Expansionary fiscal contraction: 
A theoretical exploration

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Abstract

This paper presents a dynamic general equilibrium analysis of the hypothesis that fiscal spending reductions may be expansionary. The impact of balanced budget fiscal spending on output in this model is normally negative. Quantitatively, these effects can be large. Moreover, the effects are distinctly non-linear; the higher is the initial fiscal spending to GDP ratio, the greater the expansionary impact of fiscal spending cuts. Nevertheless, the effects are likely to be accrued only gradually, so that fiscal contraction does not lead to large immediate increases in output. The analysis is extended to an economy with unemployment, and to an open economy. Some discussion of the empirical relevance of the hypothesis is presented.

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In the last decade, many countries have engaged in contractionary fiscal policies, aimed at reducing government deficits. In most cases, these programs have been associated with expenditure program reduction, privatization and other initiatives that attempted to claw back the size of their public sectors. The major pressures towards fiscal contraction have been financial rather than ideological, and indeed, governments of all political stripes have followed similar policies.
What are the macroeconomic effects of fiscal contractions? The conventional economics textbook view, as well as the view of most politicians, is that government spending and deficit reducing policies have negative effects on aggregate demand and output. Deficit reduction then has to be a balancing act between the achievement of financial goals and the containment of the negative effects on the real economy.

Against this consensus is what has been called the ‘German’ view of the impact of fiscal spending reductions, originally being propounded by the German treasury in the early 1980s (e.g. Fels and Froehlich, 1986). This view contends that a credible, permanent program of government spending or tax reductions will stimulate a large increase in private demand, working through the expectations of permanently lower tax liabilities. Private spending may increase sufficiently to offset the direct effects of the fiscal contraction, so that in fact, the main impact of deficit reduction can be positive rather than negative.

In an empirical consideration of this view, Giavazzi and Pagano (1990) look at two case studies of programs of successful deficit reduction programs; the case of Denmark in 1983–86, and Ireland in 1987–89. In both cases, fiscal contractions were associated with sustained economic recovery. Giavazzi and Pagano attempt to explain this process of ‘expansionary fiscal contraction’ by the effect of credible fiscal restraint on private sector consumption behaviour. Their hypothesis is that the favorable effect of deficit reduction on expectations of future tax liabilities can explain much of response of aggregate consumption. Further evidence from Canada in the late 1990s suggests that even sharp fiscal contractions may have only small negative and possibly even positive effects on net economic activity.

The notion that a credible permanent fiscal contraction that reduces the long run tax burden could stimulate an increase in aggregate consumption is quite reasonable. But it seems unlikely that this effect could be so great as to increase aggregate national income. This would imply the presence of a negative government spending multiplier. Both textbook macroeconomic models, as well as neoclassical model of fiscal policy developed by Barro (1987), and others, predict that government spending multipliers are positive.

This paper provides a theoretical exploration of the possibility of ‘expansionary fiscal contraction’ in a dynamic general equilibrium model. In our model, government spending has a negative impact on consumption, employment, and real GDP. A permanent contraction in government spending leads to fall in the real interest rate and an immediate increase in employment and GDP. In the long run, there is a permanently lower real interest rate, and a higher capital stock, employment, and output. When we calibrate the model using commonly accepted parameter values, we find that the implied negative government spending multipliers can be quantitatively significant. Furthermore, the process is distinctly non-linear. The neg-

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1 Bertola and Drazen (1993) demonstrate that the impact of budgetary reforms on aggregate consumption may depend very sensitively upon the particular state of government finances. They argue that expectations effects may induce a non-linear relationship between fiscal policies and private consumption. If government budget cuts signal a credible permanent cut in spending, a very sharp rise in aggregate consumption may follow.
ative impact of government spending on output becomes larger, the higher the share of government spending in output. In other words, when the share of government spending in GDP is very high, government spending cutbacks may have substantially positive effects on output.

Two features of the model are responsible for the presence of negative effects of government spending on GDP. The first is that the importance of life-cycle savings effects. If consumers faced an effective infinite horizon (i.e. if complete Ricardian equivalence applied), a permanent reduction in government spending will lead to an equal and offsetting increase in private consumption, and the present value of tax liabilities fall by the same amount as the present value of government spending. Holding labor supply constant, there would be no impact on aggregate demand, real interest rates, or overall GDP. When we include endogenous labor supply, however, the rise in consumption generates a wealth effect that leads to a fall in labor supply and a reduction in GDP (see Aiyagari et al., 1990).

By contrast, we utilize an overlapping generations model based on Blanchard (1985). In this economy, when there are no intergenerational linkages (i.e. Ricardian equivalence does not apply), the average citizen is a saver. The consumption profile for any family rises through life, even though aggregate consumption is flat in a steady state. A permanent reduction in government spending in this economy will reduce the tax burden on all generations living. Because each generation is a saver, the response of the consumer in each currently alive generation is to increase present consumption by less than she increases future consumption. The result is that the fall in government consumption leads to an incipient aggregate excess supply of current output (i.e. national savings rises). This must eliminated by a fall in the interest rate, a rise in investment, and a permanent rise in output.

While the life-cycle saving pattern is a necessary ingredient in making the case for the presence of negative government spending multipliers, it is not sufficient however. Even with life-cycle savings, government spending will still be expansionary, if labor supply is endogenous, and exhibits wealth effects. Intuitively, with endogenous labor supply, a contraction in government spending works through two channels. First, holding labor supply constant, the rise in savings will lead to a fall in the real interest rate. But against this, the wealth effect of lower taxes will lead to a fall in labor supply, and a reduction in output. Quantitatively, the second effect always dominates.

Therefore, a second necessary ingredient in explaining negative government spending multipliers is the absence of substantial wealth effects in labor supply. The models of Greenwood et al. (1988) and Hercowitz and Sampson (1991) formulate a labor supply motive satisfying this criterion. We show, using a variant of this specification for labor supply, in combination with the overlapping generations model of saving, that government spending multipliers are always negative, and may be quantitatively significant, especially when the initial share of government spending in GDP is very high.

While the model implies that the long run impact of fiscal spending cuts on the economy are positive, and may be relatively large, the dynamic analysis suggests that these gains are accrued only gradually, as real interest rates fall, and capital accumulation takes place. Interestingly, the immediate impacts of fiscal spending cutbacks are quite small, expect in the case where the cutbacks are perceived to be temporary.
How are the conclusions affected by the presence of unemployment? We extend the model to add an exogenous real wage constraint. If the real wage constraint is binding, there is unemployment in equilibrium. But the government spending multiplier is still negative. In fact, contractionary government spending actually reduces the unemployment rate.

In the small open economy version of this model, investment is independent of savings, so that domestic GDP is also independent of fiscal policy. But we can address the question of how a fiscal policy affects domestic GNP alternatively. What is the impact of a permanent balanced budget fiscal contraction on GNP? The answer is that it may be positive or negative. This depends solely on whether the world interest rate exceeds or falls short of the domestic subjective discount factor.

We briefly discuss the implications of our model for the fiscal stabilizations in Denmark and Ireland in the 1980s. Qualitatively, the key attributes of the model do seem to accord with observations from these episodes.

The rest of the paper develops these results in more detail. Section 1 briefly describes the model. Section 2 discusses the steady state effects of fiscal policies for the closed economy model. Section 3 describes the dynamic impacts of various types of fiscal contraction policies. The impact of a real wage constraint is explored in Section 4. Section 5 looks at the case of a small open economy. Section 6 discusses the empirical relevance of the model. Finally, Section 7 concludes.

1. The model

The model used is an amended version of the Blanchard (1985) overlapping generations framework in which consumers face an uncertain time of death. The probability of death is constant for every individual, despite her age. Let this probability be \( (1 - \gamma) \), so that \( \gamma \) is the constant probability of being alive one period hence. The law of large numbers ensures that \( 1 - \gamma \) is also the fraction of the population that die in every period, so that there is no aggregate risk. Efficient financial markets then allow each individual to borrow and lend at a constant interest rate, adjusted for the probability of death. If the market interest rate is \( (1 + r) \), then the actuarially fair interest rate faced by borrowers or lenders will be \( (1 + r)/\gamma \).

1.1. Consumers

A new generation is born in every period, and generations are altruistically separate. Each new generation is born without assets and must save if it is to finance an increasing consumption profile over time.

Take an individual at time \( t \) who is a representative of a generation born at time \( s \leq t \). Let this individual have preferences given by

\[
\sum_{i=0}^{\infty} (\beta \gamma)^i \log c(t, s),
\]

(1)
where \( c(t, s) = \bar{c}(t, s) - g(l(t, s), L(t, s)) \) represents an index of effective consumption, and \( \beta \) is the time discount factor. \( \bar{c} \) is actual consumption, \( g(l(t, s), L(t, s)) \) is the disutility of labor supply, \( l(t, s) \) represents actual current labor supply of the individual, while \( L(t, s) \) captures a ‘stock’ of accumulated work experience.

A somewhat similar preference specification is used in Hercowitz and Sampson (1991), and others. The important feature of these preferences is that they eliminate the presence of income effects in labor supply. This will imply that a government spending contraction does not lead to a fall in labor supply through pure wealth effects. As we illustrate below, this is a critical requirement for explaining the negative link between government spending and aggregate output, in this model.  

What role does the \( L(t, s) \) term play in the model? This introduces a form of habit persistence in labor supply. We assume that \( g_1(l, L) > 0 \), and \( g_2(l, L) < 0 \), so that it is costly to supply labor, but an increase in the stock of work experience reduces the disutility cost of supplying current labor. In what follows, we make the specific functional form assumption; \( g(l, L) = (1/(1 + \psi))(l - L)^{1+\psi} \). As in Kydland and Prescott (1982), this specification allows for non-separability in the labor supply. Effectively, it introduces forward looking behaviour in labor supply; labor supply will increase in response to a fall in the interest rate, holding real wages constant. The manner in which this occurs is made more precise in the analysis below. We assume that \( L_t \) evolves as

\[
L(t + 1, s) = \rho L(t, s) + \kappa l(t, s),
\]

where \( \rho < 1 \). Thus, the stock of accumulated work experience is increased by each period’s labor supply. In a steady state, aggregated across individuals where aggregate labor supply is constant at \( l \), the work experience stock would converge to \( \kappa l/(1 - \rho) \).  

The individual faces the budget accounting relationship given by (2) in every time period:

\[
\bar{c}(t, s) + A(t + 1, s) = \frac{(1 + r_t)}{\gamma} A(t, s) + w_t l(t, s) - T_t,
\]

where \( A(t, s) \) represent the market value of assets, or non-human wealth, brought into period \( t \) by the individual, \( w_t \) is the market wage, which is the same for all generations, and \( T_t \) represents a lump-sum tax levied by government.

Each household chooses an optimal pattern of labor supply and consumption, subject to (2) and a transversality constraint. Since households with the same wealth will act in the same way no matter what their birth date, we drop the \( s \) notation. It is easy to show that households of all ages will choose the same labor supply, given implicitly by

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2 The empirical evidence for wealth effects in labor supply is very meager (see Pencavel, 1986, for a survey). Thus, there is an argument against basing aggregate macro-economic analysis on the strength of these.

3 For the choice problem of the individual to be well defined, it is necessary that \( \kappa/(1-\rho) < 1 \).
An increase in labor supply by one unit has a cost in terms of consumption goods of \( g_1 \). The benefit is comprised of (a) the real wage obtained, \( w_t \), and (b), the increase in the stock of future work experience, which reduces the utility cost of supplying labor in the future. The term \( \psi(t) \) captures this second benefit (shadow value). Eq. (4) indicates that the shadow value of work experience is the interest-discounted sum of next period marginal utility benefit, plus the next period’s discounted shadow value. Eqs. (3) and (4) then imply that labor supply is a forward looking variable, positively related to the real wage, and negatively related to the real interest rate.

Optimal consumption is given by

\[
c_t = (1 - \beta_\gamma)
\left( \frac{1}{\gamma} A_t + h_t \right),
\]

where \( h_t \) is the labor-supply adjusted present value of disposable wage income, or a measure of the capitalized value of human capital to the individual.\(^4\)

By following the aggregation steps outlined in Blanchard (1985), we can show that, in the aggregate the dynamics of consumption and wealth in this economy will obey the following relationship:

\[
C_{t+1} = (1 + r_{t+1}) \beta C_t - \frac{(1 - \gamma)}{\gamma} (1 - \beta_\gamma) A_{t+1} (1 + r_{t+1}),
\]

\[
A_{t+1} = (1 + r_t) A_t + w_t l_t - g(l_t, L_t) - C_t - T_t.
\]

1.2. Firms

Firms act as competitive profit maximizers. If the production function for any firm is a constant returns to scale function \( F(k_t, l_t) \), then this implies that the equilibrium return to capital is \( F_1 \), and the equilibrium wage \( F_2 \).

1.3. Government

Assume that government is an infinitely lived institution which can borrow at the market interest rate. Then the government must satisfy a budget constraint given by

\[
B_{t+1} + T_t = G_t + (1 + r_t) B_t,
\]

\(\text{That is,}\)

\[
h_t = \sum_{j=0}^{\infty} \Gamma(t, \bar{t})(w_{t+i} l_t - g(l_{t+i}) - T_{t+i}), \quad \text{where} \quad \Gamma(t, \bar{t}) = \prod_{i=0}^{\infty} \frac{1}{1 + r_{t+i+1}}.
\]
where $B_t$ represents the market value of government debt, and $G_t$ represents government spending. By assumption, government spending has no direct utility value or value in production. This is obviously untrue in a literal sense. However, a way to rationalize our methodology is to conjecture that the various possible benefits of government spending don’t directly interact with the mechanism discussed in this paper. In a sense, we could think of the present analysis as quantifying the efficiency costs of government spending. Against these costs would have to be set the benefits.

1.4. General equilibrium

The economy must satisfy an aggregate resource constraint, given by

$$C_t + g(l_t, L_t) + K_{t+1} - (1 - \delta)K_t + G_t = F(K_t, l_t),$$

(9)

where $\delta$ represents the depreciation rate, so that $K_{t+1} - (1 - \delta)K_t$ is aggregate net investment. In addition, labor market clearing requires that

$$g_1(l_t, L_t) = F_2(K_t, l_t) + \kappa \psi_t,$$

(10)

where $\psi_t$ is determined by Eq. (4).

Finally, a competitive equilibrium for this economy must imply that total private sector wealth adds up to the sum of government debt plus the aggregate capital stock.

Putting all the pieces together then, we may describe the evolution of the economy implicitly by the dynamic system

$$C_{t+1} = (1 - \delta + F_1(K_{t+1}, l_{t+1}))(\beta C_t - \phi(B_{t+1} + K_{t+1})), $$

(11)

$$K_{t+1} = F(K_t, l_t) + g(l_t, L_t) + (1 - \delta)K_t - C_t - G_t,$$

(12)

$$B_{t+1} = (1 - \delta + F_1(K_t, l_t))B_t + G_t - T_t,$$

(13)

$$L_{t+1} = \rho L_t + \kappa l_t,$$

(14)

$$g_1(l(t), L(t)) = w_t + \kappa \psi_t,$$

(15)

$$\psi_t = \frac{1}{1 + r_{t+1}}(-g_2(l_{t+1}, L_{t+1}) + \rho \psi_{t+1}),$$

(16)

where $\phi = ((1 - \gamma)/\gamma)(1 - \beta \gamma)$. The steady state of this system can be solved implicitly for the five values of $C_t$, $K_t$, $l_t$, $L_t$, and $\psi_t$.

Most of the results will come from the analysis of the steady state of this dynamic system, and a similar one an economy with real wage induced unemployment, and for a small open economy. We have not allowed for economic growth within the model. But if we think of the growth rate as exogenous, as the neoclassical growth
model, the system is equivalent to stationary induced transformation along the
growth path.  
For the government’s policy to be well defined, it must be the case that govern-
ment tax and expenditure instruments are such that the government debt does not
grow asymptotically faster than the interest rate. But for a steady state to exist in this
economy, it is also necessary that the the ratio of government debt to GDP be con-
stant. Because there is no long term growth in the model, this requires that govern-
ment debt converge to a constant number. Thus, we focus on tax and expenditure
policies that are consistent with a constant long run stock of government debt rela-
tive to GDP.

2. Steady state effects of fiscal policies

2.1. Theoretical analysis

How do government spending policies affect output, employment and the capital
stock in steady state? Of course, because this economy does not satisfy Ricardian
equivalence, the method of financing government spending will be important for
its real effects. For instance, it must be the case that, beginning at any time period,
a permanent fall in government spending must eventually imply a permanent fall in
taxation, in a new steady state. But the magnitude of the steady state reduction in
taxes depends on whether taxes are cut immediately, holding government debt con-
stant, or taxes are cut only gradually, so that government debt falls in the transition.
To highlight the specific impact of government spending policies, we initially focus
on the case where taxes fall by the full amount of any government spending cut. This
gives a lower bound on the ‘crowding in’ effects of government spending, since any
delay in tax cuts will only generate a lower steady state public debt to GDP ratio,
which implies a higher capital stock in this model. Thus, we first look at the impact
of balanced budget fiscal contractions.

Assume that government spending, taxes and government debt converge to
constant time invariant values. Then the stock of work experience $L$ will converge
to

$$L = \frac{k\bar{l}}{(1 - \rho)}.$$  
Furthermore, from (15), we have

$$\bar{\psi} = -\frac{1}{1 + \bar{r} - \rho} g_2(\bar{I}, \bar{L}).$$

5 In order to allow for sustained growth, it is necessary to interpret the $g(l, L)$ function as a home
production function for leisure. The technological expansion that affects productivity of market
production will also have to improve home production, or raise the disutility of working, in order that
the supply of hours worked not increase without bound with continued growth.
Using these in the labor market clearing equation (14), we arrive at

$$g_1(\bar{l}, \bar{l}) = F_2(\bar{K}, \bar{l}) - \kappa \frac{1}{1 + \rho} g_2(\bar{l}, \bar{l}).$$

This equation can be implicitly solved for steady state employment $\bar{l}$, as a function of the steady state capital stock $\bar{K}$, i.e. $\bar{l}(\bar{K})$. Moreover, with the assumptions made above regarding the form of the $g(\cdot, \cdot)$ function, it must be that $\bar{l}'(\bar{K}) > 0$.

Then the steady state of the sub-system (10)–(12) may be written as

$$\bar{C}(\beta(1 - \delta + F_1(\bar{K}, \bar{l}(\bar{K})) - 1)) = (1 - \delta + F_1(\bar{K}, \bar{l}(\bar{K})) \phi(\bar{B} + \bar{K})), \quad (10')$$

$$\bar{K} = F(\bar{K}, \bar{l}(\bar{K})) + g \left( \bar{l}(\bar{K}), \kappa \frac{\bar{l}(\bar{K})}{1 - \rho} \right) + (1 - \delta)\bar{K} - \bar{C} - G, \quad (11')$$

$$\bar{B}(F_1(\bar{K}, \bar{l}(\bar{K})) - \delta) = T - G. \quad (12')$$

Fig. 1 illustrates the interaction of (10$'$) and (11$'$), holding government debt constant (a steady state requires that $\beta(1 - \delta + F_2) > 1$). The CC curve describes (10$'$), while the KK curve represents (11$'$).  

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6 The slope of the CC curve is

$$\frac{dC}{dK} = \frac{\phi - \beta \bar{C}(F_{22} + F_{12}\bar{r}(\cdot))}{\beta(1 - \delta + F_2) - 1}.$$

It is easy to show that this must be positive. Note that Blanchard (1985) analyzes a similar diagram, but without endogenous labor supply, and does not investigate the impact of government spending policies directly.
A balanced budget fall in government spending shifts the KK curve, which is the economy’s resource constraint, upwards. This will raise the steady state capital stock, and reduce the steady state interest rate. By Eq. (9), aggregate employment must also rise. Thus, for a balanced budget reduction in government spending, the long run effect on output is positive.

The contrast with the results of the neoclassical model of fiscal policy as described by Barro (1987) arises from the absence of effective intergenerational linkages in this economy. The curve DD in Fig. 1 describes the relationship between optimal consumption and the capital stock in an economy with infinite horizon consumers (or full altruism in Barro’s sense). Since DD is vertical there is no steady state relationship between government spending and the capital stock or output.

The impact of government spending is due to the savings motive of individual cohorts in this economy. Because new generations receive no bequests, they must be savers if they are to acquire the rights to the economy’s wealth. A government spending contraction leads to a rise in private sector wealth. Each generation responds with a rise in future consumption greater than the rise in current consumption. As a result, the potential excess supply in the present has to be eliminated by a fall in the interest rate. This will stimulate new investment. A new steady state must therefore imply a lower interest rate and a higher capital stock.

2.2. Quantitative analysis

While the theoretical mechanism for government spending contractions to stimulate output and investment is clear, it is not obvious at first glance how important this effect is, from a quantitative perspective. We now investigate this. First, we provide a steady state analysis, under calibration assumptions made below. In the next section, we will describe the dynamic impact of permanent and temporary government spending shocks.

The model is calibrated in the following way (Table 1 summarizes the calibrated parameters). We let the production technology be Cobb–Douglas. Thus \( F(K, L) = AK^aL^{1-a} \). \( a \) is set at 0.36, Prescott’s (1986) estimate of the share of capital in GNP for the US economy. The depreciation rate is set at an annual value of 10% annually.

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<td>Calibration of benchmark economy</td>
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We also assume that
\[ g(l, L) = \frac{1}{1 + \psi} (l - L)^{1+\psi}. \]
In this case \( \psi^{-1} \) represents the conventional elasticity of labor supply. This elasticity plays a major role in the quantitative results. As a benchmark, we follow Christiano et al. (1997) in setting \( \psi = 1 \), for a unit elasticity of labor supply. 7

The parameters of habit persistence in labor supply do not have any clear observable counterparts. However, Eichenbaum et al. (1988) estimate the degree of habit persistence in leisure. Although their specification of preferences differ somewhat from ours, their equivalent parameter estimates would imply that \( \kappa = 0.02 \) and \( \rho \) in excess of 0.9. We follow these estimates approximately, setting \( \kappa = 0.02 \) and \( \rho = 0.9 \). 8

The other critical parameter for the results is \( \gamma \), the survival probability. The best way to think about this is that it measures the planning horizon of the individual; \( \gamma/(1 - \gamma) \). We follow the assumption used in the overlapping generations study of Auerbach and Kotlikoff (1987), where agents have certain time of death, the planning horizon is set at 40 years. This implies a value of \( \gamma \) set at 0.976.

The time preference factor is set so as to determine a steady state real interest rate of 6% per annum. This will involve a different value of \( \beta \), for different assumptions about the steady state debt ratio and the elasticity of labor supply. We let the share of government spending in GDP be 0.2, which is a conventional estimate of the share of government consumption for the US and Canada. Pinning down a steady state value for the ratio of government debt to GDP is more difficult, since this ratio has not been constant in most countries through recent time series. We just take an average value of 0.5.

Figs. 2–6 present the results of steady state increases in government spending on GDP, consumption, labor supply, and the real interest rate. For this experiment, we examine the impact of a rise in government spending from 20% of GDP to 30% of GDP. The results are obtained by numerically solving the system (11)–(15), under the functional form and calibration assumptions set out above. From Fig. 2(a), we see that a rise in government spending from 20% to 30% of GDP causes a fall in GDP of about 5.5%. The other panels in Fig. 2 illustrate the mechanism by which government spending changes affect the economy in this model. The direct government spending increase implies a crowding out effect on private consumption. Consumption falls by 20%. Fig. 2(d) shows that the real interest rate rises by 1% point from 6% to 7%, annually. This generates a fall in investment and the capital stock. As a result, labor supply falls, although by a relatively small 1%. But the fall in labor supply acts to reduce the productivity of investment. This has a critical impact on the overall burden of the fiscal expansion, as we show below.

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7 Hercowitz and Sampson (1991), using a very similar model of labor supply, estimate \( \psi \) using US aggregate data. They find an \( \psi \) equal to 0.38, which is significant at the 5% level. This implies a much higher elasticity. Elasticities of this magnitude would imply an even greater response of output to government spending cuts.
8 The results are not sensitive even to wide variations in the parameters of the work experience equation.
Fig. 2(e) illustrates the same information as in Fig. 2(a), but in a different way. It shows the value of the government spending multiplier at every level of the government spending to GDP share. It is apparent that the government spending multiplier is negative, and in absolute terms, grows larger, the higher is the share of government spending in GDP. The relationship between government spending and output in this model is distinctly non-linear. For a government spending to GDP share of 30%, the marginal effect of government spending on GDP; i.e. the multiplier, is in fact less than $-1$. Thus, the contractionary impact of government spending grows much larger, the higher is the spending share in GDP.

Fig. 2 establishes the possibility that government spending contractions may have significant positive effects on output, consumption, and employment. Thus, in terms
of comparative steady state analysis, there exists a mechanism for 'expansionary fiscal contraction'. What are the important quantitative factors leading to these results? As discussed above, the two key ingredients behind the results are endogenous labor supply, and a finite planning horizon. We may separate these ingredients. Fig. 3 shows the effect of the same government spending change with a zero elasticity of labor supply ($\psi \to \infty$). Qualitatively, the results are similar: GDP falls, consumption falls, and the interest rate rises. But the magnitude of the effects is much less. GDP falls by only 1%. Consumption falls by less than in the previous case, and the real interest rate rises by only about one fifth of a percentage point. Fig. 2 therefore makes clear that the response of labor supply is a critical factor in generating negative government spending multipliers.

Fig. 4 shows the case where the time horizon is infinite. As is clear from the intuition behind Fig. 1, here there is no impact at all on GDP, labor supply, or the real
Fig. 4. Steady state effects of government spending: Infinite horizon model.

Fig. 5. Steady state effects of government spending: Neoclassical model.
interest rate. Government spending changes are fully offset by equal and offsetting movements in private consumption. Thus, in this model, a finite planning horizon is an absolute necessity to explain negative output effects of government spending.

How important is the absence of wealth effects on labor supply? The standard neoclassical analysis of fiscal policy (e.g. Aiyagari et al.), stress these linkages. A specification where labor supply depends on wealth is not nested within the model set out above. But it is easy to amend the model to allow for this dependence. Fig. 5 illustrates the results of the same government spending policy change in the alternative model, where labor supply depends on wealth. The results are entirely different in this framework. Government spending still reduces consumption, but the negative income effects of the fall in consumption lead to a significant increase in labor supply. The increase in labor supply increases GDP. The real interest rate is essentially unchanged.

It is important to note that the basic mechanism linking government spending and savings is still present in this alternative specification. A government spending increase will tend to reduce current consumption less than future consumption, among currently alive generations. This will tend to generate an excess demand for current output, raise the interest rate, and reduce investment and output. But the numerical results indicate that, for any reasonably calibrated model of labor supply in the

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9 In this model, we assume individual preferences are given by $\log C + \eta \log(1 - l)$ and $\eta$ is set so that the fraction of total hours that are spent at work is 0.3.
presence of income effects, the direct positive labor supply response will always dominate the negative savings response, so that overall, GDP will rise.  

So far, we have looked simply at balanced budget changes in government spending. But in many instances, fiscal contraction is carried out in order to achieve public sector debt reduction. If government spending falls without offsetting tax cuts, then public debt will fall. How much would this change our results? If government spending is cut first, and tax cuts take place only after some delay, then the public debt will be lower in a new steady state. Quantitatively, however, we find that this effect is very small. In the benchmark model, a cut in the public debt ratio from 40% of GDP to zero will increase output, but only by about 0.2 of 1% point. Thus, the possibility for expansionary effects of fiscal contraction in this model are tied to the direct effects of spending reductions, and not the indirect impacts through lower public debt.

Finally, Fig. 6 looks again at the benchmark case, except now assuming that instead of lump-sum taxation, government spending is financed via an income tax. Now an increase in government spending has to combined effects of the savings linkage described above and the negative incentive effects on labor supply and investment through a rise in the income tax. Clearly, the government spending multipliers are much more negative than before.

3. Dynamic effects of contractionary government spending

While we have established the set of circumstances under which a permanent government spending cut can be expansionary, in a steady state, a question of equal interest is the dynamic response of the economy to a cutback in the size of government. Can a program of fiscal spending reductions generate an economic boom? In this section, we focus on the dynamic effects of government spending shocks. This is done by taking a linear approximation around a steady state for the system (10)–(12) and solving using a standard linear rational expectations solution technique (e.g. King et al., 1988). Parameters are based on the calibration of the last section.

Fig. 7 illustrates the impact of a previously unanticipated, permanent cut in government spending which is matched by a reduction in taxes, leaving the debt to GDP ratio unchanged. 11 Time is measured in quarters. We know from the previous section that the long run government spending multiplier, evaluated at a government spending ratio of 20%, is approximately –0.45.

10 This is the key mechanism that differentiates our analysis from some previous studies of fiscal spending policies in overlapping generations models. For instance, Auerbach and Kotlikoff (1987) show that government spending may crowd out long run capital accumulation (chapter 6, p. 99). But their result is due to the impact of government spending increases that are financed with distortionary taxation. In the case where government spending is financed by a consumption tax (the least distortional of their taxes), they show (chapter 6, p. 100) that a government spending increase raises the long run capital stock and employment. The difference between their paper and ours, apart from the fact that they use a more standard Samuelson type overlapping generations model, is that their specification of preferences (chapter 3, p. 30) involves income/wealth effects on labor supply, so imply results that are more analogous to Fig. 5 than Fig. 2.

11 Since output rises here, this experiment involves an increase in the stock of government debt.
The dynamics can be described in light of the discussion of the previous section. At the time of the spending cut, current consumption rises by less than the fall in public sector spending. This precipitates a fall in the real interest rate. Labor supply immediately rises, given the intertemporal labor supply schedule (3). The combination of the fall in the real interest rate and the rise in employment causes an increase in the net return to investment, so that investment and the capital stock rise. Thus, a government spending reduction causes an immediate jump in output, followed by a more protracted rise over time as capital accumulation continues. Note that the rise in output takes place very gradually. The initial increase in GDP is very small compared to the permanent effect. Thus, the model does not lend support to the view that a large fiscal contraction can generate an immediate ‘boom’ in the real economy.

If the initial government spending ratio was higher, then the response of output in Fig. 7 would be higher, both in the immediate aftermath of the shock, and the long run. The picture of an ‘expansionary fiscal contraction’ described by Fig. 7 is quite in contrast to the standard neoclassical impact of fiscal policy. In the standard model (e.g. Aiyagari et al.), where wealth effects of fiscal policy shocks on labor supply are central, the impact of a spending reduction will be to reduce GDP, and labor supply. Thus, the standard neoclassical model cannot account either qualitatively or quantitatively for an ‘expansionary fiscal contraction’.

Fig. 8 illustrates the impact of a temporary cut in government spending, in the benchmark model. We let the government spending shock decay geometrically with a root of 0.85. There are two noteworthy things about the figure. First, the short run impact on output is significantly greater than for the case of a permanent spending
cut. Secondly, the maximum impact on output is over twice the magnitude of that in the permanent spending cut. Output immediately rises, as the real interest rate falls, and labor supply is stimulated. Output then progressively increases, to a peak that is over twice that of the long run multiplier in the case of a permanent shock.

The explanation for this result lies in the importance of intertemporal substitution in consumption and in labor supply. The temporary fall in government spending leads to a temporary fall in real interest rates. This leads to a temporary increase in consumption and labor supply, and a rise in investment which exceeds the response to a permanent government spending change. Agents exploit the period of low interest rates to invest and consume a lot. It is interesting that the role of intertemporal substitution in this economy accords with the Barro (1987) argument that temporary changes in government purchases should have greater effects on output than permanent changes. But the direction of the effect is the negative of that predicted in Barro.

4. Unemployment

So far, our analysis ignores any possible role for economic policy in affecting capacity utilization or unemployment. The results pertain to an economy with fully employed labor and capital. In an economy with unemployment, it might be thought that fiscal spending reductions would exacerbate the unemployment problem. In this section, we address this question by extending the model to allow for unemployment.

We assume that there is a rigid real wage set above the labor market clearing level. This might be explained by trade union power, relative wage effects, or efficiency...
wage considerations. In any case, let this wage be \( \bar{w} \). We also assume that employment is determined by the employers' side of the labor market. Thus, in this economy there is unemployment equal to the difference between the demand for labor and the supply of labor at the sticky real wage.

It is straightforward to extend the analysis of Section 2 to allow for a fixed real wage and unemployment. From the firms profit maximization, employment is determined by

\[
F_2(K, L) = \bar{w}.
\]

The problem of the household now differs in that hours worked is taken as given, at the level that firms demand. Nevertheless, the Euler equation (11) still applies at the aggregate level, so long as capital markets are still operative and households can choose an optimal path of consumption.

The analogue to Eq. (12) in the case of unemployment may be written as

\[
K_{t+1} = F(K_t, L(\bar{w}, K_t)) - g(L(\bar{w}, K_t)) + (1 - \delta)K_t - C_t - G_t.
\]

If we take \( \bar{w} \) as fixed over a long time period, then we may define a fixed wage steady state with unemployment as determined by Eqs. (10'), (12'), and

\[
K = F(K, L(\bar{w}, K)) - g(L(\bar{w}, K)) - (1 - \delta)K - C - G.
\]

Again, this represents an upward sloping schedule in \( C, K \) space, as illustrated in Fig. 1. For a fixed wage, the unemployment rate can be altered only by changes in the aggregate capital stock. An increase in the capital stock will increase the demand for labor and reduce aggregate unemployment.

What is the impact of a contractionary fiscal policy in the economy with a fixed real wage? It is clear from the above equation that a balanced budget reduction in \( G \), leaving the overall debt ratio unchanged, will shift the \( KK \) curve upwards. The new steady state equilibrium will exhibit a higher capital stock, and, a fortiori, a lower unemployment rate.

Thus, even in an economy with a fixed real wage and unemployment, government spending tends to reduce GDP and \textit{raise} unemployment. The key effect of government spending in this economy, even with unemployment, is the impact on saving and capital accumulation. Since household saving behaviour is unaffected by the presence of unemployment, the qualitative affects of a government contraction remain the same.

An interesting implication of this case is that the magnitude of the impact of a fiscal contraction does not depend on the size of the labor supply elasticity, since by assumption labor supply is given by the horizontally sloped real wage curve. Thus, the model predicts that the fiscal spending multiplier is likely to be very large in absolute terms when there is a fixed wage. Rather than mitigate the presence of 'expansionary fiscal contraction', real wage constrained unemployment actually \textit{enhances} it.

5. The open economy

So far we have discussed policy within the context of a closed economy, where the real interest rate was set by domestic capital market clearing. Since the results are
clearly dependent upon the movement in the interest rate and capital accumulation following a fiscal policy contraction, it is important to see how they might be generalized to an open economy setting.

Take a small open economy model. If the interest rate is set in the rest of the world, GDP will be independent of domestic economic policy. This will be the case even in the event of a fixed real wage. GNP however, is determined by domestic fiscal policy to the extent that it affects the steady state level of external debt. In the case of a small open economy, we may describe the dynamic equations describing aggregate consumption and debt accumulation as (see Blanchard, 1985)

\[
C_{t+1} = (1 + r)(\beta C_t - \phi A_{t+1}),
\]

\[
A_{t+1} = (1 + r)A_t + Y_t - g(l_t) - C_t - T_t.
\]

(16) (17)

Here \(A_t\) represents private wealth, and can be defined as

\[A_t = B_t + K_t + F_t,\]

where \(F_t\) represents net foreign assets.

The public sector budget constraint is again as in (7). Substituting into (17) gives

\[F_{t+1} + K_{t+1} = (1 + r)(F_t + K_t) + Y_t - g(l_t) - C_t - G_t.\]

(18)

In a steady state Eqs. (16) and (18) give two equations that determine \(F_t\) and \(C_t\). It is easy to see that two case can arise. If \((1 + r)\beta > 1\), and net national wealth \(K + F\), is positive. Then each new generation of individuals are still net savers, as in the analysis before. A balanced budget fiscal contraction will then reduce total demand, increase national saving, and raise steady state net foreign assets. Although GDP will remain unchanged, GNP will rise. Thus, national income increases, similar to the results above.

If, on the other hand, \((1 + r)\beta < 1\), steady state net national wealth is negative. The value of the economy’s external debt exceeds the value of its total capital stock. In this case, a balanced budget fiscal contraction will reduce the stock of foreign assets, and reduce GNP. Intuitively, when \((1 + r)\beta < 1\), each newly born cohort in this economy are dissavers. Then, a government spending contraction which raises disposable income will lead to a rise in current consumption by more than future consumption, for a member of any cohort. Thus, at any moment in time, a greater volume of foreign borrowing is being done by national residents.

6. Empirical implications

Our model is very stylized. It cannot easily be applied in its entirety towards any particular fiscal policy consolidation in the historical record. Nevertheless, some key attributes of the model do seem to accord with the episodes of dramatic fiscal stabilization in Ireland and Denmark documented by Giavazzi and Pagano (1990). In both cases government deficits were cut abruptly and a boom in consumption, investment and GDP followed, as shown in Table 2.
Domestic interest rates also fell significantly in response to the contraction. In Denmark the year before the contraction the nominal long-term interest rate was 21% and the ex-post real rate 10%; the year after the contraction these had declined to 14% and 8% respectively. In Ireland the equivalent declines were from 11 down to 9% for the nominal rate and from 7% down to 5% for the real rate.

These features are consistent with the broad implications of our model, which provides theoretical support for the “German view” of fiscal policy as described by Fels and Froehlich (1986).

An important finding concerns the non-linearity of these positive effects of fiscal contraction, as seen in Fig. 2(e). We have seen that the effects are particularly strong when the share of government expenditure in GDP is high. At lower ratios the effects identified here may well be dominated by factors operating in the conventional direction which have been left absent from the present model.

One shortcoming in the model’s ability to track these real-world events remains, in that the output gains predicted by the model accrue only very gradually. This leads us to reiterate the point made in Barry and Devereux (1995) and Alesina and Ardagna (1998) that concurrent improvements in cost competitiveness through wage moderation appear to be the sine qua non for fiscal contractions to have immediate beneficial output effects.

7. Conclusions

We have examined in some detail the implications of a rather standard general equilibrium model for the impact of contractionary fiscal policy. We find that the model in many cases does indeed predict that in terms of aggregate national income, a fiscal contraction is expansionary. But the magnitude of this effect is open

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Table 2
Fiscal stabilization in Ireland and Denmark

<table>
<thead>
<tr>
<th></th>
<th>Pre-stabilization period 1979–82</th>
<th>Stabilization period 1983–86</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Denmark</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net government borrowing (% of GDP)</td>
<td>5.3</td>
<td>2.5</td>
</tr>
<tr>
<td>Average real consumption growth</td>
<td>−0.8</td>
<td>4.2</td>
</tr>
<tr>
<td>Average real investment growth</td>
<td>−6.3</td>
<td>11.1</td>
</tr>
<tr>
<td>Average real GDP growth</td>
<td>1.3</td>
<td>3.7</td>
</tr>
<tr>
<td><strong>Ireland</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net government borrowing (% of GDP)</td>
<td>10.4</td>
<td>4.2</td>
</tr>
<tr>
<td>Average real consumption growth</td>
<td>2.6</td>
<td>3.8</td>
</tr>
<tr>
<td>Average real investment growth</td>
<td>−4.9</td>
<td>5.3</td>
</tr>
<tr>
<td>Average real GDP growth</td>
<td>1.9</td>
<td>5.7</td>
</tr>
</tbody>
</table>

Source: European economy (statistical appendix).

12 Giavazzi et al. (2000) empirically investigate such non-linear effects.
to question, depending crucially upon the size of the labor supply elasticity. In addition, for permanent fiscal contraction, the positive impact on the economy is felt only over a considerable time. This does not strictly accord with the view that credible budget cutting generates an immediate consumption-led boom.

We also find that even in an economy where there is inefficient unemployment, a fiscal contraction would still be expansionary. In the case of the open economy we found that the impact of contractionary fiscal spending on GNP depends on the net asset position of the economy.

An important caveat that should be mentioned yet again is that we have not examined or allowed for any of the standard roles for government policy, such as the provision of public goods, or public investment. In addition, recent results from general equilibrium models with imperfect competition allow for a positive role for fiscal policy. These factors should be included before any definitive conclusions could be drawn from the analysis above.

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