domestic price variable – the GDP deflator – depends on unit labour costs in the long run, while in the short run the output gap has some effect on the dynamics of its convergence to the long-run steady state. A 1 per cent higher output gap leads to around 0.2 per cent higher GDP deflator in 1 year.

[20] Our list of possible fiscal consolidation compositions is not complete. We have omitted forms of consolidations which rely on unimportant or hard-to-modify fiscal revenues (e.g. capital taxation, increase of customs duty, etc.).

all non-Keynesian effect of fiscal contractions. As the NEM model does not include such strong non-Keynesian channels, it is not very surprising that in all cases fiscal multipliers turned out to be Keynesian or weakly-Keynesian, in the medium term – 2 to 5 years – multipliers lie between 0.2 and 2. Weakly-Keynesian multipliers are the result of strong initial output effects, which are mitigated by second-round effects. Lower employment (higher unemployment) pushes nominal wages down more slowly than the lower output gap decreases prices (through a decrease in mark-ups over costs). The initial output effect is thus offset by a positive shock to consumption (and possibly to corporate investments).

4.2. DESCRIPTION OF SHOCKS

The shocks in our model simulations were set to arrive at an average permanent fiscal saving of 1 percentage of the initial GDP five years on. This exercise required shocks of very different magnitudes for different variables (see Table 5).

Table 5

Shock scenarios in different simulations

(percentage deviations from baseline in levels on a 5-year horizon)

Type of shock	Individual shocks	Mixed shock
Reduction in Financial Transfers*	-6.7	-3.2
Increasing PIT rate (percentage point)	0.3	1.1
Reduction in Gov't Employment	-12.5 labour force -1.1	-1.8
Reduction in Gov't Purchases of Goods (Public consumption)	-9.5	-0.7
Reduction in Gov't Investment	-24.6	...
Increasing SSC rate (percentage point)	4.6	...
Regulated Price Increases	2.4 percent higher growth for 5 years	...
Indirect Tax Increase (percentage point)	1.8	...
Transfers in Kind	...	-0.5

PIT: personal income tax and contributions paid by employees; SSC: social security contributions paid by employers.
** Endogenous variable unless otherwise indicated.*

In our model, a reduction of around 7 per cent in financial transfers (transfers from government outside benefits in kind, e.g. pensions and unemployment benefits) would be equivalent, respectively, to an increase of 3 percentage points in the PIT and 4.6 percentage points in the social security contribution rate.[21] On the other hand, the same amount of savings (1 per cent of GDP) would require a decline of around 25 and 10 per cent in public investments and public consumption, respectively.

A reduction in public employment might have very different effects depending on how labour markets (unemployment and participation rate) respond. Here, we assumed that around half of the employees who were dismissed become inactive and thus the labour force was also negatively shocked by around 1 per cent.

The so-called mixed shock was calibrated such as to match the fiscal contraction scenario published in the 2005 Convergence Report of the central bank of Hungary. This takes the form of a reduction of around 2 per cent in public employment, a 3 percentage point cut in financial transfers and a corresponding 1 percentage point personal income tax hike.

[21] A higher increase in social security contribution than in PIT is needed as contributions of public employees net out and do not change the financing requirement of the budget.

As far as price-related fiscal consolidations are concerned (i.e. inflation taxing), an increase of around 2 percentage points in the effective indirect tax rate would result in a saving of 1 percentage point of GDP. Fiscal consolidations can also be interpreted in a wider perspective. Not only the central government's, but state owned companies' revenues and expenditures matter in this sense. In the medium run, losses of the broadly defined public sector are finally financed by taxpayers. According to our calculations, a price increase of around 30 per cent would be required for services directly influenced by the government (excluding, for example, energy, phone prices or prices determined by municipalities) to achieve the required amount of savings, but that would clearly be unacceptable for the public. Hence we assumed that such an 'adjustment' (i.e. the regulated price shock) would take more than one year, resulting in a 2.4 percentage point higher yearly inflation rate for (total) regulated prices lasting for five years. One should note that the two 'price related' shocks differ significantly in their nature – while the indirect tax shock can be mostly viewed as a one-off price level shock, regulated price hikes in our set-up create a prolonged higher inflationary environment. This is not an arbitrary assumption, since past experiences confirm that modifying indirect tax rates is less frequent, while regulated price shocks can last a longer time.[22]

4.3. CONSOLIDATION AFFECTING GOODS MARKETS

In the case of constant interest rate policy, fiscal shocks directly affecting goods markets have a relatively large initial GDP impact in the NEM model, with multipliers in the first year lying between around 0.5 and 0.9. As investment goods are more import-intensive than public goods, their impact multiplier is lower than that of public consumption. Some second round effects start to work through lower prices due to lower output gap. As a next step, employment and then real wages start to decrease, inducing lower income of households. Hence, the initial drop in GDP is exacerbated by labour market responses. This effect is somewhat mitigated by the increase in real disposable income (as nominal wages decrease slower than prices) and consumption of households. In the case of government investment reduction, the capital stock also drops, leading to a very mild decrease in potential output, which decreases the magnitude of price adjustment as well. Overall, according to the model these shocks have a relatively sharp effect on the level of GDP, but price responses are more subtle, inflationary impacts are not more than 0.35 percentage points in the longer run (see Chart 3).

Box 2. Chart description and explanation

The following charts contain concentrated information and might require explanation. We have graphed the year-end CPI inflation rate on the vertical axis and the output gap (relative to the baseline) on the horizontal axis to present the trade-off for monetary policy between inflation and output. To make the different effects of the different shocks more pronounced and differences in policy reactions more visible, we arrived at different optimal scales of axis in the case of different kinds of fiscal adjustments.

Squares denote the constant monetary policy scenarios. The arrows start from the first year (short-run effects), cross the second year effects and end in the third year (medium-term) simulation results. One should mention that we only report the output loss for the respective year, the 'total' cost of such policies would be the cumulative of these yearly 'sacrifice ratios'.

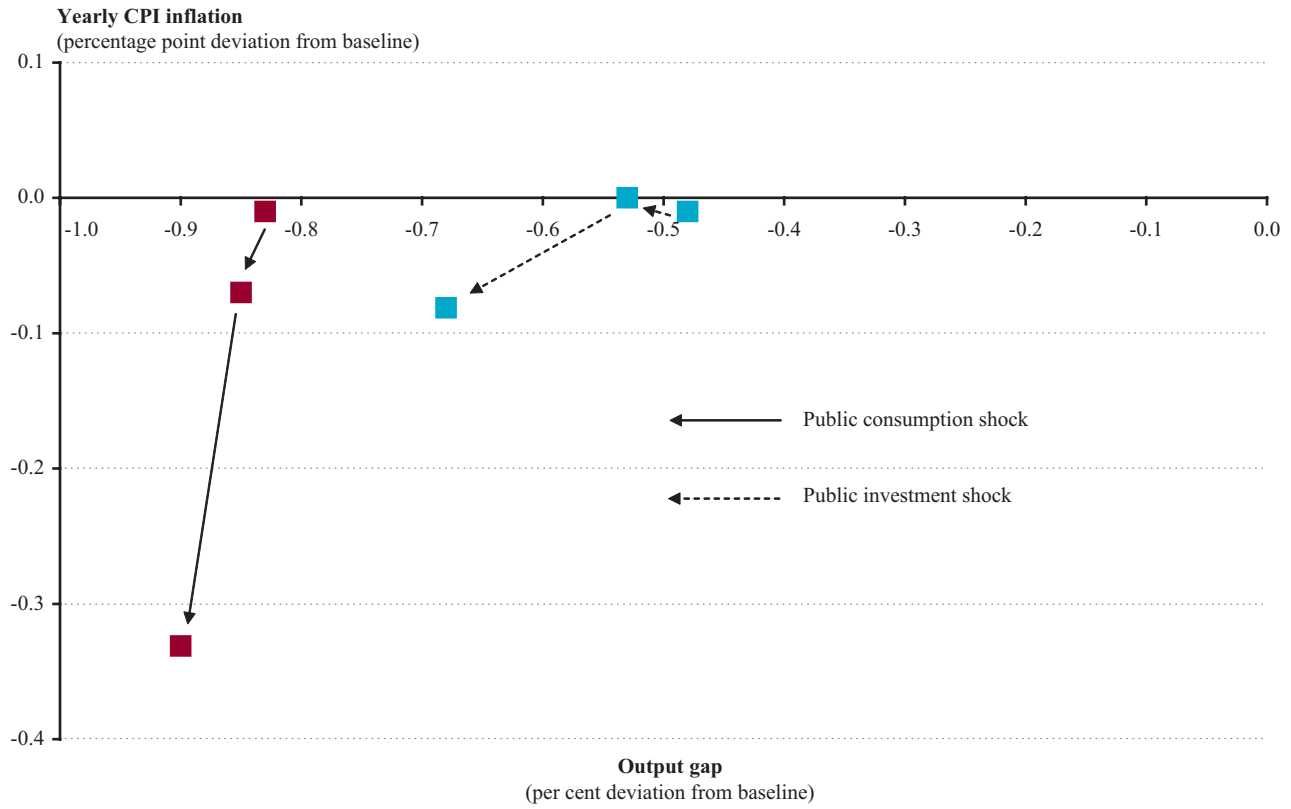
For example, in Chart 3 below we see that in the case of the public consumption shock the constant monetary policy scenario (squares) would decrease the level of GDP considerably by approximately 0.8 of a percentage point in the first year, but would have in fact no inflationary impact in the short run in comparison to the baseline scenario of no fiscal adjustment. In the medium term, the size of the output gap is similar and we end up with considerable disinflation (approximately a 0.3 of a percentage point deviation from the baseline, i.e. inflation target) if monetary policy keeps the interest rates fixed.

Details can be found in Annexes 4 and 5, where we document all our results categorised by monetary rules and shocks, for both the level and growth rate changes of output and prices. In addition, the impulse response functions of GDP and CPI are also graphed for all shock scenarios.

[22] In particular, Hungarian regulated price inflation was faster than both headline and core inflation.

Chart 3

Fiscal consolidation through goods markets*



** The arrows start from the first year (short-run effects), cross the second year effects and end in the third year (medium-term) simulation results. For chart description and explanation see Box 2.*

As both output and inflation are heading to the same direction when interest rates are kept fixed, monetary policy can ease without risking the fulfilment of any of its goals in the perfect foresight case, regardless of the weights given to the output gap and inflation in its reaction function. In the medium run, monetary policy would mostly affect inflation, since output development is heavily determined by the initial shock. According to our illustrative simulations (see Annex 5), monetary policy may well offset the effects of these types of fiscal adjustment.

4.4. CONSOLIDATION THROUGH DISPOSABLE INCOME

In the model these types of fiscal consolidation work through altering disposable income and have longer, but smoother GDP responses than those in the previous group (see Chart 4). These can take the form of, for example, increasing personal income taxes (PIT), reducing (financial) transfers – pensions and unemployment benefits – to households or our 'mixed shock scenario'.[23, 24] We assumed no labour supply reactions: e.g. PIT increases do not hamper labour supply. The smoothness of fiscal multipliers can be explained by the consumption-smoothing feature of agents.

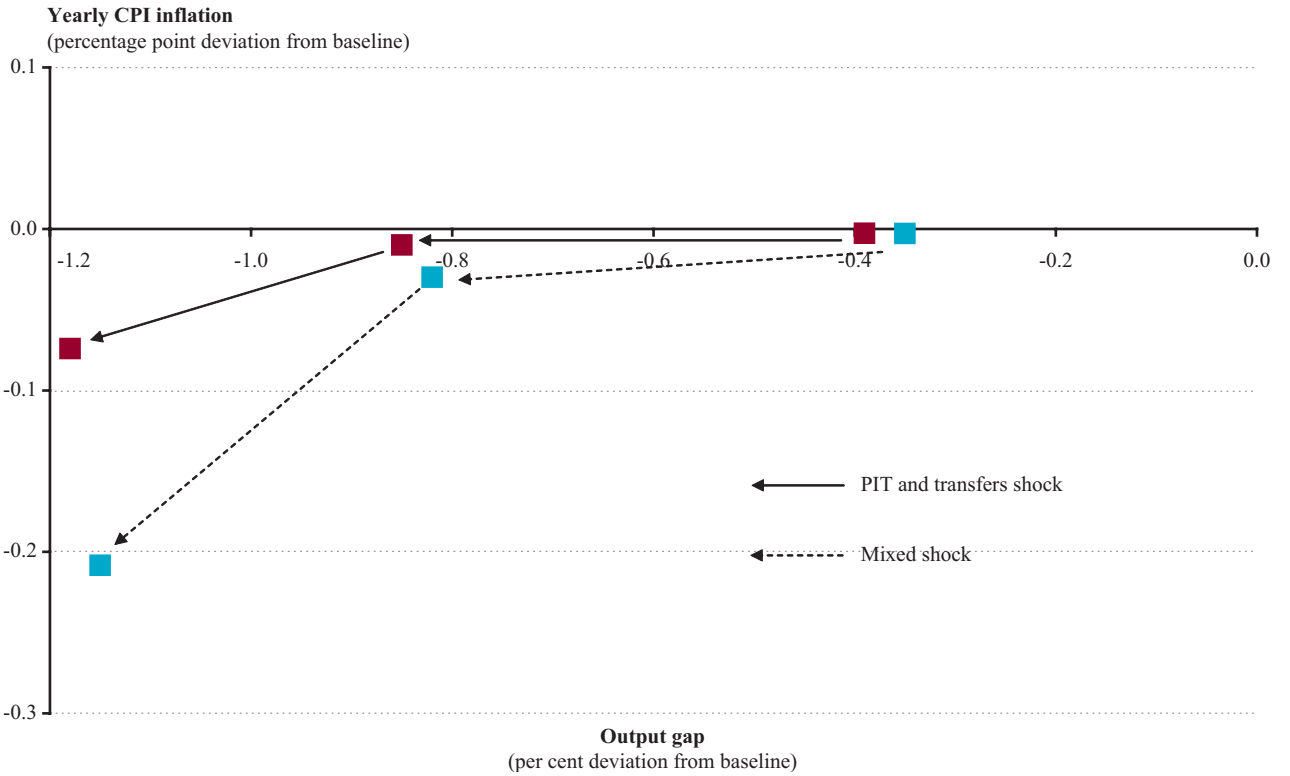
Inflationary effects are the lowest among the scenarios analysed, due to the fact that labour supply responses are neglected in these cases. It might happen, however, that PIT hikes imply lower labour supply generating lower nominal

[23] One should note that our 'mixed' shock scenario can be more or less categorized into this group. In fact it is a weighted average of increasing personal income taxes, a reduction in financial transfers and some reduction in government employment with weights of 40, 50 and 10 per cent of total savings, respectively. This scenario is the feasible one outlined in the *Report on Convergence* (2005).

[24] A substitution (or demonstration) effect from public to private wages is not endogenized in the NEM model – modification in public wages does not lead to private wage responses. Hence, a fiscal adjustment by cutting public compensation only enters into disposable income. Thus, in this model set-up a public wage shock might have similar effects than those analysed here. This restrictive treatment of the labour market results in more modest output and inflation response than with a more detailed labour market set-up.

Chart 4

Fiscal consolidation through disposable income*



** The arrows start from the first year (short-run effects), cross the second year effects and end in the third year (medium-term) simulation results. For chart description and explanation see Box 2.*

wages and an increasing output gap. Hence, CPI responses might be sharper if this restricting assumption were relaxed.

The two income shocks behave in the same way, although the mixed shock scenario results in a somewhat higher but still moderate disinflation. Similarly to the case of fiscal adjustment through goods markets, both inflation and output head in the same direction when monetary policy is exogenised (interest rates are kept fixed).

Monetary policy is again in a relatively simple situation – lack of inflationary pressures makes monetary easing possible, regardless of the weights given to the output gap and inflation in its reaction function (see Annex 5). In contrast to the previous group of scenarios (see section 4.3), the drop in output could be significantly mitigated while the inflation outcome is only slightly modified by monetary reactions. This can be explained by the modest inflationary impact without monetary reactions; monetary policy in this case does not face significant inflationary problems and might mostly focus on output stabilisation without endangering its inflation target.

4.5. CONSOLIDATION AFFECTING LABOUR MARKETS

According to the model, a fiscal contraction initially affecting the labour market – reducing public employment or increasing social security contributions (SSC) – has a relatively low first round GDP impact.

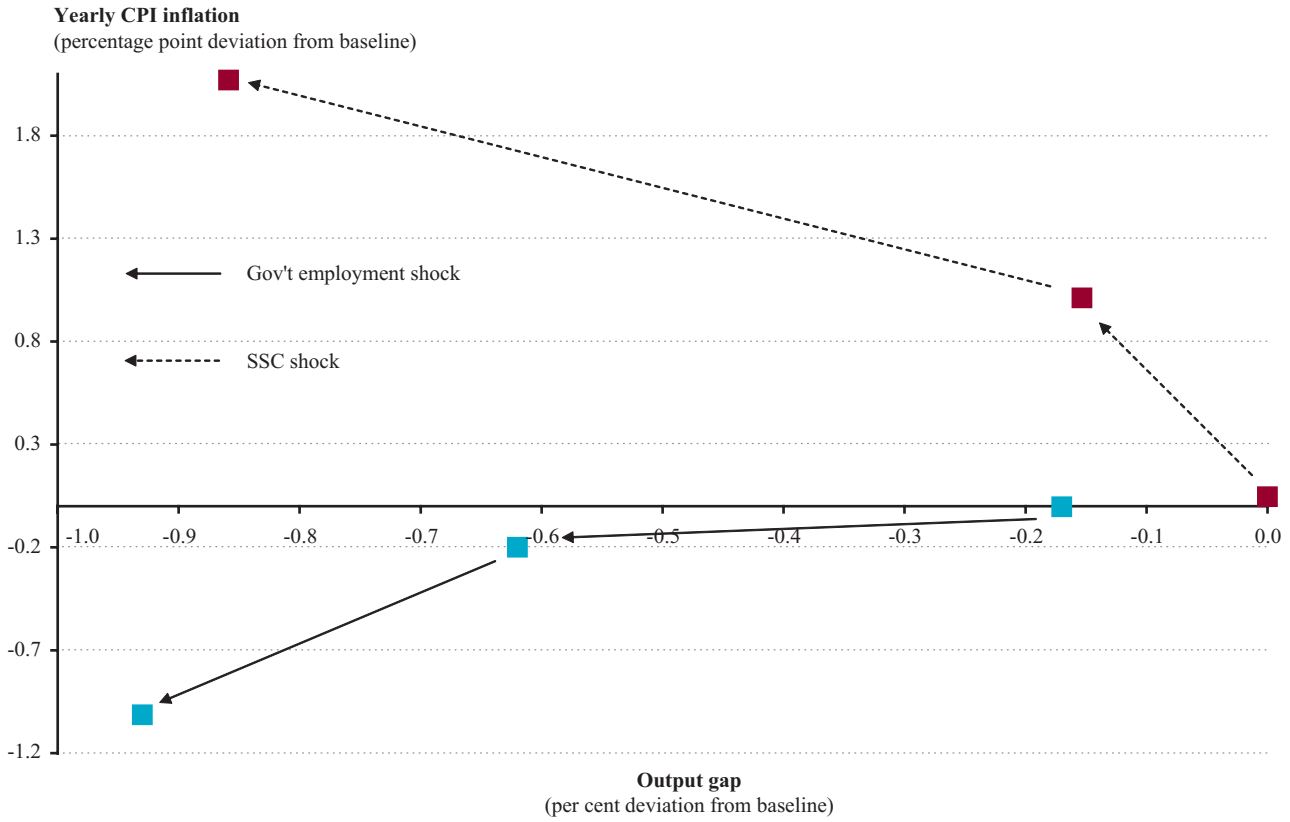
The major difference between the two scenarios is mostly driven by their different effects on disposable income. The former has a stronger short-run effect on consumption and GDP, while the latter 'only' works in the medium term through wage bargaining. Consequently, price responses are very different in signs. Social security contributions directly increase the labour cost of the corporate sector, leading to an upward pressure on prices. In contrast, reducing public employment increases unemployment and thus leads to lower wages, which in turn induces disinflationary forces to

appear. Both types of fiscal adjustment have significant long-run effects on output – altered labour market conditions feed into incomes and costs.[25]

One should also mention that there might be other channels of fiscal adjustments affecting labour markets. Most notably, if there are skill mismatch problems in the private sector and public employees entering the private labour market might ease this. Hence, productivity may increase somewhat, implying a smaller fall in output in the medium run. Although the NEM model is not able to capture such heterogeneities in skill, we tried to imitate this by adding a technological progress shock to the original public employment shock. Short-term dynamics did not change significantly, but in the medium run (3-4 years) the GDP multiplier and CPI effect decreased by around one third.[26]

Chart 5

Fiscal consolidation through labour markets*



** The arrows start from the first year (short-run effects), cross the second year effects and end in the third year (medium-term) simulation results. For chart description and explanation see Box 2.*

The short and the medium-term effects of the fiscal shocks operating through the labour market are largely different – inflationary impact is almost zero in the short run, while in the medium term the largest price responses can be observed among all scenarios. Increasing, though not extreme output losses arise in the medium run.

Monetary policy is in a more convenient situation when government employment is reduced, as there is no inflationary pressure in the medium run. Indeed, disinflationary forces are considerable. Again, as both output and inflation is heading in the same direction when interest rates are kept fixed, monetary policy can ease without risking the fulfilment of any of its goals in the perfect foresight case, regardless of the weights given to the output gap and infla-

[25] One might also ask why SSC and PIT increases have different effects. The reason lies in our assumption when modelling the process of wage bargaining. Labour demand and wages are assumed to be determined through a right-to-manage type of bargaining process. After gross wages are decided by the bargaining process, SSC directly influences labour demand while PIT changes affect the employment level mainly through indirect mechanisms (e.g. income, prices). This is a widely used specification in simulations with macromodels – see, for example, Henry et al. (2004).

[26] Simulation results upon request.

tion in its reaction function. According to our illustrative simulations in Annex 5, output might be stabilised. However, monetary policy can only partly counteract the large disinflationary effect, and the rules were suboptimal from this point of view.

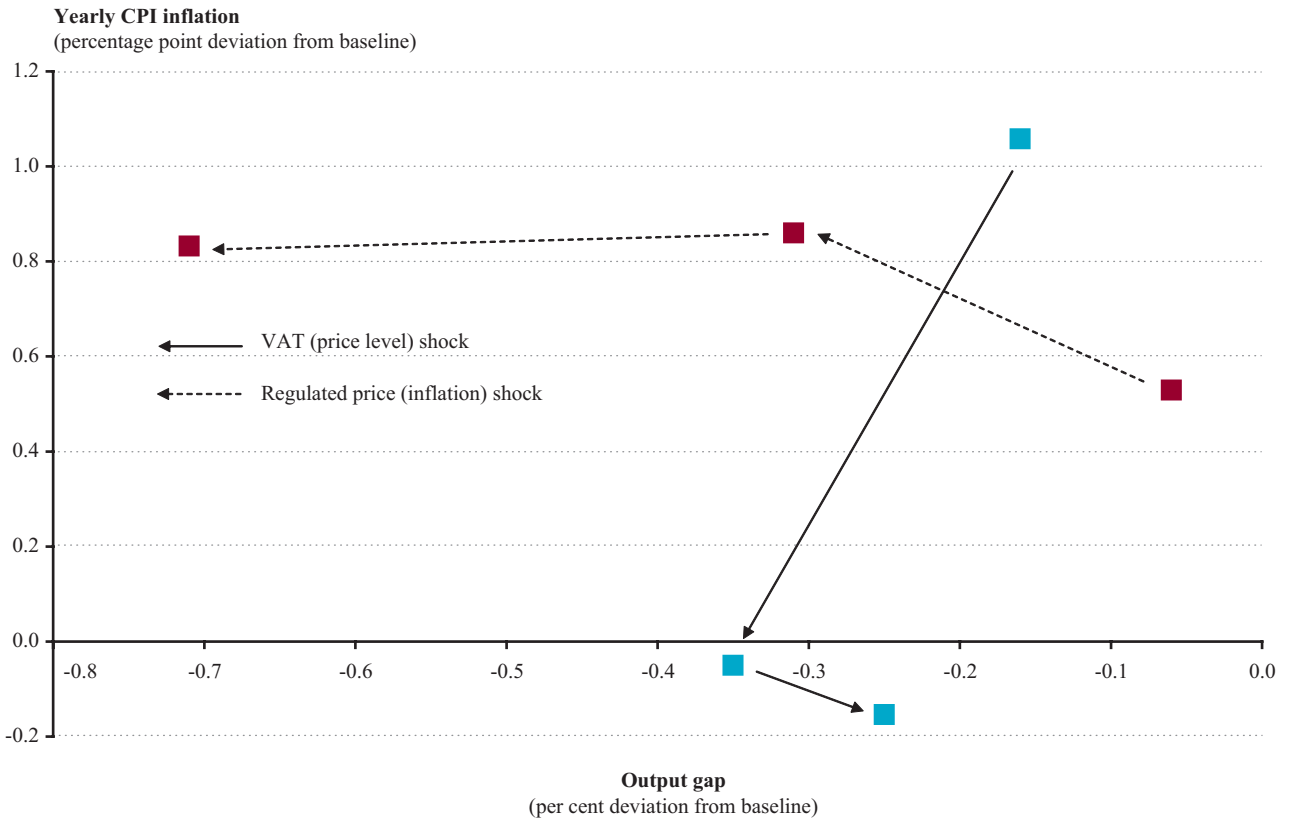
On the other hand, forward looking monetary policy should trade off short and medium run outcomes in the case of the social security contribution shock. As output and inflation go in opposite directions, different weights on inflation in monetary policy rules can make pronounced differences in outcomes. A reaction function that gives a larger weight to output stabilisation would minimize the output loss, but would allow for a considerable increase in inflation. In contrast, a more price stability oriented monetary policy would tighten monetary conditions to draw back inflation, even if a further decrease in the level of GDP is needed. Annex 5 shows how different monetary policy rules matter for the output effect in this inconvenient set-up. All monetary rules used in our simulations turn out to be non-optimal and not able to stabilise inflation and output at the same time.

4.6. CONSOLIDATION THROUGH PRICES AND INDIRECT TAXATION

Fiscal tightening might also take the form of price adjustments.[27] This can be achieved through (non-energy) regulated price hikes and indirect taxation. By construction, both shocks will have the highest initial inflationary impact. This would inflate the real disposable income of households very rapidly and that is why the GDP multiplier is the lowest among all scenarios. The analysis of these shocks might be particularly relevant, since, according to case studies, the 1995-96 Hungarian fiscal consolidation considerably relied on surprise inflation (see section 3.2).

Chart 6

Fiscal consolidation through prices or inflation*



** The arrows start from the first year (short-run effects), cross the second year effects and end in the third year (medium-term) simulation results. For chart description and explanation see Box 2.*

[27] One should note that here we omitted the usual inflation-taxation channel, i.e. the decrease in real money balances after a monetary easing. Monetary policy is assumed to follow an inflation targeting policy.

The basic difference between the two scenarios lies in their effect on the profitability of the private corporate sector. A regulated (non-energy) price increase does not lead to a change in profitability, while indirect taxation does (due to the imperfect pass-through of taxes into prices). The profitability loss in the latter case induces lower labour demand, and consequently a drop in real wages.

At first glance, both scenarios would likely request some monetary policy tightening in order to at least counteract the 'second order' effects of such policies. However, as mentioned before, the shock processes differ significantly in nature. While increasing indirect taxes means a one-time change in the price level, the nature of the regulated price shock is rather an inflation shock, as the regulated prices change is more prolonged.

In the perfect foresight case, an indirect tax shock increases only the price level and should not induce further inflation. Indeed, we see that its transitory effect diminishes after the second year. Therefore, forward looking monetary policy should not necessarily react to such indirect tax changes in the short run. However, this holds only under the assumption of credible fiscal policy, otherwise monetary policy might counteract the possible second-round effects, e.g. increased inflationary expectations. Annex 5 shows that monetary rules used in simulation do not differ significantly from the constant policy case.

In contrast, the regulated price shock spreading out for several years triggers a monetary policy reaction. Similarly to the social security contribution shock, weighting schemes in the reaction functions will matter. A reaction function that gives a larger weight to output stabilisation would minimize the output loss but allow for a considerable increase in inflation. In contrast, a more price stability oriented monetary policy would tighten monetary conditions to draw back inflation, even if a further decrease in the level of GDP is needed. According to Annex 5, the estimated Taylor rule can help in a very limited amount in stabilising both output and inflation. The Taylor rule traded off output stabilisation against higher inflation. Neither of the rules can give optimal monetary reactions.

5. Likelihood of non-Keynesian channels of fiscal adjustments in Hungary

The previous section analysed different scenarios for fiscal consolidations in a neo-Keynesian model. Not surprisingly, all the simulated fiscal multipliers suggest recessionary fiscal consolidations for Hungary. In this section we augment these findings by evaluating those channels working through expectations and credibility, which could not have been fitted into the above framework. As defined in Section 1, these non-Keynesian channels describe mechanisms that provide fiscal consolidations with the ability to enhance economic activity, in contrast to the traditional channels which imply some loss in output.

As we will show, on the whole, a number of necessary conditions for a major and well-structured consolidation to exhibit mostly non-Keynesian effects are present to some degree in Hungary. Moreover, there are new channels that could not have been operative at the time of the 'Bokros package'. Nevertheless, these partial effects only seem sufficient to render the immediate, overall effect less Keynesian, though it is very improbable that they would turn the short-run fiscal multiplier negative. In the case of Hungary these expectation and credibility (dominating non-Keynesian) effects are summarised in Table 6. This table also shows how likely it is that expansionary effects would be invoked through the given channel.

In the medium and long-term, however, existing non-Keynesian channels could just as well overturn the fiscal multiplier. In the case of Hungary we find that the risk premium channel along with an eventual currency appreciation and the effects of expectations on investments might be important ingredients for such an effect. Labour market reforms resulting in higher incentives to work or easing of skill mismatches might also imply non-Keynesian effects in the longer run. On the other hand, the role of expectations in consumption decisions and the current wage bargaining structure do not support non-Keynesian effects.

As we have already seen, the reactions of the private agents and monetary policy largely depend on the particular means of consolidation. In this section we further argue that with relevant non-Keynesian channels this argument continues to be valid. Moreover, monetary policy needs to take into account whether fiscal shocks shift aggregate demand or they affect potential output. Generally, a forward looking central bank is more careful in its reactions when fiscal measures change demand, while it is more tempted to modify its policy when potential output has been affected.

Even though we will focus on the workings of non-Keynesian channels in the case of a fiscal tightening, the inversion of the arguments for the case of fiscal loosening should also be instructive regarding how strong or weak the non-Keynesian results might be. In general, the dominance of non-Keynesian channels would not only explain an expansionary fiscal tightening but it would just as well suggest that higher government expenditure, for instance, would crowd out private consumption, make growth decline and reduce welfare.

However, as the previous section has pointed out, different instruments have different multipliers and clearly a fiscal loosening would be most probably achieved via instruments different from a consolidation package. Hence, even with the dominance of non-Keynesian effects the inversion experiment might be less revealing.

Nevertheless, the above argument illustrates an important point. According to this, one might 'mix' different policy measures such that the overall growth effect of fiscal contraction is close to zero or even positive in the short run. Fiscal policy should save (tighten) in relation to those items with low multipliers (e.g. social security contributions) and dissave (loosen) on items with high multipliers (e.g. public consumption and personal income taxes). In this theoretical policy 'mix' even Keynesian or weakly-Keynesian effects can have low recessionary effects or might even stabilise or increase output.

Such a policy 'mix' is even more relevant in real life, as loosening through some channels is needed to accompany the fiscal tightening in order to make packages more acceptable to the public.

Table 6

Possible non-Keynesian or weakly-Keynesian effects of a fiscal consolidation in Hungary

Model assumptions	Fiscal prerequisites / relevance for Hungary	Increases the probability of non-Keynesian effects
Exchange rate and credibility	Uncertain how much more the Forint can appreciate	Potentially, through consumption
Risk premium and credibility	Moderately high government debt and high risk premium	Slightly, through fiscal interest payments
Strong employees' bargaining power, social dialogue and partnership	Very weak in Hungary	Not likely
Not binding liquidity constraints / forward looking agents / long horizons / expectation channel of fiscal policy	Relatively large size of the government, but small number of forward looking agents with the ability to borrow.	Slightly
Expectations	Small number of forward looking agents.	Potentially, through foreign investments
Labour market reforms	High ratio of inactives/skill-mismatches	Slightly, through more elastic labour supply and higher employment

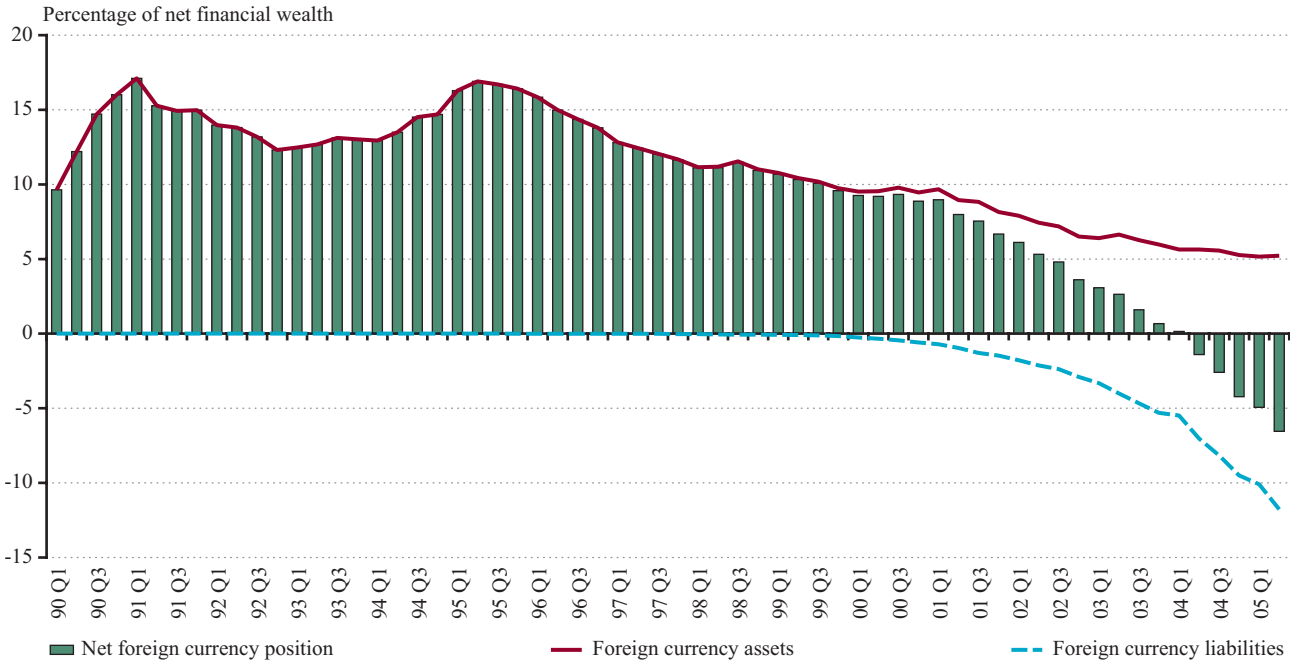
5.1. ROLE OF EXCHANGE RATE

A major consolidation of the government sector that proves to be credible in the long run and hence considerably improves the outlook for EMU entry might be honoured by an exchange rate appreciation as well. However, besides deteriorating the trade balance, such an event might invoke secondary effects through consumption.

One important aspect of recent household behaviour in Hungary is the overwhelming rise of foreign currency denominated credit. As Chart 7 illustrates, households have moved from a net lending position to a net borrowing position, which might substantially increase their net wealth in the case of an appreciation of the Forint.[29]

Chart 7

Households' foreign currency position



[28] A possible reduction of interest rates would make those households better off as well who only borrow in the domestic currency. On the other hand, consumption is generally found to be inelastic to interest rate changes.

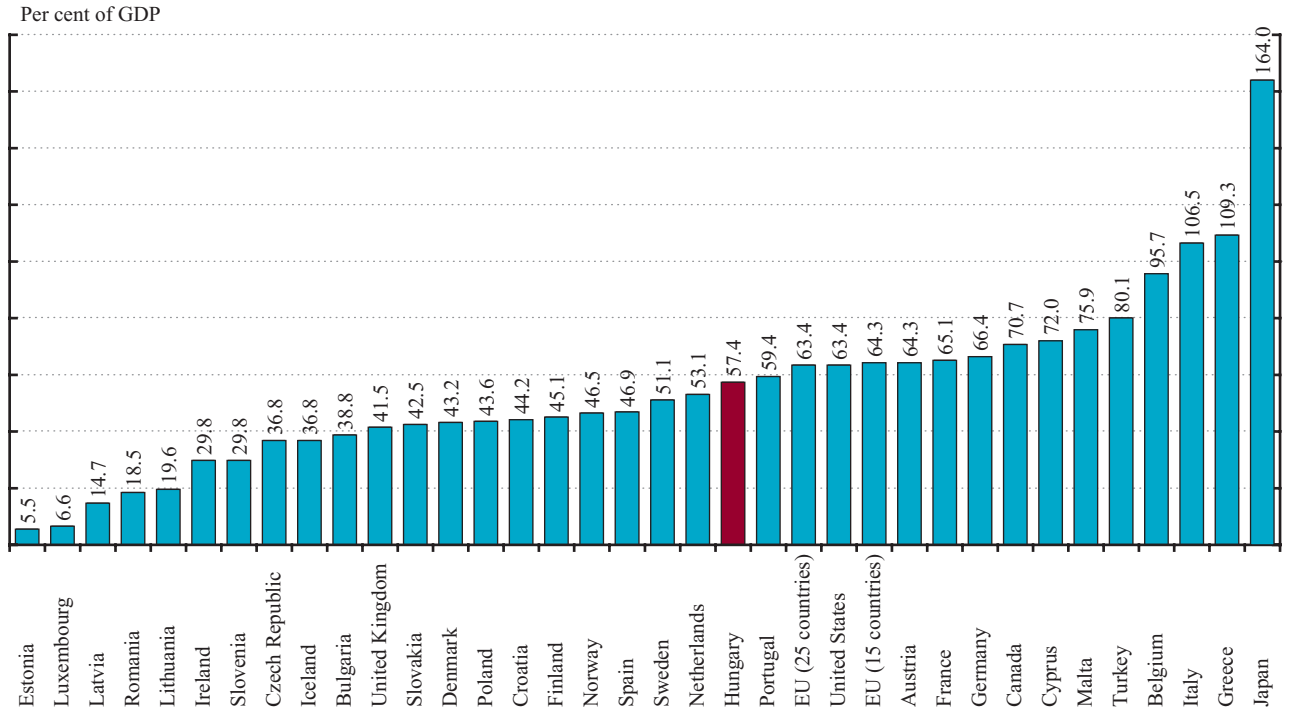
On the other hand, Jakab et al. (2006) found that lower interest rate premium plus exchange rate strengthening might cause higher real disposable income, due to faster pass-through to prices than to wages. This in turn, along with valuation effects, might lead to higher private consumption. Hence, one might expect consumption to respond and help mitigate the recession brought about by the fiscal measures when the credibility of fiscal consolidation appreciates the domestic currency.

5.2. ROLE OF INTEREST RATE PREMIUM

The second channel we considered was the 'risk premium channel', which says that for a high enough debt level and risk premium a credible consolidation may reduce the premium and the interest rate so much that the gains from reduced interest payments and changes in consumption and investment actually compensate for first-round loses. Assessing the strength of this channel is not simple as it largely depends on whether government debt is considered to be high or not. This, however, is ambiguous as government debt is only moderately high when compared with Europe and some developed countries (this is shown in Chart 8). Given that the premium on long-term bonds (compared to eurozone rates) is sizeable in the case of Hungary and compared to countries with similar per capita GDP, one should consider government debt to be substantial.

Chart 8

General government consolidated gross debt in 2004



Source: Eurostat.

Czeti and Hoffmann (2006) simulated several fiscal consolidation scenarios (stable primary deficit, slow and fast path of consolidation to fulfil Maastricht criteria). They found that government debt level would increase in most of the scenarios. Only in the case of fast fiscal consolidation one might anticipate the debt level to revert back to around 60 per cent of GDP.

Given the size of debt and the above scenarios, with a steady level or with a contained increase in government debt a reduction in debt service is still possible if the interest rate is sufficiently decreased. According to the authors' calculation, a 1 percentage point decrease in interest rates (mostly long-term rates) would result in savings of around 0.6 per cent of GDP. Taking into account the magnitude of current interest rate premium (around 3 per cent on long-term bonds), if Hungary fulfils the Maastricht fiscal criterion on budget deficit via a fast consolidation, and assuming that the premium drops to eurozone levels, savings would amount to 1.8 per cent of GDP in the longer run.[29]

[29] Annex 5 analyses the role of monetary policy during a fiscal consolidation.

However, these savings on interest payments would most likely fall short when compared with the reduction needed in the budget deficit to reach the Maastricht criteria. The *Report on Convergence* (2005) – based on forward yield curves – finds the necessary cut in deficit to be around 5.5 per cent of GDP. Moreover, as a major part of Hungarian public debt is fixed with 2-3 year duration, this effect would be spread out over the years; hence it would not show up immediately in the budget. Thus, even though a large drop in interest rates alone would be insufficient to meet the EMU deficit criterion, it could considerably alleviate the burden.

Even if interest savings are present, it still remains a question as to how they translate into growth. In our view, apart from income and wealth effects, the major role of savings is that they may create room for manoeuvre for fiscal policy. Credible consolidation efforts today may relieve fiscal policy of further adjustment in the future. Wider room for manoeuvre may result in less recessionary output effects in the medium run.

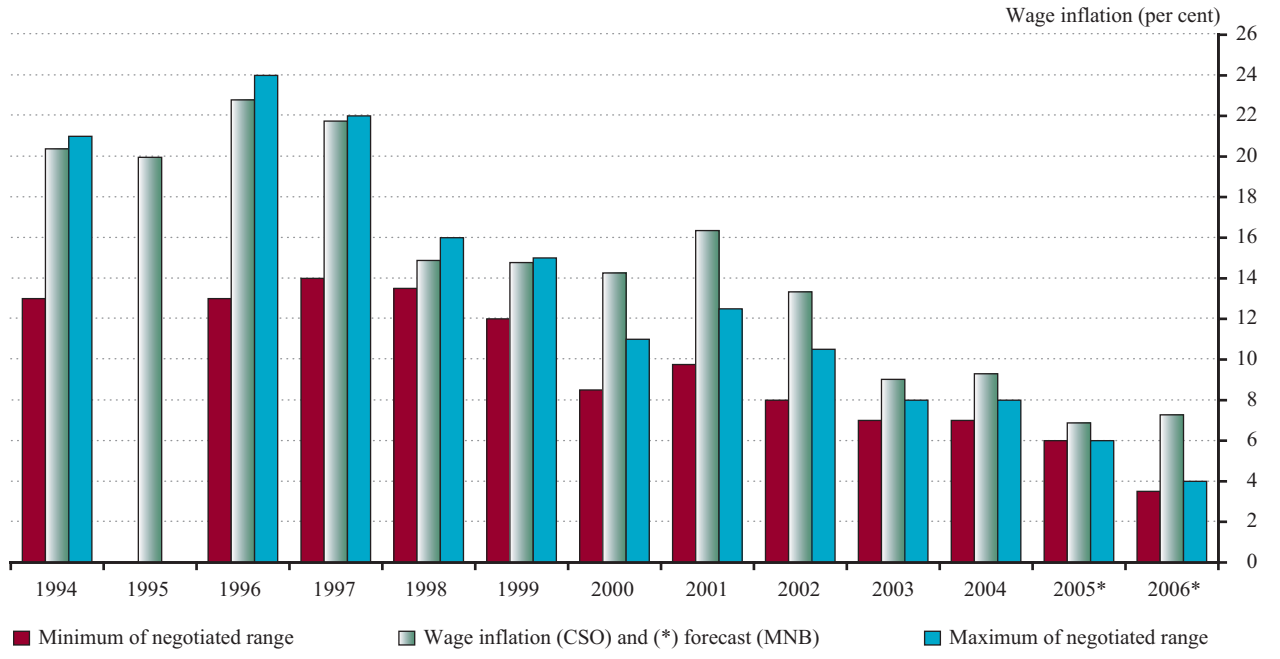
Thus, the savings on the stock of debt due to the fall of interest rates would not be as large as it was in some countries in their run-up to the EMU. Nevertheless, the non-Keynesian effect due to the drop in risk premium could be sizeable, since debt is relatively large compared to countries with similar per capita GDP. Moreover, a drop in the risk premium and consequently in interest rates might trigger a 'classic' non-Keynesian channel, namely it may boost investments (e.g. foreign direct investments). This effect could be further strengthened by improving expectation of future taxes.[30]

5.3. ROLE OF WAGE BARGAINING

Case studies for Ireland and Denmark (see Annex 1) illustrate well the decisive role of labour market events in making consolidations successful. Thus, in the case of Hungary we look for the possibility of a powerful social dialogue and partnership similar to that of Ireland, for example. We find that even though tripartite talks at the Interest Reconciliation Council (IRC) had been important at the very beginning of the transition, today settlements reached at the IRC are not effectively binding on the social partners.[31] Chart 9 illustrates this point. As Pula (2005) pointed out, the diminishing role of labour unions seems to be a phenomenon common to almost all transition countries in the region.

Chart 9

Negotiated and actual wages at the Interest Reconciliation Council

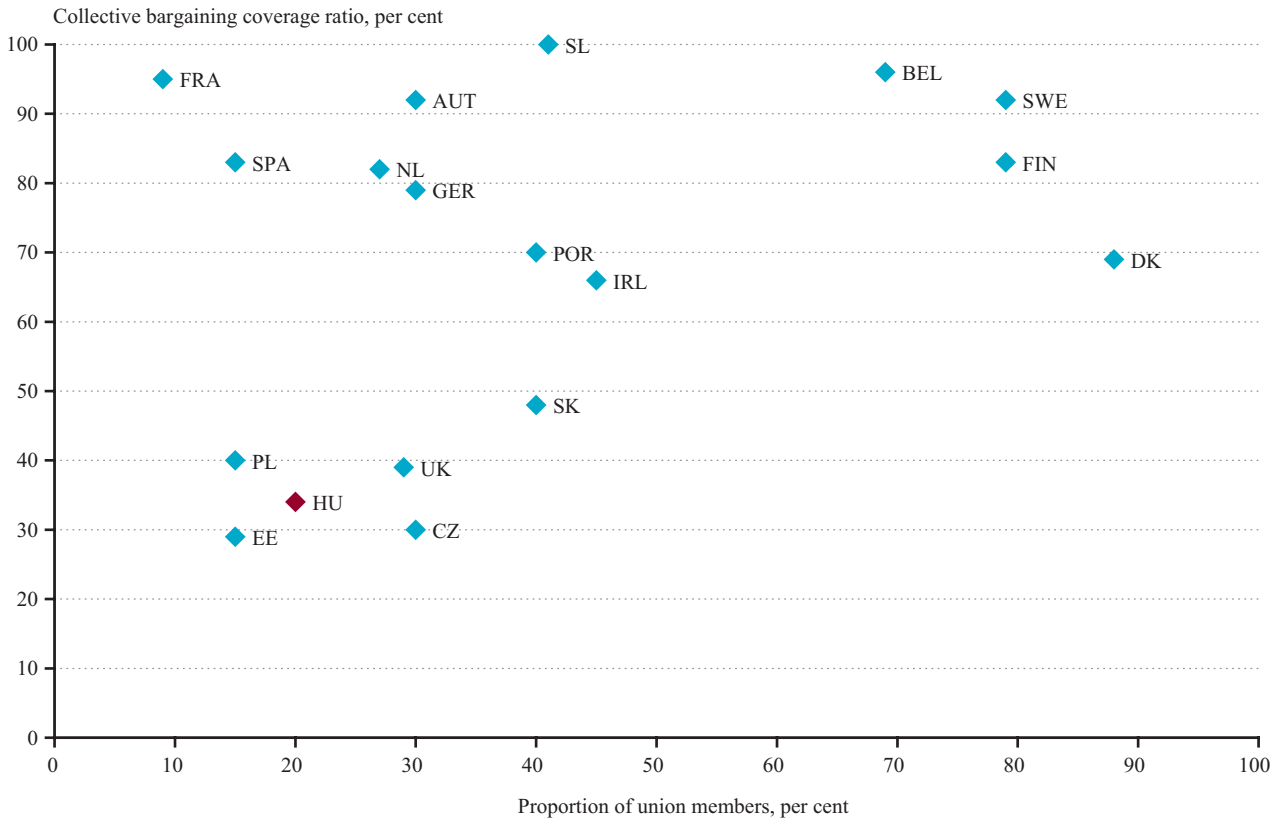


[30] See also section 5.5.
[31] See, for instance, Héthy (2001).

Based on data from the European Industrial Relations Observatory (EIRO), Chart 10 illustrates how much weaker the bargaining power of Hungarian employees is compared to their Irish counterparts. Without the ability to defend their position, employees might suffer a drop in real wages during consolidation periods, which would help firms maintain their competitiveness. This gain in cost effectiveness would undoubtedly contribute to the non-Keynesian effects. However, without an effective agreement between social partners tension in the labour market created by a fiscal tightening could also lead to a rise in unemployment, which would in turn enhance the associated output loss.

Chart 10

Unionisation and coverage ratio of wage negotiations



Source: Pula (2005).

5.4. ROLE OF LABOUR MARKET REFORMS

Some arguments claim that the major source of non-Keynesian effects in Hungary should come from driving the inactive into the labour market as the participation rate is well below the EU average. Based on some historical developments we are tempted to believe that the Hungarian labour market is quite inelastic (in its current structure), thus implying that there is no room for a large increment in employment. This seems to be underpinned by faster growth in New Member States and the concurrently widening gap between their employment rate and that of the Old Member States. Moreover, the fact that the up-turn in manufacturing in recent years was not accompanied by growing employment suggests that the Hungarian economy might be characterized by a capital/labour substitution process.

Pula (2005) claims that in transition economies switching to a more capital intensive production via a labour-augmenting technological process might generate inelasticity in labour demand and as such it should not be of concern. On the contrary, inelasticity of labour supply can lead to a persistently low employment rate. Furthermore, some studies on labour supply point at the educational system in Hungary as the major cause of the inelastic supply of labour. According to these, not only is the ratio of under-educated people high in Hungary compared to Europe, but this group is less likely to be hired as well.

Furthermore, several minimum wage hikes and a fixed health contribution make wage costs relatively high and thus hinder the employment of low-skilled workers. Pula (2005) emphasises another aspect of insufficient labour supply in transition economies, namely that most of the skills used in the centrally planned economy were suddenly devalued by the economic transition.

On the other hand, labour market reforms might take the form of modifications in the tax and social security system in a way that incentives for employment were increased. In this case, the long-run potential output might be raised. As mentioned before, reduction in government employment might also have long term positive effects on output if skill mismatches in certain industries were eased as a result of an increased pool of educated labour force.

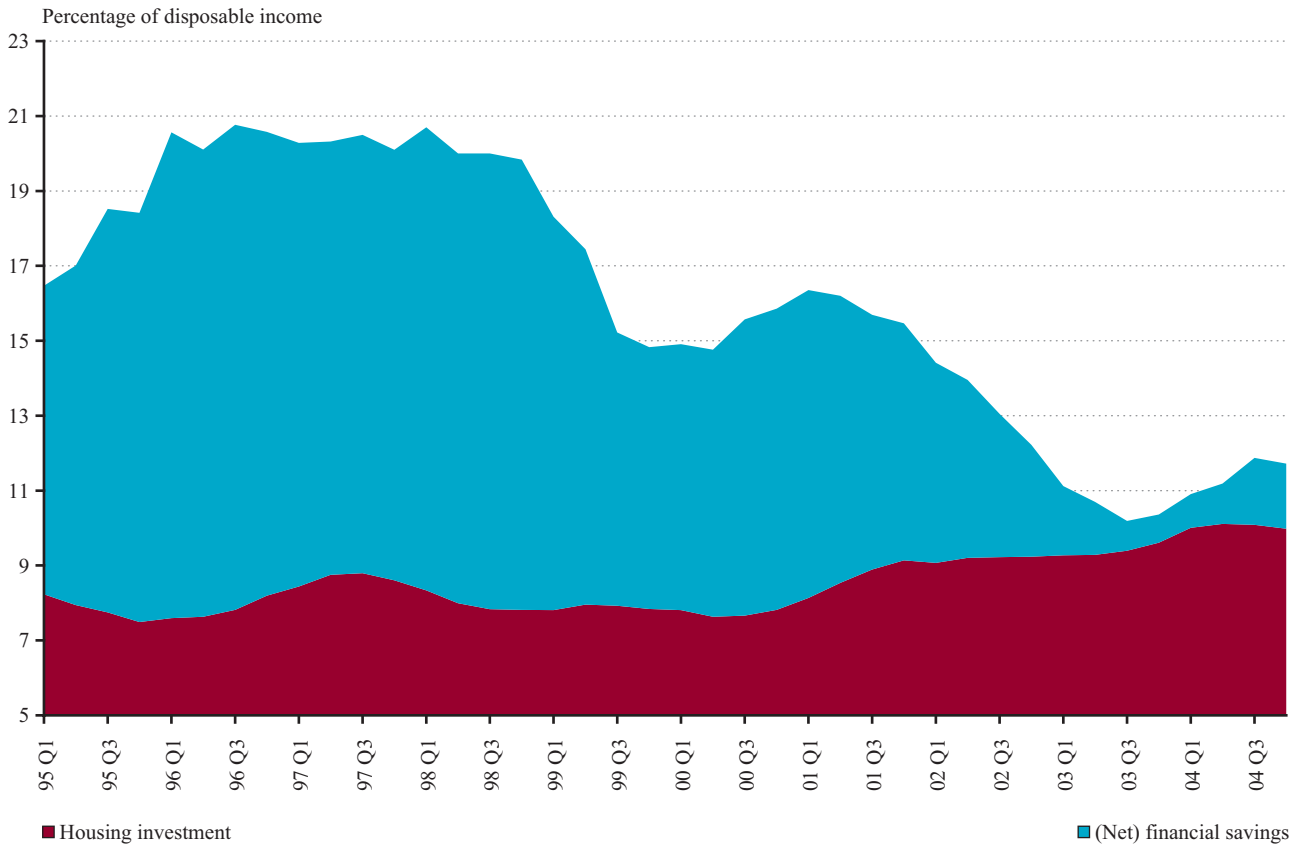
Even though a contemporaneous increase in employment and productivity is not without an example (Ireland during the 1990s), educational and other structural reforms, besides being indispensable, would only gradually break down the inelasticity of labour supply. Nonetheless, a major reform of the labour market might change its structure and thus its flexibility so much that it would raise the possibility of non-Keynesian effects. Such a transformation, however, is likely to be time consuming and hence non-Keynesian effects would only be effective in the medium or long term.

5.5. ROLE OF EXPECTATIONS

Finally, the rest of the possibly non-Keynesian effects in Table 6 all work through the expectation channel. This channel groups all the effects fiscal policy has on today's economy by changing agents' perception of future economic conditions. No matter what economic aggregate is assumed to react to future changes, this non-Keynesian channel is stronger the more agents are forward looking, the longer the horizon agents plan for, the slower they discount the future and the more creditworthy or the less liquidity constrained consumers are, so they are also able to adjust their consumption path as they wish.

Chart 11

Household investments and savings

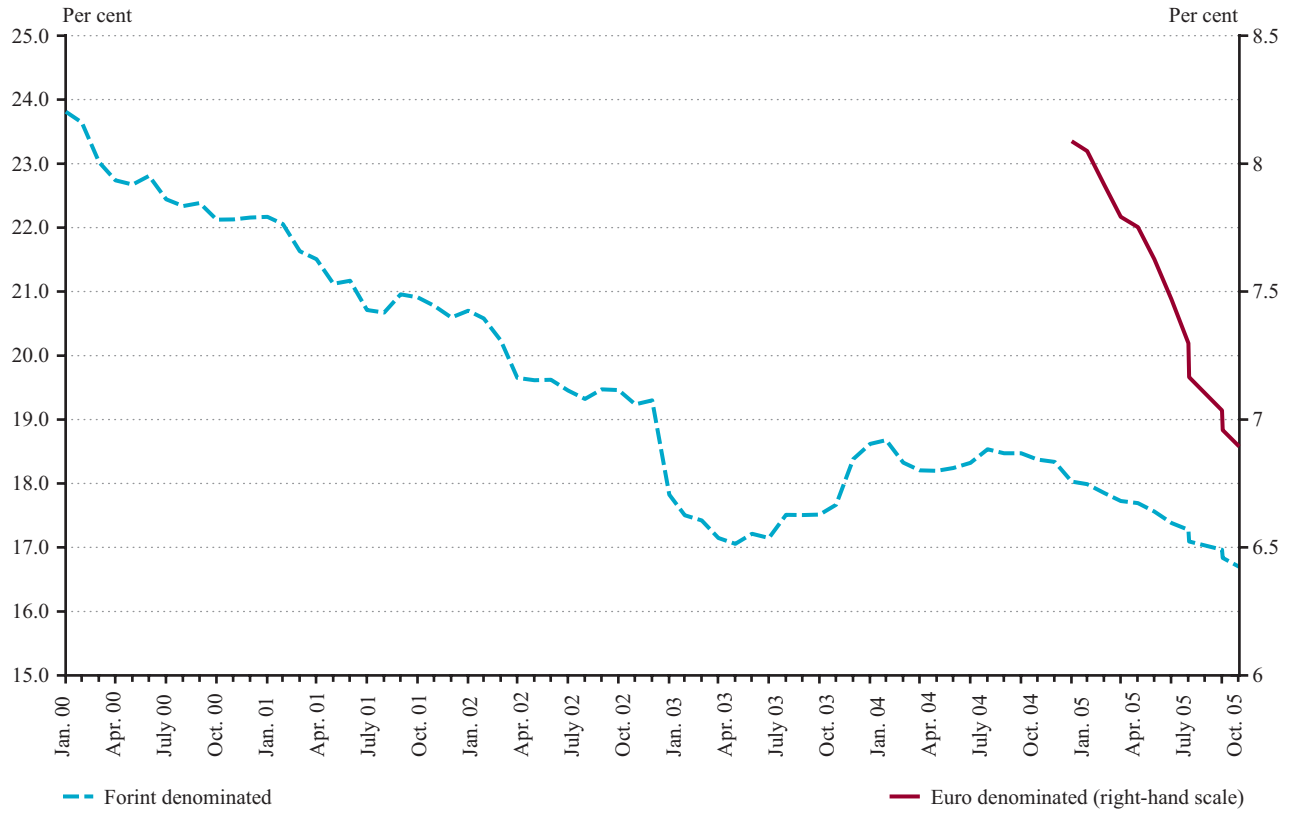


The ratio of liquidity constrained households has been steadily decreasing due to financial deepening and previous government policy on housing subsidies. As a result net savings declined, as shown in Chart 11. This development, therefore, gives support for possibly non-Keynesian fiscal effects.

Moreover, liquidity constraints are expected to be further lifted as intensifying competition in the financial sector has already caused steadily declining interest rates on consumer credits, as shown in Chart 12. On the other hand, together with the decline in savings, the consumption-income ratio is remarkably high in Hungary, narrowing down somewhat the possibility of further increase in household consumption.

Chart 12

Average interest rate for consumer credit



The other condition supporting the expectation channel, the forward looking behaviour of households is probably harder to measure or influence. By analogy, the result of Lendvai (2005) might serve as a rough indicator; she finds that the ratio of firms who set their prices in a backward looking manner amount to 1/3–1/2, while this ratio is remarkable lower in the EU (0-1/3).

Overall, the response of consumption in the medium term to a credible fiscal adjustment would much depend on whether consumer credits can further expand as they have done in recent years. This in turn might be supported by the presumable further development of financial services and a probable drop in the risk premium. However, a relatively high aggregate consumption-to-income ratio and the substantial recent increase in the instalment-to-income level may suggest that households are drawing near to their borrowing limits, which makes this channel less likely.

As private consumption reacts rapidly to changes in current and expected income, this is one of the channels that could make a difference in turning the within-year fiscal multiplier negative. However, its effectiveness much depends on the planning horizon of agents and on how uncertain their future income is. Since we have a perception that households are rather backward looking and the uncertainty of future incomes only declines as the continuity of fiscal measures becomes more evident, in our view the consumption channel is less likely to contribute to non-Keynesian effects in the short run. After a couple of years, however, it may gather strength.

Our case study of the 1995-96 consolidation period suggests (see Table 4) a further possible channel through which improving expectations could invoke non-Keynesian effects. Namely, a credible tightening may lead foreign investors to expect a more favourable tax policy and stability in economic conditions, and hence it may bring about an increased FDI inflow. It should be noted, however, that intensified tax competition in the region to allure investment into other countries might have weakened this channel since a decade ago. Furthermore, without a gradual devaluation of the Forint investments might be considered less profitable.

Thus, several counteracting factors impede assessment of the expectation channel. It is our belief that, despite the rapidly developing financial sector, this channel would still produce quite weak non-Keynesian effects during the first 1-2 years.

5.6. MONETARY REACTIONS UNDER NON-KEYNESIAN EFFECTS OR IMPERFECT FORESIGHT

We have seen in Section 4 that under perfect foresight and depending on the composition of fiscal consolidation the level of GDP and the inflation rate were affected differently in the medium term. These outcomes, generated by standard methods, might become very much different if credibility and expectation (dominating non-Keynesian) channels of fiscal policies are incorporated in our view of the economy.

When analysing the case with dominating non-Keynesian effects it is useful to distinguish between fiscal consolidations operating primary through aggregate demand or on production capacities, factor markets. In this sense, when demand shifts then expectations will adjust so as to arrive at equilibrium (e.g. higher consumption due to lower expected tax burden). Hence, a forward looking monetary policy does not have a large role in this case – equilibrium will be restored by market forces. The situation is completely different if fiscal consolidations affect the supply side of the economy. Here, potential growth might also be changed, and depending on how fast prices, costs and wages adjust to this new situation, monetary policy might help in restoring equilibrium earlier. To sum up, amongst our simulation scenarios, reducing public employment, increasing social security contribution and possibly tax hikes (if they increase labour supply) are the candidates for monetary policy intervention in a dominantly non-Keynesian environment.

We have seen above that in the case of Hungary only a sufficient fall in the risk premium accompanied by currency appreciation is likely to deliver non-Keynesian effects. However, we also found that the extent of possible non-Keynesian effects are small in the short run and therefore it is unlikely that they can turn around the sign of our simulated neo-Keynesian fiscal multipliers, even in the most favourable outcome in terms of output.

As for monetary policy, no general rule-of-thumb applies if non-Keynesian effects become dominant. If these channels are allowed to work, the composition of adjustment will still matter just as in the neo-Keynesian case. In the case of the social security contribution and the regulated price shock, a possible though small non-Keynesian effect would lead to an even higher deviation of inflation from its target than in the standard case. Therefore, the central bank might have to tighten monetary conditions already in the short run. This additional monetary tightening might increase the final output loss as well. A completely different case is the reduction in government employment, where even in the case of non-Keynesian effects monetary policy has some room for manoeuvre to ease conditions in comparison to the neo-Keynesian case. In all the other cases monetary policy need not necessarily choose to ease less than was suggested when Keynesian channels were dominant.

In addition, there might also be cases when our UIP assumption fails. Fiscal policy (or indebtedness) might affect exchange rate developments as well. The importance of this channel is given by the twin deficit problem of Hungary. Fiscal contraction – among others – would likely dampen imports and improve the current account balance and, ceteris paribus, the exchange rate might appreciate. As the exchange rate pass-through is still quite strong, although decreasing in the Hungarian economy, inflation responses might be magnified.

Apart from the shock-dependence of required monetary policy, imperfect information on the credibility of fiscal adjustment should also be taken into account. The central bank need not necessarily change interest rates to a fiscal contrac-

tion in the short run at all. Both academics[32] and influential policymakers[33] emphasise the fact that deficit reductions would typically not be effective in the short run and therefore central banks should not change interest rates today in response to a fiscal contraction that will lower deficits only in the future. If markets believe that the long-term interest rate has a potential to decline all this requires is the change in market expectations that future short-term rates will decline. Moreover, an immediate interest rate cut following the declaration of the fiscal package would ratify the often questionable credibility of fiscal policy.

5.7. EXPECTATION AND CREDIBILITY CHANNELS IN COMPARISON TO THE 1995-96 CONSOLIDATION PERIOD

The above description of the possible credibility and expectation channels shows that conditions for a consolidation have changed dramatically since the 'Bokros package' a decade ago. Consumer credits have become more and more widespread and the planning horizon of agents has stretched further ahead as disinflation continued. Moreover, the potency of an easing monetary policy to raise output has improved, since with a decreasing pass-through real disposable income is less exposed to exchange rate movements.

However, it is uncertain what the potential role foreign direct investment might have in reaccelerating the economy after a fiscal tightening, as the then existing monetary regime was quite different from the current one and competition for investors in the region has become more intense.

On the whole, these channels appear to be stronger compared to a decade ago. Thus, the short-term costs of a consolidation might have become more moderate, but gains in terms of output and growth are still likely to be deferred to 2-3 years after measure were taken.

[32] For example, Taylor (1995).
[33] For example, King (1995).

6. Conclusion

The workings of real world economies are amazingly complex and so they are full of pro- and counteracting forces, making the various channels impossible to separate with econometric tools and also making the whole mechanism impossible to model theoretically. Such fundamental issues collide when one looks at the machinery of fiscal consolidations. Without questioning the legitimacy of any theory or empirical evidence on the effects of fiscal tightening, this paper on the one hand attempts to sort out in a qualitative manner how important the adverse, non-Keynesian effects might be in the case of Hungary. While, on the other, it gives, with the help of model simulations, a quantitative analysis of the channels through which fiscal measures can affect the economy.

As neither theoretical nor empirical studies have agreed upon a precise definition for non-Keynesian effects, we started out by stating that in our preferred description, non-Keynesian effects are those which have a negative (overall) fiscal multiplier within the first year after measures were taken. We have chosen this definition as in our view an initially positive, but in the long run (or even in the medium term) negative fiscal multiplier complies with the standard neo-Keynesian view. Moreover, the longer the horizon allowed for non-Keynesian effects, the more likely that it will be impossible to separate empirically the original shock from other effects and stimuli.

In contrast to most of the empirical literature in which composition issues are neglected, our simulation exercises point to the dependence of economic outcomes on the particular compilation of fiscal adjustments. Composition matters a great deal, since different fiscal instruments have different fiscal multipliers and therefore a complete fiscal 'package' – with both tightening and loosening elements – could generate a negative overall multiplier even in the short run.

Using our neo-Keynesian model for simulations we have found that in all of the cases output drops in the short run. Fiscal multipliers were found weakly-Keynesian (less than 1) in the short run. Output loss following fiscal consolidations is the largest when consolidation affects government purchases of goods, while the case of social security contribution hikes results in the smallest output sacrifice in the short run. On the other hand, medium-run output losses are the highest for those adjustments having significant cost/price consequences (public employment reduction, social security contribution hikes and regulated price increases) or those working through disposable income.

The sign of price responses is not obvious in the medium run. Prolonged adjustments in regulated prices or social security contribution increases lead to higher inflation. At the same time, fiscal adjustments primarily affecting the goods markets and the income of households through taxation or transfers lead to lower inflation both in the short and in the medium run.

We have also assessed the relevance for Hungary of those fiscal mechanisms which are capable of generating non-Keynesian effects either within one year or in the medium term. We have found that during the consolidation years or immediately after it is very likely that Keynesian effects will dominate and the fiscal multiplier remains positive. That is to say that a fiscal tightening comes at the cost of sacrificing growth in the short run – just as model simulations have suggested.

Within the first 2-5 years, however, building up the credibility of the fiscal adjustment might invoke additional forces that could considerably reduce first-round losses or even put the economy right back on its former growth path. A credible fiscal adjustment that causes a large drop in the risk premium could potentially boost investments and through a currency appreciation private consumption as well. Moreover, with a trustworthy fiscal policy an improving future profit outlook may lead to a considerable increase in foreign investments, as it might have been the case after the 1995-96 episode in Hungary. One should also mention the long-term role of labour market reforms. Measures increasing the elasticity of labour supply (through, for example, modifications in the personal tax and social security system) might increase the potential output of Hungary. Moreover, a reduction in government employment coupled with an easing of skill mismatches in certain industries might also imply higher potential output in the medium to longer run.

Our investigation has revealed that monetary policy is in a relatively simple situation when output and inflation head in the same direction. Monetary policy decision makers could reduce the initial output loss and also counteract the disin-

flationary effect of the adjustments by easing monetary conditions, regardless of the weights given to output and price stabilisation in their reaction function. We also saw the special case of the temporary indirect tax shock that did not trigger any monetary policy response at all.

On the other hand, there are fiscal consolidations when monetary policy could find itself in an unpleasant situation – rising inflation is accompanied by a fall in output. These are the cases when fiscal policy persistently relies more on inflation (regulated price shock) or when it significantly affects labour costs (social security contribution hikes).

Furthermore, we have shown that the dominance of non-Keynesian effects could in certain cases turn monetary policy even more contractionary if they increased the inflationary pressure. When shocks affect potential output the necessity for forward looking monetary policy reaction is more pronounced in order to reach its targets.

Uncertainty of consolidations might also influence monetary reactions as well. Fiscal consolidations often turn out to be transitory and the magnitudes to be less than initially declared. Therefore, caution is required and a wait-and-see strategy may be superior to any front-loaded monetary easing under considerable uncertainty.

It is important to note in connection with all of the above that the overall macroeconomic costs of fiscal measures should be compared to potential losses of an adjustment forced by the market. As an illustration of this point we have shown that although some output loss occurred during the Hungarian consolidation (1995-96), these losses afflicted the economy only for two years, whereas in the case of a potential crisis it typically lasts for five years.

We have also found that the role of non-Keynesian channels is likely to have become stronger in Hungary in the last decade. Hence, a fiscal consolidation could be less painful in terms of output than what history appears to tell us.

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Annexes

A.1. CANDIDATES OF EXPANSIONARY FISCAL ADJUSTMENTS: THE CASE OF IRELAND AND DENMARK

As the literature defines a non-Keynesian effect of fiscal consolidation as increasing economic activity in the short run, it should not be surprising that no general lesson can be drawn from empirical studies. Rather, country specific factors are identified. The most often cited case studies are those of Ireland and Denmark. Giavazzi and Pagano (1990) were the first to show that forecasts of private consumption substantially underpredicted the true values during the periods of fiscal adjustments.[34]

Without questioning the possible non-Keynesian effect of fiscal policy, we would like to emphasise the potential role of the above-mentioned other economic policy factors in the well-known outcome.

In the case of Ireland, monetary and exchange rate policies definitely contributed to lower costs of fiscal contraction. First, price stability had been achieved after almost a decade of increasing unemployment and falling output, and capital flows also became liberalized. Second, the devaluation of the Irish pound in 1986 established exchange rate credibility, allowing for a sustained reduction in interest rates. The external environment also played a crucial role – the economic upturn of Ireland's main trading partners, especially the UK, pulled along the small, open Irish economy. In our view, labour market developments also contributed to the expansionary effect of the deficit cut. First, social partnership assured moderate wage increases and the freezing of social transfers in exchange of an income tax reform. Second, increasing employment (by 5.4 percentage points) coupled with a decrease in the extremely high unemployment rate (by 3.7 percentage points) eased the burden of the budget considerably, which effect may be not fully captured by a cyclical adjustment of the deficit. The difference is striking between the first and the second episodes of fiscal adjustment. During the first episode (1981-1986) the main factors of economic growth were unfavourable, while all of them became quite favourable during the second episode (1987-1990). Against this background several studies were sceptical about the labelling of the second episode as an expansionary fiscal policy.[35]

Table 7

Comparison of subsequent episodes of fiscal adjustment in Ireland

First episode	Second episode
- external recession, high oil prices	+ economic upturn in USA, UK, falling oil prices
- EMS membership, exchange rate appreciation	+ exchange rate devaluation (1986)
- disinflation with high interest rate	+ price stability, credibility, decreasing interest rate
- high wage inflation, no wage agreements	+ wage moderation through centralised wage agreements
- crises in some sectors due to higher competition, falling employment, increasing unemployment	+ increasing competitiveness through social partnership, increasing employment, falling unemployment

In the case of Denmark, for the 1983-86 stabilisation period similar arguments hold. The initial economic conditions of 1982 were quite similar – high unemployment and weak public finances were accompanied by high inflation, high interest rates and current account deficit. The hard currency policy and the increased credibility of monetary policy made substantial monetary easing possible, which in turn increased household wealth and the resulting higher demand partly offset the recessionary effect of the deficit cut. Again, the favourable external environment helped to boost exports and employment. The agreement about abolishing both public and private wage indexation increased competitiveness and helped to restore the current account balance. A mimeo of Knudsen emphasises the fact that

[34] Further interesting contributions that identify the Irish and Danish case as expansionary fiscal episodes are of Alesina and Perotti (1996), McDermott and Wescott (1996) and Alesina and Ardagna (1998).
[35] Eichengreen (1998), Prammer (2004), Barry (1991), Whelan (1997).

austerity measures did decrease consumption and the consumption ratio when the upturn of 1983-86 was followed by a downturn in 1987-93.

Besides Ireland and Denmark, EU member states in general have to be mentioned during the 1990s. As the third stage of European Economic and Monetary Union become more and more credible, countries made considerable efforts to satisfy the Maastricht convergence criteria. Of the criteria, decreasing fiscal deficits below 3 per cent of GDP and government debts below 60 per cent of GDP required the most from governments. Many of them complemented real measures with creative accounting measures, which by definition had no negative effects on growth.[36] Here it again has to be underlined that the devaluations of the 1992-93 ERM crises and the necessary short-term interest rate convergence on the run up to EMU eased monetary policy, which partly offset the contractive effect of fiscal consolidations. Social partnerships or wage agreements also accompanied these adjustments in almost all countries. However, the external environment was not very favourable during these fiscal episodes.

Table 8

Real GDP Growth and its components in Ireland 1981-1986 and 1987-1990

	1981 to 1986 Average per cent change	1987 to 1990 Average per cent change
Government consumption	1.2	-1.4
Private Consumption	0.9	3.8
Investment	-0.3	5.8
of which: Government	*-3.5*	*-6.3*
Non-housing	*-2.2*	*8.5*
Housing	*-0.5*	*7.6*
Domestic Demand	0.3	3.6
of which: Private	*0.1*	*4.8*
Exports	7.4	10.4
Imports	3.7	7.4
GDP	1.3	5.0

Source: Central Statistics Office Ireland.

Table 9

Real GDP Growth, deflators, labour market and interest rates in Denmark 1982-1986

	1982	1983	1984 per cent change	1985	1986
Domestic demand	3.4	0.8	4.1	0.5	6.6
Of which: consumer durables	*6.9*	*21.6*	*12.9*	*12.3*	*4.8*
Housing	*-5.5*	*11.1*	*21.8*	*-1.4*	*24.2*
GDP	2.8	1.9	3.7	3.9	4.1
Consumer prices	10.1	6.9	6.3	4.7	3.7
House prices	-1.4	21.3	15.5	17.1	12.2
Unemployment*	7.8	8.4	7.9	6.6	5.0
Hourly wage	10.0	6.4	4.4	4.7	5.0
Bond yield**	20.5	14.4	14.0	11.6	10.5
Bond yield after tax**	8.4	5.6	5.3	4.3	4.0

/per cent of labour force **/in percentage points.
Source: Knudsen (2005).

[36] See a list of measures in Koen-van den Noord (2005) and European Commission (2004).

A.2. CROSS-COUNTRY ESTIMATIONS OF THE IMPACT OF FISCAL EPISODES

One stylised fact is that fiscal adjustments are often accompanied by accelerating economic growth. This is really striking in the case of some groups of countries during specific periods; for example, Rzonca and Cizkowicz (2005) found expansionary fiscal adjustments in the new EU member states in the second half of the nineties. In contrast, Purfield (2003) analysing the consolidation of 25 transition countries from 1992 to 2000, did not find any expansionary effects, although the adjustments did not cause major growth sacrifices either.[37] On the other hand, McDermott and Wescott examining consolidations of industrial countries from 1970 to 1995 found that successful consolidations, which constitute one quarter of the total episodes, increased output by 0.1 of a percentage point on average during episodes and by 0.6-0.7 of a percentage point one year after. The other episodes had an average output loss of 0.7 of a percentage point and almost 1 percentage point one year after.

A number of studies distinguish fiscal episodes on the basis of whether fiscal contractions turned out to be expansionary *ex post* and ask directly what makes a fiscal consolidation sustainable or, in other words, successful.

The relevance of expansionary fiscal episodes was originally identified by several studies of two groups of authors; Alesina, Perotti and Ardagna, on the one hand, and Giavazzi, Jappelli and Pagano, on the other.[38] However, more recent studies which employed different data sets, methods and definitions found very limited evidence of non-Keynesian effects, if any.[39] Reviews of this literature stress that results and possible explanations are ambiguous due to several reasons.[40] We have already mentioned definition problems related to the proper identification of effective discretionary fiscal policies.

The first series of studies – prepared by the same authors – which support non-Keynesian effects found a number of different explanations and channels. Most papers conclude that the composition of adjustments has some explanatory power, in addition the size of the adjustment or initial levels of fiscal imbalances and debt turned out to be relevant factors in a subset of the papers. Another group of articles emphasises the role of the investment and supply side channels, in addition to the consumption channel. A survey of the cross-country evidence is presented in Giudice et al. (2003).

A.2.1. Composition of consolidation

The structure of taxation and public spending affects growth through various channels and different fiscal variables may have quite different multipliers. Consequently, the composition of fiscal consolidation may matter. Let us assume a fiscal policy which keeps the deficit unchanged while significantly reducing both taxes and spending. In this case the effects on the rate of growth would not be neutral, since multipliers of taxes and expenditures can be different. Alesina and Perotti (1996) also emphasise the supply side effects of fiscal policy on unit labour costs and competitiveness.

A.2.2. Size of adjustment and initial conditions

Some papers found that private responses to fiscal adjustments may exhibit non-linear features. A possible explanation for such a phenomenon is the so called new policy expectation view – a sizeable adjustment may prompt a change in expectations of future income. Another explanation is related to high levels of risk premia, which are usually the consequences of unsustainably high levels of public debt and fiscal imbalances.

A.2.3. Demand side: the consumption channel

It is a key question as to what extend the private sector responds to a fiscal impulse, as the ability of a fiscal contraction to reduce the debt-to-GDP ratio depends precisely on this.

[37] We can also consider an alternative benchmark for growth in the case of twin deficits. De Gregorio and Lee (2003) found that a balance-of-payments crisis reduces growth by 1.7 per cent per annum. They also found that fiscal policy was not effective in supporting the recovery.
[38] The idea of expansionary fiscal adjustments was originally called the 'German view'; however, it was empirically supported mostly by Italians.
[39] Von Hagen et al. (2001), Hemming et al. (2002), Miller and Russek (2003), Hogan (2004).
[40] Eichengreen (1998), Hemming et al. (2002), Prammer (2004), OECD (2005), ECB (2005).

Empirical studies usually reject full Ricardian equivalence,[41] but partial Ricardian effects and non-linear features may still be possible.[42] Bhattacharya (1999) found that households' behaviour, which is normally non-Ricardian, can became more Ricardian as government net debt increases above 30-35 per cent of GDP and as uncertainty about future taxes increases.[43] This study has focused on 12 OECD countries. With a bigger sample of countries, Giavazzi, Jappelli and Pagano (2000) examine the effects of fiscal policy on national savings. Concerning 18 OECD countries their results also support the non-Ricardian view. In the case of large fiscal adjustments they found non-linearity; less non-Ricardian results (i.e. Ricardian equivalence still remains rejected), but debt dynamics and composition of the adjustment had no significant effects on their results. Recent studies [OECD, (2004)] also found partial Ricardian effects through private savings responses which offset fiscal adjustments. Consolidations in many OECD countries are often associated with inverse movements of private savings. Concerning the developing countries, some partial Ricardian effects were identified by some studies, notwithstanding the fact that methodological difficulties were intensified by limitations of data.[44]

There are two approaches applied in the estimations. The first approach estimates a cross-country consumption equation,[45] while the second one estimates country-specific consumption functions.[46] Evidence reported using the pooled mean group estimator does not suggest that the response of private saving to public saving differs significantly across counties[47] [Haque et al. (1999)]. However this is not necessarily the case during sizeable fiscal adjustments when a spurious correlation can be observed between public deficits and consumption.[48]

Some papers found that composition of adjustments matters through expectations [Caselli and Rinaldi, (1998)]. Some studies could completely explain non-Keynesian effects by cuts in government consumption, while others found that reductions in transfers are the most important factor. Giavazzi et al. (1999) identified even stronger effects in the case of an increase in taxes. Some other authors found asymmetry between the effects of a fiscal contraction and a fiscal expansion.[49]

A.2.4. Demand side: the investment channel

McDermott and Wescott (1996) recognised that economic growth during fiscal adjustments came more from growth in investment than from growth in consumption. Alesina and Ardagna (1998) and Alesina et al. (2002) found that private investment can be an important factor, but rarely the most important one. According to Alesina et al. (2002), increases observed in private investment are to be attributed to the labour market channel of the supply-side model.

A.2.5. Supply side effects

Alesina and Perotti (1997) emphasised the effects of fiscal policy on unit labour costs and competitiveness, and the role of the composition of the adjustment. They found that private investment is partly crowded in during fiscal adjustments and unit labour costs could improve through devaluation and moderation effects on private wages. This study together with Alesina and Ardagna (1998) and Ardagna (2004) provided some evidence that the unit labour cost channel might be at least or even more relevant than the credibility channel and the wealth effects on consumption. Alesina et al. (1999 and 2002) found that the composition of fiscal policy is also relevant to profits determination, which is a determinant of investment. Higher public spending can increase labour demand and real wages can also be increased by claims of the

[41] The Ricardian Equivalence theory states that, given some (quite strict) assumptions (such as lump sum taxes), consumers understand that the value of their lifetime consumption does not change due to the increase in government expenditures, as this will lead to higher taxes in the future. Therefore, households save the resulting extra income, which will exactly offset higher taxes in the future. Hence, the fiscal multiplier according to this theory is zero.
[42] For example, Thomas, A. (2001), An exploration of the Private Sector Response to Changes in Government Saving Across OECD countries, IMF working paper.
[43] Perotti (1999) found that even non-Keynesian effects may occur in the case of higher levels of debt.
[44] Giavazzi, Japelli and Pagano (2000), Masson, Bayoumi and Samiei (1995), Corbo and Schmidt-Hebbel (1991).
[45] Giavazzi and Pagano (1995).
[46] OECD (2004).
[47] Haque, Pesaran and Sharma, (1999), "Neglected heterogeneity and dynamics in cross-country saving regressions", IMF working paper, No. 09/128.
[48] According to Cour et al. (1996), with the pooled estimation, differences in consumer behaviour across countries would show up in the residual, which in turn is treated as the proxy for the effect fiscal policy has on private consumption.
[49] Giavazzi et al. (1999), Afonso (2001).

unions. Rzonca and Cizkowicz (2005) investigated fiscal adjustments in the new EU member states. They recognised that capital income increased and that labour income decreased during these episodes. They found a so-called export channel, which is working through increasing competitiveness and FDI flows.

A.3. SIMULATION RESULTS IN COMPARISON WITH INTERNATIONAL EXPERIENCE

One might ask how our results relate to findings of model simulations for other countries. Hemming et al. (2002) shows that the multipliers of government consumption lay between 0.6 and 1.4, while for taxes model simulations show a multiplier between 0.3 and 0.8 for Germany, the US and Japan. Our results conform to these values for government consumption. On the other hand, the Hungarian tax multiplier is among the lowest. The close to average public consumption multiplier might be surprising. For Hungary, being a small open country, one might expect a much lower multiplier than for larger, more closed economies. This puzzling fact might be explained by the slow adjustment of wages in the Hungarian NEM model, which makes multipliers (adjustments in quantities) more pronounced. On the other hand, the average Hungarian multiplier can also be a sign of different monetary reactions.

In order to better compare our results with international experience it would be useful to analyse the models of small, open EU countries. Following the same shock setting described in Fagan et al. (2005), we can control for the disturbing features of different monetary reactions. Moreover, we are also able to focus on small, open economies' multipliers. The multipliers of a permanent government consumption shock are shown in Chart 13 and Chart 14. Compared with the results of Fagan et al. (2005), the NEM model is very much like an average small European open economy macromodel. Its fiscal multiplier of public consumption is also close to average. The Hungarian block of the NIGEM model – see Jakab and Kovács (2002) – shows a different multiplier, one at the lower edge of the range of models. This can be explained by the different treatment of demand for imports in NEM and NIGEM. While in the former, demand components are weighted by their import intensities, NIGEM treats all aggregate demand components similarly. As public consumption has lower than average import elasticity in the import equation of NEM, the initial import reaction is less sharp and thus the GDP response is more pronounced. One interesting feature of the Hungarian economy can be observed when looking at the price response of such a fiscal shock. After the third year, price response in Hungary becomes higher than the average small, open European economies' models. This might again be the result of slow wage adjustment in the Hungarian model – only after the second-third year do nominal wages adjust significantly. Higher output induces increasing nominal wages and this creates cost-based inflationary pressures.

Comparing our results to Henry et al. (2004) we found that most of our simulations conform to their results, as well.

Chart 13

GDP response of increasing Government Consumption of Goods and Services in ESCB macromodels

(Percentage deviations from baseline [in levels])

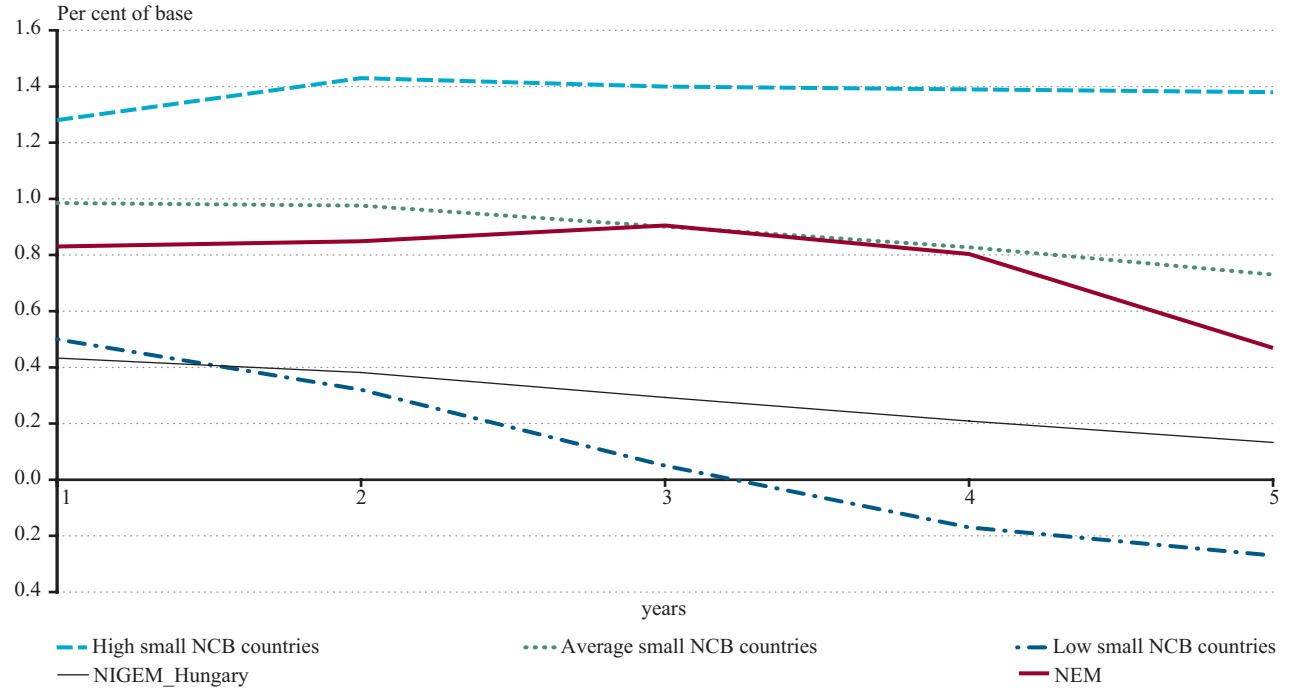
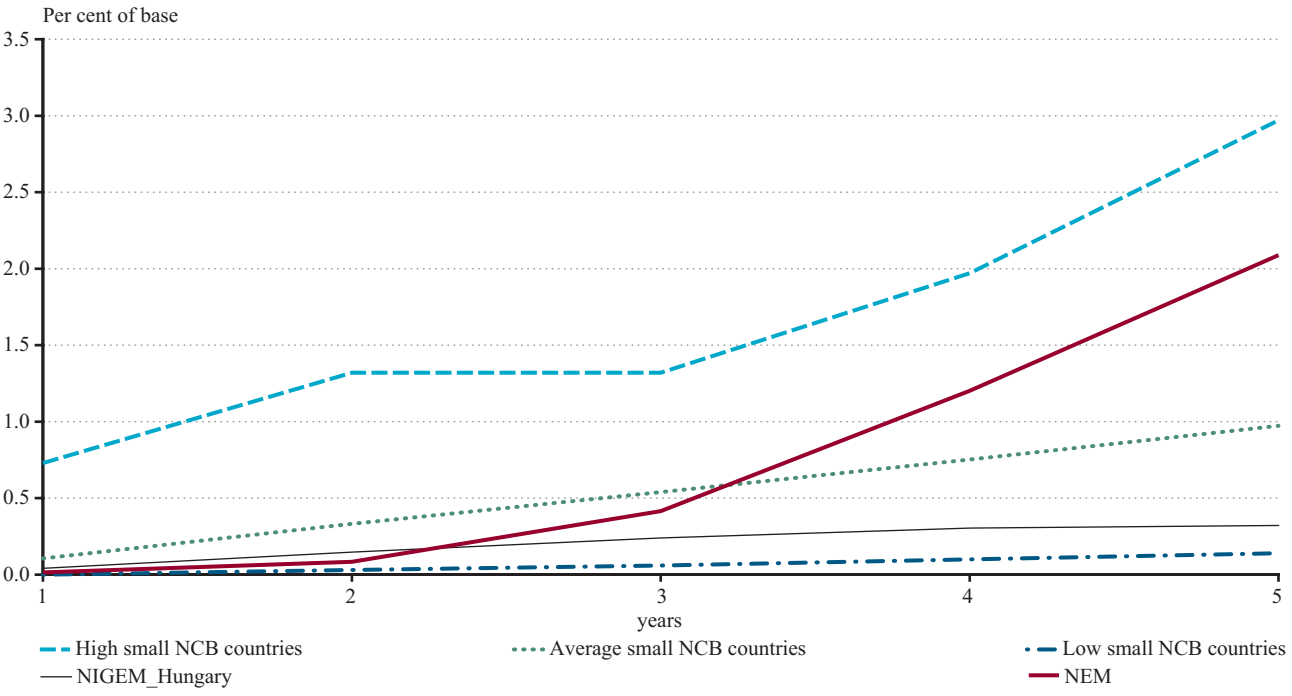


Chart 14

CPI response of increasing Government Consumption of Goods and Services in ESCB macromodels

(Percentage deviations from baseline [in levels])



Source: authors' calculations based on Fagan et al. (2005).

A.4. SIMULATION RESULTS FOR CONSTANT MONETARY POLICY

A.4.1. Fixed interest rates

Table 10

Response of GDP to a fiscal tightening of 1 per cent of GDP

(Percentage deviations from baseline [in levels])

Type of shock	1 year	2 year	3 year	4 year	Notes
1. Reduction in Financial Transfers or Increasing Personal Income Taxes	-0.39	-0.85	-1.18	-1.34	Income taxes have no effect on labour supply
2. Reduction in Gov't employment	-0.17	-0.62	-0.93	-0.73	Financial transfers and labour supply (labour force) also accomodate
3. Mixed shock	-0.35	-0.82	-1.15	-1.25	Weighted average of Shock 1 and 2, based on Convergence Report (2005)
4. Reduction in Gov't Purchases of Goods	-0.83	-0.85	-0.90	-0.80	Only non-labour related gov't consumption affected. financial transfers endogenised
5. Reduction in Gov't Investment	-0.48	-0.53	-0.68	-0.72	Financial transfers endogenised
6. Increasing Social Security Contributions	-0.01	-0.15	-0.86	-2.02	Employers' social security contributions shocked
7. Regulated Price Increases	-0.06	-0.31	-0.71	-1.17	2.4 percentage points higher annual growth of (non-energy) regulated prices for 5 years
8. Indirect Tax Increases	-0.16	-0.35	-0.25	-0.12	Around 4 percentage point increase in top VAT-rate

Source: simulations with the Quarterly Projection Model (NEM).

Table 11

Response of GDP growth to a fiscal tightening of 1 per cent of GDP

(Percentage point deviations from baseline [in year-on-year growth rates])

Type of shock	1 year	2 year	3 year	4 year	Notes
1. Reduction in Financial Transfers or Increasing Personal Income Taxes	-0.39	-0.46	-0.33	-0.16	Income taxes have no effect on labour supply
2. Reduction in Gov't employment	-0.17	-0.45	-0.31	0.20	Financial transfers and labour supply (labour force) also accomodate
3. Mixed shock	-0.35	-0.46	-0.33	-0.11	Weighted average of Shock 1. and 2., based on Convergence Report (2005)
4. Reduction in Gov't Purchases of Goods	-0.83	-0.02	-0.06	0.10	Only non-labour related gov't consumption affected, financial transfers endogenised
5. Reduction in Gov't Investment	-0.48	-0.05	-0.14	-0.04	Financial transfers endogenised
6. Increasing Social Security Contributions	-0.01	-0.15	-0.70	-1.16	Employers' social security contributions shocked
7. Regulated Price Increases	-0.06	-0.25	-0.40	-0.46	2.4 percentage points higher annual growth of (non-energy) regulated prices for 5 years
8. Indirect Tax Increases	-0.16	-0.19	0.10	0.13	Around 4 percentage point increase in top VAT-rate

Source: simulations with the Quarterly Projection Model (NEM).

Table 12

Response of CPI to a fiscal tightening of 1 per cent of GDP

(Percentage deviations from baseline [in levels])

Type of shock	1 year	2 year	3 year	4 year	Notes
1. Reduction in Financial Transfers or Increasing Personal Income Taxes	0.00	-0.01	-0.08	-0.49	Income taxes have no effect on labour supply
2. Reduction in Gov't employment	0.00	-0.20	-1.22	-2.93	Financial transfers and labour supply (labour force) also accomodate
3. Mixed shock	0.00	-0.04	-0.24	-0.84	Weighted average of Shock 1 and 2, based on Convergence Report (2005)
4. Reduction in Gov't Purchases of Goods	-0.01	-0.08	-0.41	-1.20	Only non-labour related gov't consumption affected, financial transfers endogenised
5. Reduction in Gov't Investment	-0.01	-0.01	-0.09	-0.39	Financial transfers endogenised
6. Increasing Social Security Contributions	0.05	1.06	3.14	4.35	Employers' social security contributions shocked
7. Regulated Price Increases	0.53	1.39	2.22	2.91	2.4 percentage points higher annual growth of (non-energy) regulated prices for 5 years
8. Indirect Tax Increases	1.06	1.01	0.85	0.71	Around 4 percentage point increase in top VAT-rate

Source: simulations with the Quarterly Projection Model (NEM).

Table 13

Response of CPI inflation to a fiscal tightening of 1 per cent of GDP

(Percentage point deviations from baseline [in year-on-year growth rates])

Type of shock	1 year	2 year	3 year	4 year	Notes
1. Reduction in Financial Transfers or Increasing Personal Income Taxes	0.00	-0.01	-0.07	-0.41	Income taxes have no effect on labour supply
2. Reduction in Gov't employment	0.00	-0.20	-1.01	-1.71	Financial transfers and labour supply (labour force) also accomodate
3. Mixed shock	0.00	-0.03	-0.21	-0.59	Weighted average of Shock 1 and 2, based on Convergence Report (2005)
4. Reduction in Gov't Purchases of Goods	-0.01	-0.07	-0.33	-0.79	Only non-labour related gov't consumption affected, financial transfers endogenised
5. Reduction in Gov't Investment	-0.01	0.00	-0.08	-0.30	Financial transfers endogenised
6. Increasing Social Security Contributions	0.05	1.01	2.07	1.21	Employers' social security contributions shocked
7. Regulated Price Increases	0.53	0.86	0.83	0.69	2.4 percentage points higher annual growth of (non-energy) regulated prices for 5 years
8. Indirect Tax Increases	1.06	-0.05	-0.15	-0.14	Around 4 percentage point increase in top VAT-rate

Source: simulations with the Quarterly Projection Model (NEM).

A.5. SIMULATION RESULTS FOR ALTERNATIVE MONETARY POLICY RULES

A.5.1. Alternative monetary reaction functions

In order to analyse the pure effects of fiscal shocks, we tried to separate their effect from other channels. Hence, we established a baseline simulation set such that possible reactions of monetary policy were shut down, i.e. interest rates (short and long term) and the nominal exchange rate were kept fixed. Inflation expectations and the interest rate premium were also kept unchanged.

In contrast to the fixed interest rate scenarios, more realistic scenarios can be simulated assuming active monetary policymakers. For example, fiscal consolidations working through prices (indirect tax hikes or administered price increases) produce relatively low fiscal multipliers. On the other hand, as monetary policy focuses heavily on inflation, the assumption of unchanged monetary conditions is likely to become unfeasible. Moreover, intuition suggests that different types of fiscal consolidations would trigger different monetary policy behaviour.

Throughout our simulation exercises we consider two different policy functions. They are similar in the sense that both monetary policy rules are forward-looking but differ significantly in their weights given to output and inflation stabilisation. First, we use a rule that contains the original Taylor-rule parameters with some very modest interest rate smoothing – called 'Taylor rule', see equation (1). This rule puts relatively large weight on the output gap and was originally calibrated to match historical US policy.

Second, Hungary, a small, open economy following an inflation targeting regime, certainly applies a different monetary policy. According to Hidi (2006) a modified Taylor rule – see equation (2) – is found to be better in describing monetary policy in Hungary. Taking this approach as a starting point, Hungarian monetary policy puts a relatively large weight on inflation, but nominal exchange rate deviations also play a role in determining short-term interest rates (called 'estimated Taylor rule'). The exact formula for the rules used in the simulations are as follows.

'Taylor rule' (with smoothing):

$$i_t = 0.75 \cdot \left[7.75 + 1.5 \cdot (E\pi_{t+4} - \pi^{Target}) + 0.5 \cdot (gap)\right] + 0.25 \cdot i_{t-1} \quad (1)$$

'Estimated Taylor rule':

$$i_t = 0.25 \cdot \left[7.75 + 2.93 \cdot (E\pi_{t+4} - \pi^{Target}) + 1.29 \cdot \left(e^{base} - e\right)\right] + 0.75 \cdot i_{t-1} \quad (2)$$

where i, π, π^{Target}, gap, e and e^{base} denote short-term interest rate, the annual inflation rate, the inflation target, the output gap, the nominal exchange rate and its baseline value, respectively. Eπ refers to expected (model consistent) inflation.

One might ask why the output gap is missing in the 'estimated Taylor rule'. The reasoning is twofold. Firstly, output gap fluctuations in Hungary were quite modest since the introduction of the inflation targeting regime (see Chart 15) and were not found to be significant for the Taylor rule econometrically. One cannot clearly judge how monetary policy would react during less stable periods. Therefore, we also experimented with a modified version of the 'estimated Taylor rule', in which we excluded the nominal exchange rate and inserted the output gap – for which the parameter was borrowed from Benk and Jakab (2004). The simulation results were numerically similar to those using the 'estimated Taylor rule'.

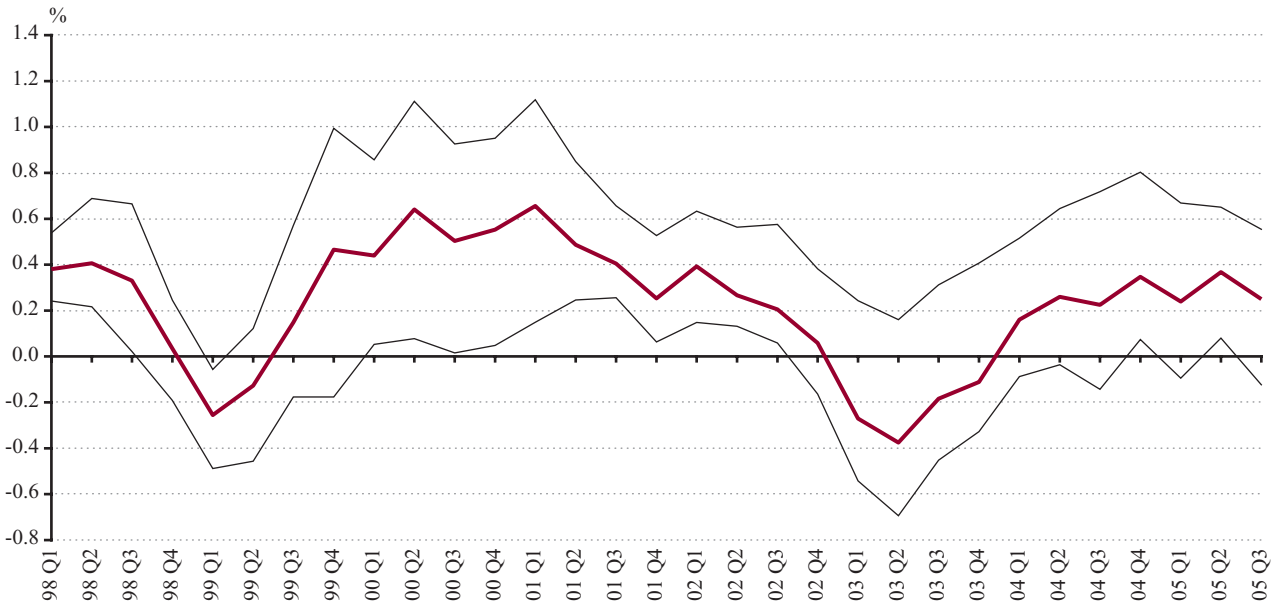
Secondly, inserting both the nominal exchange rate and inflation in the rule implicitly implies that monetary policy takes care of real exchange rates. As Hungary is a small, open economy, real exchange rate fluctuations might be well correlated with output fluctuations. Hence, in practice the estimated rule works in the same way as directly inserting the output gap -237 088 inflationary tensions are traded-off by output gap deviations.

We also emphasise that the short-term interest rate was not the only forward looking variable. The nominal exchange rate was set to follow the forward looking uncovered interest rate parity (UIP) condition. According to our equation for the long-term interest rate, this is equal to the three year moving average of future short-term rates.

Chart 15

Output gap fluctuation in Hungary 1998-2005*

(percentage deviation of actual output from potential)



**Minimum, maximum and average of output gap estimates with several methods; source Benk et al. (2005).*

A.5.2. 'Estimated Taylor rule'

Table 14

Response of GDP to a fiscal tightening of 1 per cent of GDP

(Percentage deviations from baseline [in levels])

Type of shock	1 year	2 year	3 year	4 year	Notes
1. Reduction in Financial Transfers or Increasing Personal Income Taxes	-0.19	-0.43	-0.59	-0.68	Income taxes have no effect on labour supply
2. Reduction in Gov't employment	0.04	-0.01	-0.24	-0.41	Financial transfers and labour supply (labour force) also accomodate
3. Mixed shock	-0.16	-0.37	-0.54	-0.64	Weighted average of Shock 1 and 2, based on Convergence Report (2005)
4. Reduction in Gov't Purchases of Goods	-0.68	-0.59	-0.59	-0.62	Only non-labour related gov't consumption affected, financial transfers endogenised
5. Reduction in Gov't Investment	-0.46	-0.49	-0.56	-0.64	Financial transfers endogenised
6. Increasing Social Security Contributions	-0.28	-0.88	-1.29	-1.52	Employers' social security contributions shocked
7. Regulated Price Increases	-0.18	-0.57	-0.72	-0.68	2.4 percentage points higher annual growth of (non-energy) regulated prices for 5 years
8. Indirect Tax Increases	-0.27	-0.57	-0.32	-0.10	Around 4 percentage point increase in top VAT-rate

Source: simulations with the Quarterly Projection Model (NEM).

Table 15

Response of GDP growth to a fiscal tightening of 1 per cent of GDP

(Percentage point deviations from baseline [in year-on-year growth rates])

Type of shock	1 year	2 year	3 year	4 year	Notes
1. Reduction in Financial Transfers or Increasing Personal Income Taxes	-0.19	-0.24	-0.16	-0.08	Income taxes have no effect on labour supply
2. Reduction in Gov't employment	0.04	-0.05	-0.23	-0.17	Financial transfers and labour supply (labour force) also accomodate
3. Mixed shock	-0.16	-0.21	-0.17	-0.10	Weighted average of Shock 1 and 2, based on Convergence Report (2005)
4. Reduction in Gov't Purchases of Goods	-0.68	0.09	0.00	-0.03	Only non-labour related gov't consumption affected, financial transfers endogenised
5. Reduction in Gov't Investment	-0.46	-0.03	-0.08	-0.08	Financial transfers endogenised
6. Increasing Social Security Contributions	-0.28	-0.60	-0.41	-0.23	Employers' social security contributions shocked
7. Regulated Price Increases	-0.18	-0.39	-0.15	0.04	2.4 percentage points higher annual growth of (non-energy) regulated prices for 5 years
8. Indirect Tax Increases	-0.27	-0.30	0.25	0.22	Around 4 percentage point increase in top VAT-rate

Source: simulations with the Quarterly Projection Model (NEM).

Table 16

Response of CPI to a fiscal tightening of 1 per cent of GDP

(Percentage deviations from baseline [in levels])

Type of shock	1 year	2 year	3 year	4 year	Notes
1. Reduction in Financial Transfers or Increasing Personal Income Taxes	0.01	0.03	-0.03	-0.35	Income taxes have no effect on labour supply
2. Reduction in Gov't employment	0.05	0.14	-0.64	-2.25	Financial transfers and labour supply (labour force) also accomodate
3. Mixed shock	0.01	0.05	-0.11	-0.62	Weighted average of Shock 1 and 2, based on Convergence Report (2005)
4. Reduction in Gov't Purchases of Goods	0.01	0.05	-0.16	-0.87	Only non-labour related gov't consumption affected, financial transfers endogenised
5. Reduction in Gov't Investment	0.00	0.03	-0.01	-0.27	Financial transfers endogenised
6. Increasing Social Security Contributions	-0.04	0.57	2.50	3.95	Employers' social security contributions shocked
7. Regulated Price Increases	0.49	1.17	1.97	2.84	2.4 percentage points higher annual growth of (non-energy) regulated prices for 5 years
8. Indirect Tax Increases	1.01	0.96	0.73	0.53	Around 4 percentage point increase in top VAT-rate

Source: simulations with the Quarterly Projection Model (NEM).

Table 17

Response of CPI inflation to a fiscal tightening of 1 per cent of GDP

(Percentage point deviations from baseline [in year-on-year growth rates])

Type of shock	1 year	2 year	3 year	4 year	Notes
1. Reduction in Financial Transfers or Increasing Personal Income Taxes	0.01	0.03	-0.06	-0.33	Income taxes have no effect on labour supply
2. Reduction in Gov't employment	0.05	0.08	-0.78	-1.61	Financial transfers and labour supply (labour force) also accomodate
3. Mixed shock	0.01	0.03	-0.16	-0.51	Weighted average of Shock 1 and 2, based on Convergence Report (2005)
4. Reduction in Gov't Purchases of Goods	0.01	0.04	-0.22	-0.70	Only non-labour related gov't consumption affected, financial transfers endogenised
5. Reduction in Gov't Investment	0.00	0.03	-0.04	-0.26	Financial transfers endogenised
6. Increasing Social Security Contributions	-0.04	0.61	1.93	1.45	Employers' social security contributions shocked
7. Regulated Price Increases	0.49	0.68	0.80	0.87	2.4 percentage points higher annual growth of (non-energy) regulated prices for 5 years
8. Indirect Tax Increases	1.01	-0.04	-0.23	-0.20	Around 4 percentage point increase in top VAT-rate

Source: simulations with the Quarterly Projection Model (NEM).

A.5.3. 'Taylor rule'

Table 18

Response of GDP to a fiscal tightening of 1 per cent of GDP

(Percentage deviations from baseline [in levels])

Type of shock	1 year	2 year	3 year	4 year	Notes
1. Reduction in Financial Transfers or Increasing Personal Income Taxes	-0.17	-0.37	-0.54	-0.66	Income taxes have no effect on labour supply
2. Reduction in Gov't employment	-0.05	-0.32	-0.73	-0.99	Financial transfers and labour supply (labour force) also accomodate
3. Mixed shock	-0.16	-0.36	-0.56	-0.70	Weighted average of Shock 1 and 2, based on Convergence Report (2005)
4. Reduction in Gov't Purchases of Goods	-0.67	-0.58	-0.65	-0.75	Only non-labour related gov't consumption affected, financial transfers endogenised
5. Reduction in Gov't Investment	-0.44	-0.48	-0.59	-0.69	Financial transfers endogenised
6. Increasing Social Security Contributions	-0.01	-0.01	-0.10	-0.38	Employers' social security contributions shocked
7. Regulated Price Increases	-0.02	-0.06	-0.07	-0.07	2.4 percentage points higher annual growth of (non-energy) regulated prices for 5 years
8. Indirect Tax Increases	-0.22	-0.42	-0.21	-0.01	Around 4 percentage point increase in top VAT-rate

Source: simulations with the Quarterly Projection Model (NEM).

Table 19

Response of GDP growth to a fiscal tightening of 1 per cent of GDP

(Percentage point deviations from baseline [in year-on-year growth rates])

Type of shock	1 year	2 year	3 year	4 year	Notes
1. Reduction in Financial Transfers or Increasing Personal Income Taxes	-0.17	-0.19	-0.17	-0.12	Income taxes have no effect on labour supply
2. Reduction in Gov't employment	-0.05	-0.27	-0.41	-0.27	Financial transfers and labour supply (labour force) also accomodate
3. Mixed shock	-0.16	-0.20	-0.20	-0.14	Weighted average of Shock 1 and 2, based on Convergence Report (2005)
4. Reduction in Gov't Purchases of Goods	-0.67	0.09	-0.06	-0.10	Only non-labour related gov't consumption affected, financial transfers endogenised
5. Reduction in Gov't Investment	-0.44	-0.04	-0.10	-0.11	Financial transfers endogenised
6. Increasing Social Security Contributions	-0.01	0.00	-0.08	-0.28	Employers' social security contributions shocked
7. Regulated Price Increases	-0.02	-0.03	-0.01	0.00	2.4 percentage points higher annual growth of (non-energy) regulated prices for 5 years
8. Indirect Tax Increases	-0.22	-0.20	0.21	0.20	Around 4 percentage point increase in top VAT-rate

Source: simulations with the Quarterly Projection Model (NEM).

Table 20

Response of CPI to a fiscal tightening of 1 per cent of GDP

(Percentage deviations from baseline [in levels])

Type of shock	1 year	2 year	3 year	4 year	Notes
1. Reduction in Financial Transfers or Increasing Personal Income Taxes	0.01	0.08	0.04	-0.29	Income taxes have no effect on labour supply
2. Reduction in Gov't employment	0.02	-0.05	-1.00	-2.80	Financial transfers and labour supply (labour force) also accomodate
3. Mixed shock	0.02	0.06	-0.11	-0.65	Weighted average of Shock 1 and 2, based on Convergence Report (2005)
4. Reduction in Gov't Purchases of Goods	0.01	0.07	-0.17	-0.93	Only non-labour related gov't consumption affected, financial transfers endogenised
5. Reduction in Gov't Investment	0.00	0.03	-0.01	-0.28	Financial transfers endogenised
6. Increasing Social Security Contributions	0.05	1.11	3.51	5.32	Employers' social security contributions shocked
7. Regulated Price Increases	0.55	1.49	2.54	3.59	2.4 percentage points higher annual growth of (non-energy) regulated prices for 5 years
8. Indirect Tax Increases	1.00	0.96	0.76	0.59	Around 4 percentage point increase in top VAT-rate

Source: simulations with the Quarterly Projection Model (NEM).

Table 21

Response of CPI inflation to a fiscal tightening of 1 per cent of GDP

(Percentage point deviations from baseline [in year-on-year growth rates])

Type of shock	1 year	2 year	3 year	4 year	Notes
1. Reduction in Financial Transfers or Increasing Personal Income Taxes	0.01	0.06	-0.04	-0.33	Income taxes have no effect on labour supply
2. Reduction in Gov't employment	0.02	-0.07	-0.95	-1.79	Financial transfers and labour supply (labour force) also accomodate
3. Mixed shock	0.02	0.04	-0.17	-0.53	Weighted average of Shock 1 and 2, based on Convergence Report (2005)
4. Reduction in Gov't Purchases of Goods	0.01	0.05	-0.24	-0.75	Only non-labour related gov't consumption affected, financial transfers endogenised
5. Reduction in Gov't Investment	0.00	0.03	-0.04	-0.27	Financial transfers endogenised
6. Increasing Social Security Contributions	0.05	1.06	2.40	1.80	Employers' social security contributions shocked
7. Regulated Price Increases	0.55	0.95	1.05	1.05	2.4 percentage points higher annual growth of (non-energy) regulated prices for 5 years
8. Indirect Tax Increases	1.00	-0.05	-0.20	-0.17	Around 4 percentage point increase in top VAT-rate

Source: simulations with the Quarterly Projection Model (NEM).

Chart 15

Impulse responses

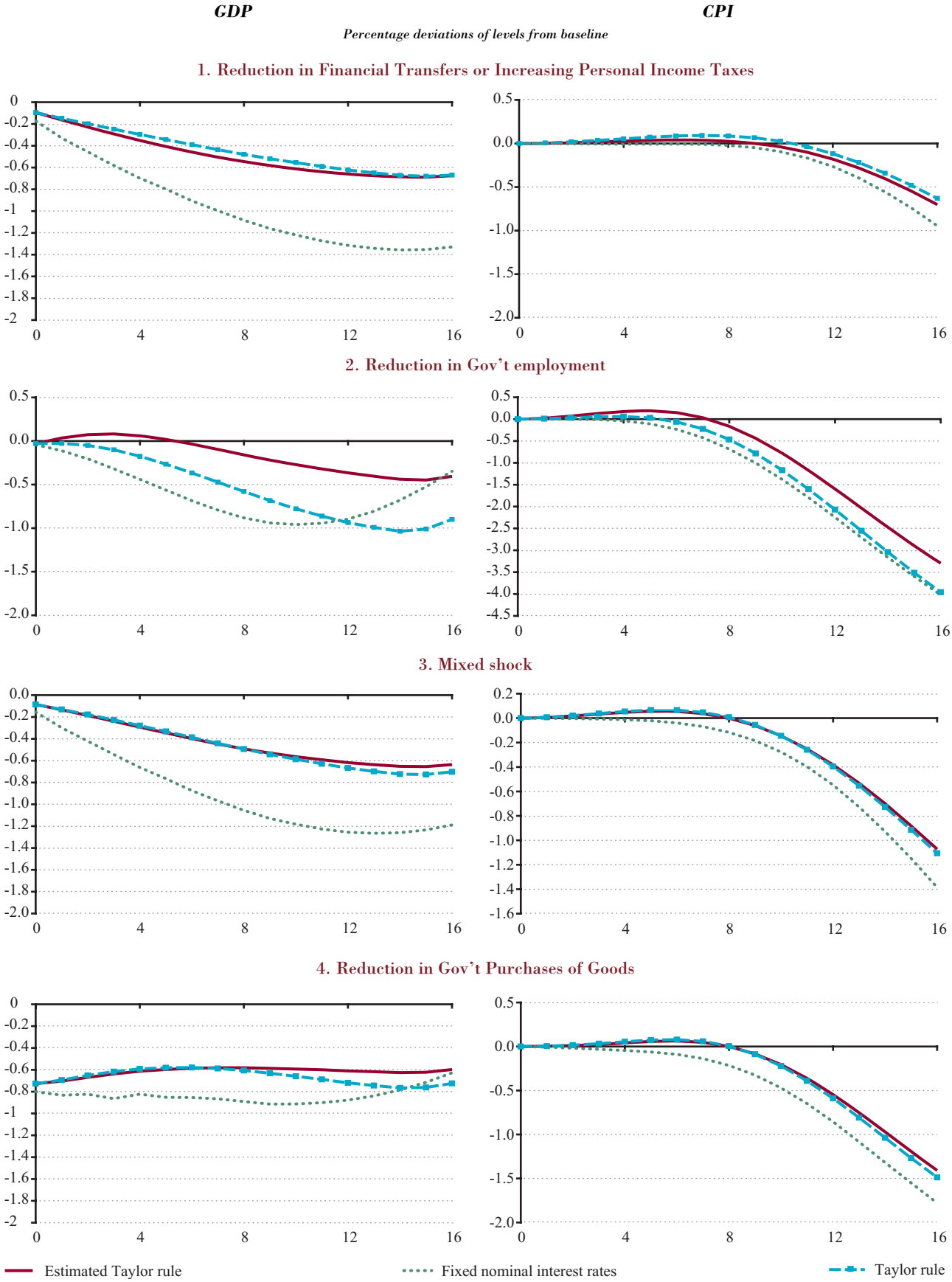
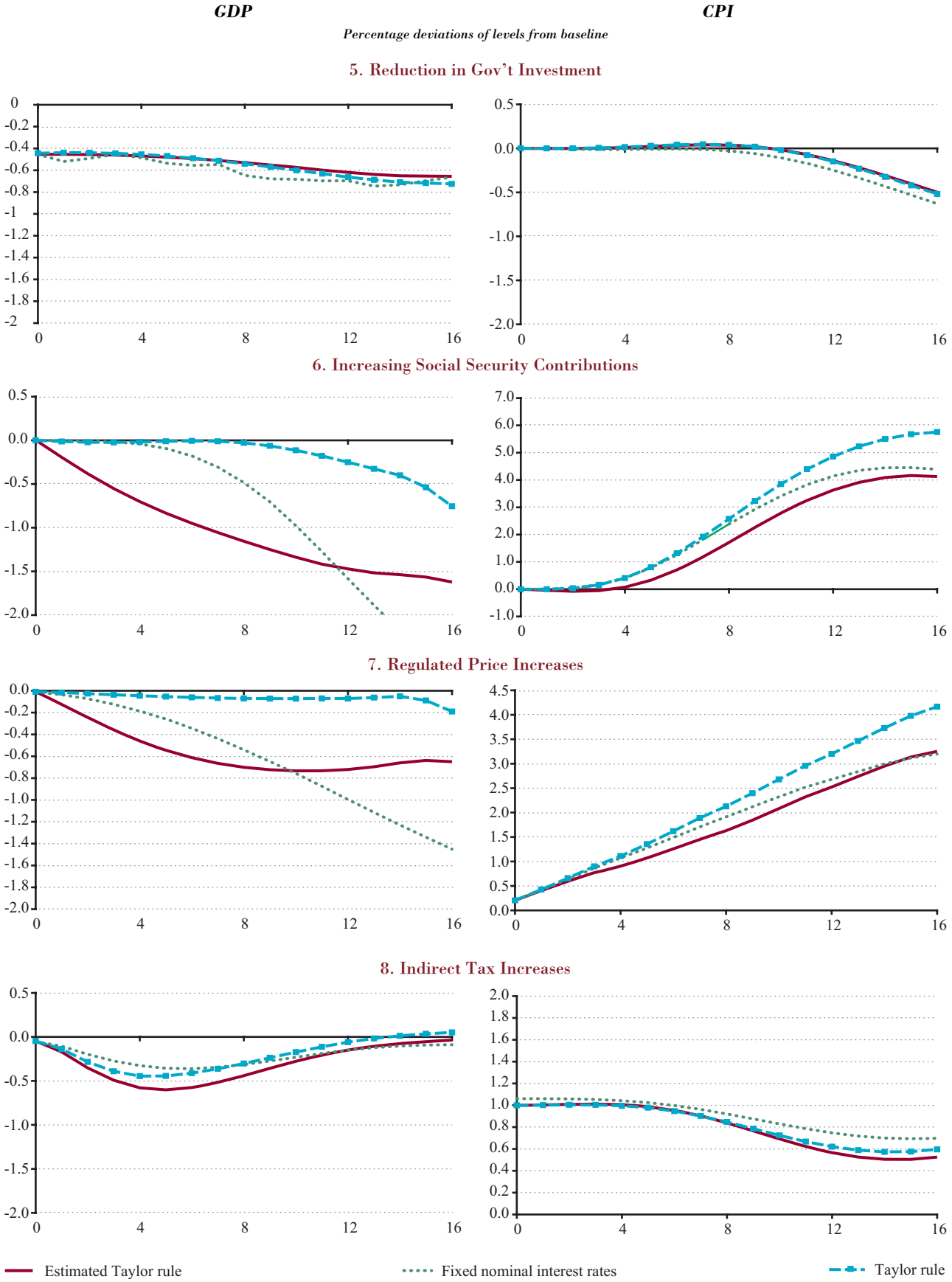


Chart 15

Impulse responses (con'd)



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