A Scandinavian "high-tax, high-spend" model for regions?

The impact of enhanced regional fiscal autonomy. *

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Abstract

The fiscal powers of the Scottish Government have increased significantly, resulting in the first (modest) regional differences in income tax rates within the UK. In fact, the current degree of fiscal autonomy would permit a radical shift towards a high-tax, high-spend "Scandinavian model". We find that the impact of such a change on the Scottish economy is likely to be positive only if the public value the increased public spending and are willing, and able, to accept a corresponding reduction in their take home pay. We conclude that the current bargaining system is unlikely to deliver such an outcome.

1. Introduction and background

As a consequence of the Scotland Acts of 2012 and 2016 the fiscal powers of the Scottish Government have increased significantly. It now has the authority to set income tax bands, rates and thresholds (but not personal allowances), and keeps all income tax receipts on wage income collected in Scotland. These changes make Scotland one of the most powerful devolved governments in Europe in terms of the proportion of public spending and tax revenues under its control (Bell and Eiser, 2014), and the Welsh and Northern Ireland Assemblies are also shortly to receive greater fiscal powers over income tax and corporation tax rates respectively. Furthermore, there is an increasing tendency towards regional fiscal autonomy in Europe and elsewhere, so that the tax and expenditure choices that the Scottish Government faces have considerable relevance to regions in Europe and the rest of the World, as well as to other regions within the UK.

This increase in fiscal autonomy would allow a radical change in the structure of the Scottish economy and the nature of Scottish society. However, while the Scottish Government's 2017 budget marked the first regional differentiation of income taxation within the UK the changes were very modest (Scottish Government, 2017). It seems likely that pressure will grow on the Scottish Government (and, in due course, other regional authorities) to pursue a more regionally differentiated income tax policy, as it seeks to maintain its generous benefits provision and other policy initiatives against the background of continuing austerity at the UK level, exacerbated by leaving the EU.

The "Scandinavian model" has often been held up as one that Scotland, if it had the necessary fiscal powers, might wish to emulate, although the emphasis has typically been on the high level (and quality) of public services rather than the associated high level of taxation that such a model implies. The Scottish Government currently has tax powers that would allow it to raise average income tax rates to Scandinavian levels and use those revenues to increase substantially public spending.[1] This paper explores the likely consequences of such a shift to a "high tax, high spend" policy for the host regional economy and society, following a brief account of key characteristics of the Scandinavian model.[2]

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[1] Even the income tax powers devolved in April 2016, as a consequence of the Scotland Act 2012, allowed this although until recently successive Scottish Governments chose not to exercise their discretionary tax powers.

[2] Because borrowing powers remain limited, we focus on balanced-budget adjustments. Although there has been little public pressure to adopt a low tax, low spend "Baltic model", we briefly consider this within our theoretical and empirical analyses.

Table 1 gives the average personal tax payments as a share of labour costs for the UK and the Scandinavian economies, Denmark, Finland, Norway and Sweden. These proportions have been relatively stable over time. Taking 2013 as our reference year, the Scandinavian personal tax revenue was 38% of average wages, 7.4 percentage points higher than the UK figure of 31.4%.[3] As Keating and Harvey (2014) suggest, the state plays a larger role in these Scandinavian economies than in the UK[4].

Table 1. Average personal income taxes as a percentage of labour costs, 2008-2017

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Denmark	38.9	37.6	36.4	36.6	36.7	36.4	36.3	36.4	36.4	36.3
Finland	43.8	42.5	42.3	42.4	42.5	43.1	43.6	43.5	44.1	42.9
Iceland	30.9	30.5	33.4	34.1	33.8	34.1	33.9	34.3	34.0	33.2
Norway	37.6	37.3	37.3	37.6	37.4	37.4	36.9	36.8	36.3	35.9
Sweden	44.8	43.2	42.8	42.8	42.9	43.0	42.5	42.6	42.8	42.9
United Kingdom	32.8	32.4	32.6	32.5	32.1	31.4	31.0	30.8	30.9	30.9

Source: OECD (2018)

Apart from having higher tax and spending levels, the Scandinavian economies also exhibit important institutional differences from the UK. These are crucial to the way in which these states operate. For example, the Scandinavian economies operate a "tripartite bargaining" system of national wage negotiations which include workers' unions, employers' associations and the government. This is an annual bargaining cycle which is believed to reduce tensions in these negotiations that are commonly observed in other European economies, such as Germany (Keating & Harvey, 2014). A second institutional difference is the principle of "universalism" in which even the middle-class is included in the benefit system, ensuring the maintenance of social solidarity, which allows the system to thrive (Keating & Harvey, 2014).[5]

Acemoglu *et al* (2012) maintains that the success of the Scandinavian model represents "cuddly capitalism" free riding on the ability of "cutthroat capitalism" (such as that in the US) to push out the World's technology frontier. Barth *et al* (2014) argues that the success of the

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[3] The analysis is not sensitive to the choice of reference year given the relative constancy of the tax wedges.

[4] In Scandinavia, social security contributions are also a significantly larger percentage of GDP (10.9% compared to 6.4%) as, generally, are both direct and indirect taxes. For example, the VAT rate was 24.8%, as compared to 20% for the UK in the same year, 2013.

[5] The principle was also upheld in economic crises, including the recent financial crisis of 2008. During those periods, the Scandinavian economies continued to pursue their 'social investment state' rather than austerity. However, prolonged downturns put a strain on the system, which relies on near full-employment levels to allow for its inclusive social solidarity system (Keating & Harvey, 2014).

Scandinavian economies in delivering economic growth, high productivity, low wage dispersion and a big welfare state rests on what is, in effect, a two-level wage-bargaining system. A local system supplements the national system described above and strong unions both suppress wage dispersion and enhance local productivity.

It is clear that there is more to emulating the "Scandinavian model" than simply raising income taxes to Scandinavian levels and using the resultant revenues to increase current government spending; institutional differences are also central. The analysis that follows focusses particularly on the valuation of government expenditures and the nature of the wage bargaining process. It considers in detail the impact of the fiscal expansion under the Conventional Macroeconomic and Microeconomic approaches and compares this with an outcome in which a Social Wage is adopted.

Section 2 provides a brief analysis of the likely economic impact of the substantial balanced budget fiscal expansion that a move towards the Scandinavian model would require.[6] Section 3 outlines a Computable General Equilibrium (CGE) model for Scotland, which is used to explore the likely impact of emulating Scandinavian levels of income taxation and associated public expenditure. Section 4 presents the results and Section 5 concludes.

2. The macroeconomic impact of a shift towards the Scandinavian Model

What would be the likely consequences of a regional government moving towards the Scandinavian model by significantly raising the average tax rate and recycling the revenues to expand current government expenditure? The answer proves to depend crucially on the value placed on the enhanced public services and the reaction of wage bargainers. For simplicity, we assume that the increase in government expenditure per se has no immediate supply-side impact beyond creating a local amenity.[7]

We adopt the open-economy model of the region of Lecca et al (2014), which builds upon the disaggregated analysis of Layard *et al.* (1991, Ch. 6), with imperfect competition in the regional labour market. Here we focus on a comparative-static long-run analysis where equilibrium implies that both the regional capital stock and population are optimally adjusted. Long-run equilibria are therefore characterised by zero net investment and zero net migration.

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[6] Borrowing powers remain limited and so we focus here on a balanced budget adjustment.
[7] This assumption rules out the potential productivity-enhancing effects of increased spending in areas such as education and health that authors such as Barth et al (2014) would emphasise, an issue we return to below.

In this framework equilibrium is determined by the interaction of two relationships between the regional employment (unemployment) rate and the real consumption wage: the zero net migration condition and the bargaining function (wage curve). Following Layard et al (1991), and many other authors, net in-migration is positively related to real wage and employment rates in the host region, relative to other regions. This function has its roots in the work of Harris and Todaro (1970) and has been widely employed elsewhere (e.g. Greenwood *et al,* 1991).[8] This relationship implies a set of values of the post-tax real consumption wage, w, and the employment rate, e, for which net migration is zero. This long-run equilibrium condition is given by:

$$w = (1-\tau)^{\beta} z(e) \qquad\qquad \beta \geq 0; 1 > \tau \geq 0;\ z_e, w_{\beta}, w_{\tau} \leq 0 \qquad\qquad (1)$$

where τ is the proportionate rate of income tax, so that $w = \dfrac{W(1-\tau)}{cpi}$, where W is the nominal wage and cpi the consumer price index.[9] The parameter β indicates the degree to which households value public, as against private, consumption.

Equation (1) is represented by the function ZNM_0 in Figure 1 and shows the negative relationship between the post-tax real wage and the employment rate across zero net migration (long-run) equilibria. That is to say, for zero net migration a low local wage, which deters net in-migration, must be offset by a high local employment rate, which attracts migrants. However, following Lecca et al (2014), the equation includes the term $(1-\tau)^{\beta}$ in an attempt to capture the effect of locally financed amenities on the migration decision.

Figure 1. The long-run impact of a balanced-budget fiscal expansion.

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[8] The specific form of the function used in our empirical analysis is given by equation (3) below.

[9] The long-run zero-net-migration condition implied by our empirical net migration equation, (3), is equation (4) below.
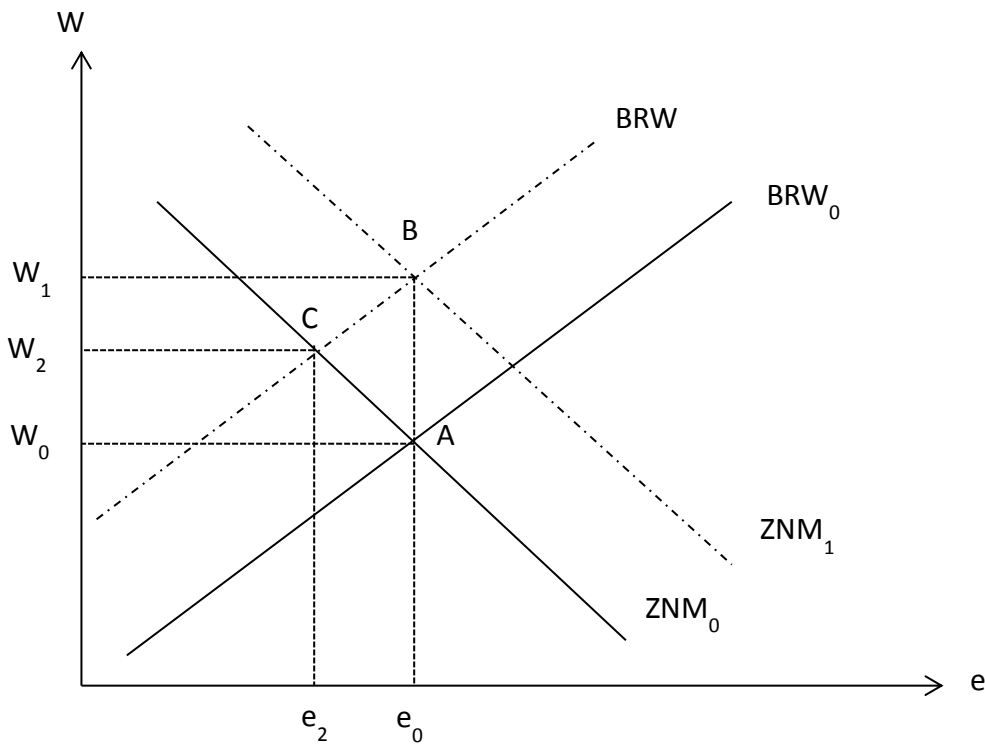
Where individuals attach no value to this amenity, so that β = 0, the term $(1-\tau)^{\beta}=1$ and the migration condition depends on the *post-tax* real consumption wage. This is the conventional net migration condition. However if, as is emphasised in the literature on fiscal federalism, there is a positive amenity effect, then β > 0, and the value of this parameter measures the potential migrant's relative marginal valuation of public expenditure versus private consumption. For a given employment rate, this implies that the larger the value of β, the lower the post-tax real consumption wage required to preclude net outmigration. When β = 1, the potential migrant is indifferent between marginal changes in local public expenditure and private consumption so that in this case the *pre-tax* real consumption wage drives migration.[10]

In this case, the first term on the RHS of (1) is equal to (1-τ), so that $\dfrac{w}{(1-\tau)}=\dfrac{W}{cpi}=z(e)$ Here

$\dfrac{W}{cpi}$, the *pre-tax* real consumption wage, governs the zero net migration condition.

On the other hand, through the regional real wage curve or bargained real wage function, BRW_0 in Figure 1, the real (post tax) consumption wage is positively (negatively) related to the regional employment (unemployment) rate (Layard *et al*, 1991):

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[10] That is to say, the individual is indifferent between £1 marginal private consumption and the public good implications of paying £1 more in tax.

$$w = (1 - \tau)^{\alpha\beta} b(e) \qquad\qquad b_e > 0, \ w_\alpha, w_\beta, w_\tau \leq 0, 0 \leq \alpha \leq 1 \qquad\qquad (2)$$

In this formulation of the regional bargaining function, the local amenity generated by the expenditure influences wage bargaining behaviour directly. The parameter α, which takes a value between 0 and 1, then reflects the extent to which the value of the amenity is taken into account in the wage bargaining process (Lecca et al, 2014).[11]

Where labour markets are competitive, since the amenity provision is exogenous to the individual worker it is ignored in the individual's work/leisure choice so that only the post-tax real consumption wage matters.[12] This corresponds to a situation where the value of α is zero. In this case the first term on the RHS of (2) becomes unity, and bargaining is over w, the post-tax real wage. However, in so far as local unions cover a significant section of the labour force and act co-operatively, the public good externality will be internalised. Given that the scale of the amenity is tied directly to income and therefore to the bargained wage, the value of α will rise above zero. For example, If α is unity the marginal valuation of the amenity is fully reflected in workers' bargaining behaviour. If α=β=1, the "social wage" case discussed subsequently in the text, $\dfrac{w}{1-\tau} = \dfrac{W}{cpi} = b(e)$. In this case bargaining focuses on the *pre-tax* wage; workers do not require to be compensated for a tax rise since they value the increased government expenditure equally to the loss of consumption.

We now consider the likely impact of a balanced budget fiscal expansion. In general, this generates two countervailing forces. One is a net stimulus to demand through the transfer of expenditure from private to less import-intensive public consumption. The second is a negative competitiveness effect if workers feel worse off after the tax increases and attempt to restore their real consumption wages through increased wage claims. The nature and scale of the competitiveness effect depends critically on migration and wage bargaining behaviour.

Figure 1 illustrates the initial long-run equilibrium of the regional economy, which is established at point A in employment rate - nominal wage space, where the initial bargained real wage curve, BRW_0, and zero net migration curve, ZNM_0, intersect.[13] We next consider the

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[11] The specific wage curve that we employ in our empirical analysis is equation (5) below.

[12] The labour supply decision could, of course, be influenced by the amenity if, for example, the amenity were complementary to leisure.

[13] In fact both relationships are formulated in terms of the real consumption wage. They are here transformed in nominal wage relationships so that we can clarify competitiveness effects.

impact of a balanced budget fiscal expansion under three alternative visions of regional labour markets that imply different values of the parameters α and β.

The Conventional Macro model

In the Conventional Macro model neither local residents nor potential migrants place any value on the increase in public consumption following the balanced budget expansion so that *α=β=0*, and the standard (neoclassical) specifications of the net migration and bargained real wage curves apply, with after tax real consumption wages governing both migration and bargaining decisions. This approach is embedded in many studies of net regional migration and of regional wage curves. In this case the ZNM function in Figure 1 shifts vertically upwards by the amount required to restore the real post tax wage. At any given employment rate the nominal wage has to rise by the amount required to offset the rise in the tax rate and the increase in the CPI to ensure zero net migration. The BRW function is shifted up vertically by exactly the same amount (since β = 0 in (2)), to maintain a given post tax real wage at any given employment rate. In the new long-run equilibrium, at point B in Figure 1, the real post-tax wage is restored to its original level, as is the employment (and unemployment) rate.

In this case workers bargain for a net of tax real wage, and there is upward pressure on wages and prices, which creates an adverse competitiveness effect, as workers seek to restore their real take home pay. The more open the economy, in terms of share of imports and responsiveness to relative price changes, the greater the adverse demand effects associated with the loss of competitiveness. Migration responds only to net of tax real wage and unemployment differentials in this case. Given a predominant adverse competitiveness effect, real post tax wages initially fall, unemployment rises and net out-migration occurs until real wage and unemployment rates are restored (at lower levels of population and employment).

The Conventional Micro Model

In microeconomic models of fiscal federalism (e.g. Tiebout, 1956), potential migrants value the increase in public services provided by the relevant authority and factor that into their migration decisions. This is the basis of the Conventional Micro model, in which we assume that migrants are motivated by their 'social wage', which we take to be unaffected by the balanced-budget fiscal expansion: migrants value the increased public spending equally to the foregone private wage as a result of the income tax increase so that β = 1. However, this

valuation is not reflected in regional wage bargaining so that $\alpha = 0$. In Figure 1, the BRW curve shifts vertically upwards by the same amount as under the Conventional Macro model, but in this case, since $\beta = 1$, the ZNM curve does not shift in response to the hike in taxes because migrants value the increased public spending as much as they do the loss of consumption, and so feel no worse off after the fiscal expansion. Long-run equilibrium occurs at point C where the nominal wage increases (but not sufficiently to restore the real wage), and the employment (unemployment) rate falls (rises). While the unemployment rate rises in this case, the extent of the adverse supply shock is less than under the Conventional Macroeconomic case, with nominal wages rising less, so that employment and GDP effects are improved and any induced net out-migration reduced.

The Social Wage

In the Social Wage case the increase in public consumption is valued equally to the loss in private consumption, and that valuation is fully reflected in the regional wage bargaining process so $\alpha = \beta = 1$. In terms of the long-run equilibrium in Figure 1, neither the ZNM nor the BRW curves are affected by the hike in taxes: both depend only on the pre-tax wage, and the long-run equilibrium of the nominal wage and employment rate is unaffected. This reflects the fact that workers value the increase in government consumption as much as their foregone private consumption, so that they feel as well-off after the change as they did before. Accordingly, workers do not push to restore their take-home wage following the policy change, and the adverse competitiveness effect is eliminated completely. In this case, therefore, the beneficial net demand stimulus associated with the fiscal expansion predominates, and output and employment expand, in a manner similar to that envisaged in the simple Keynesian balanced budget multiplier. However, the whole of the increase in tax (and induced effects on the cpi) is reflected in a significant reduction in the post-tax wage.[14]

What evidence do we have that relates to the likely values of α and β for Scotland? Note from the start that these parameters measure very different things. The β parameter reflects the population's preferences amongst public and private consumption, whilst α reflects the nature of the labour market and institutional architecture of the wage bargaining procedure. We begin by considering the preferences of the Scottish population relating to the level of government expenditure.

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[14] A shift towards the Baltic model can be illustrated using the same Figure. Starting at point B, the Conventional Macro model would result in a shift to point A; here there is a stimulus to competitiveness that operates against the net contraction in demand. The Social Wage case would result in the wage being held at W_1, preventing the gain in competitiveness so that the only impact would be the net contraction in demand.

First, it is clearly the case that in recent general elections the Scottish nation has voted in ways that differ markedly from the rest of the UK. Moreover, in the strong support for the Scottish National Party, the electorate is voting for a party with a clear, if rather muted, policy of fiscal expansion. Second, in the 2016 British Attitudes Survey (BSA), 62% of Scots were in favour of increasing taxes and spending. This was the highest of all regions of the UK and 12% above the UK average of 49%. This is a pattern which has remained fairly constant over the last twenty years (Dunatchick and Smith, 2018).

However, the view that the Scottish people would in practice favour a radical expansion in public expenditure needs to be tempered. For example, Bell and Eiser (2015) find no statistically significant difference for various indicators of political attitudes on a right-left scale between Scottish and RUK respondents to the British Social Attitudes survey. Furthermore, after the Scottish Independence Referendum in 2014, although the majority of those participating in an ESRC-commissioned surveys wanted greater devolution of fiscal powers to Scotland, only a minority favoured tax rates that differed from those in the RUK. This apparent contradiction may reduce to an issue over which Government – at Holyrood or Westminster - commands greater trust (Bell and Eiser, 2015). On average, respondents wanted to see lower taxes and higher welfare benefits, which would very probably violate the balanced budget constraint of the present analysis.

Evidence for an appropriate value for α is a bit more straightforward. The Social Wage case comes closest to reflecting the outcome of the centralized tripartite bargaining of the Scandinavian model.[15] Of course, there is no such system in Scotland, or any other UK region, presently and the shift would require the Government to take a much bigger role in the bargaining system as a whole than it currently possesses. Furthermore, in the UK (Scotland) only 26.1% (31.6%) of the workforce is unionized (Department of Business, Innovation and Skills, 2015), compared to 64% in Scandinavia in 2012.

However, trade union density is not uniform across sectors of the Scottish economy and is much higher in the public than in the private sector (with average rates of 60.8% and 14.0%

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[15] The SNP Government appear to hope for such a response to their draft budget plans: "Ms Sturgeon [the Scottish First Minister] argues that higher taxes for the wealthy cannot be considered in isolation. They gain, she says, from a "social contract" that rejects university tuition fees, provides "free" social care and much else besides" (Massie, 2017).

respectively).[16] Furthermore, centralised bargaining in the public sector is facilitated by the presence of, in effect, a single employer. Given also that trade union members in the public sector stand to gain directly from any commitments to increased government spending, in addition to the amenity gained from enhanced public services, conditions seem especially propitious for bargaining over a social wage within this sector. Accordingly, it is worth exploring the impact of disaggregating the labour market into the (high union density) public sector, with a private sector that, given low unionisation rates and multiple employers, is unable to capture amenity effects in the wage bargaining process (so that α=0). While we know that the aggregate impact of a conventional macroeconomic private sector and public sector characterised by bargaining over a social wage must lie somewhere between the two models considered above, the precise outcome is clearly an empirical issue, which we investigate in our simulations.

3. The computable general equilibrium (CGE) model

This section provides a brief overview of AMOS (A Macro-micro model Of Scotland), a regional CGE model, which we use to simulate the impact of a balanced budget fiscal expansion that raises the average Scottish income tax rate to Scandinavian levels. This is essentially a regional, multi-sectoral, forward looking, empirical variant of the Layard, Nickell, and Jackman (1991) model (Lecca et al, 2013). The version employed here is calibrated on the 2009 Scottish SAM (Emonts-Holley et al, 2014). In long-run equilibrium all stocks are optimally adjusted, so that it is characterised by both zero net migration and zero net investment. In the short-run, all sectoral capital stocks and population are fixed. AMOS has three domestic transactor groups, namely, households, firms and government; and four major components of final demand: consumption, investment, government expenditure and exports. In the version used here there are eighteen commodities/activities.

Here we use the intertemporal variant of the model with perfect foresight, the full specification of which can be found in Lecca *et al.* (2013, 2014). Government expenditure is equal to its base year level plus the increment to revenues attributable to the rise in the average income tax rate, so that revenues become dependent on the entire general equilibrium of the system. In fact, under the new Fiscal Framework (Scottish Government, 2016) government expenditure is still partly funded through the Barnett formula, subject to block grant adjustments. However, here we want to focus on a balanced budget fiscal

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[16] Source: authors' calculations from the Labour Force Survey (2016).

expansion, in which all income tax revenues from the increase in income tax are recycled as increased current spending. The demand for Scottish exports is determined by export demand functions with a price elasticity of demand of 2.0. Imports are modelled by an Armington link (Armington, 1969) with trade substitution elasticities of 2.0 (Gibson, 1990).

In the initial simulations there is a single representative household and a unified Scottish labour market with perfect sectoral mobility. However, in our sensitivity analysis we explore the impact of distinctive public and private sector wage bargaining. All sectors are taken to be perfectly competitive and produce using multi-level CES production functions. The elasticity of substitution in the production of gross output and value added is 0.3 and is Leontief for intermediate demands (Harris, 1989). We do not explicitly model financial flows: Scotland is a price-taker in competitive UK financial markets.

The size of the labour force only varies due to net inter-regional migration flows, modelled in accordance with Layard *et al* (1991), but incorporating the amenity effects discussed in Section 2. Net migration is positively related to real after tax wage differential, and negatively related to the difference between regional and national unemployment rates:

$$m = \varsigma - 0.08\left[\ln(u^S) - \ln(u^R)\right] + 0.06\left[\ln\left(\frac{w^S}{cpi^S}\right) - \beta\ln(1-\tau) - \ln\left(\frac{w^R}{cpi^R}\right)\right] \tag{3}$$

In equation (3): *m* is net in-migration as a proportion of the Scottish population; u is the unemployment rate; the S and R superscripts stand for Scotland and the Rest of the UK, respectively; and ς is a parameter calibrated to generate zero net migration in the base period. As discussed in Section 2, β is the parameter indicating the extent to which households value public, as against private, consumption. It represents the subjective net valuation by households of the benefits of the increased public expenditures weighed against the corresponding increase in their income tax.

As we have seen, in the Conventional Macro model households attach no value to the amenity created by the increased expenditures so that β = 0 and the standard specification of the net migration function applies, with after tax real consumption wages governing migration decisions. However, if public expenditure generates a positive amenity, so that households attach any value at all to the services produced by the additional expenditure, then β > 0. In the Conventional Micro and Social Wage models β = 1, and the potential migrant is indifferent

between marginal changes in public expenditure and private consumption, so that in this case the *pre-tax* real consumption wage governs migration.

For long-run equilibrium we require that no net migration and also assume that the real wage and unemployment rate in the Rest of the UK is fixed. Therefore, setting m = 0 and rearranging equation (3) produces the long-run equilibrium condition for zero net migration:[17]

$$\ln\left(\frac{w^S}{cpi^S}\right) = 1.33\ln(u^S) + \beta\ln(1-\tau) + \kappa \qquad (4)$$

Wage setting reflects the bargained real wage curve estimated by Layard *et al* (1991), again augmented by amenity effects:

$$\ln\left(\frac{w^S}{cpi^S}\right) = c - 0.113\ln\left(u^S\right) + \alpha\beta\ln\left(1-\tau\right) \qquad (5)$$

Where: α, as before, represents the extent to which the amenity effect is reflected in the wage bargain and *c* is a calibrated parameter.[18] In the Conventional Macro model both *α* and β equal zero so that the last term on the RHS of (5) is zero, so that bargaining is over the real net of tax consumption wage. In the Conventional Micro model β equals unity, but *α*=0, so that again (5) simplifies to the conventional wage curve specification. However, in the Social Wage case *β*=*α*=1, so that (5) implies that workers bargain over the pre-tax real wage: the tax hike has no impact on the bargained wage.

4. Results

This Section simulates the effects of a rise in the average rate of income tax in Scotland of 7.4 percentage points, the change required to match average tax rates in Scandinavia (Table 1). The resultant tax revenues are used to fund an increase in current government consumption.[19]

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[17] This is the specific form of equation (1). In equation (4) κ is a constant and equals $-\dfrac{\varsigma + 0.08\ln(u^R)}{0.06} + \ln\left(\dfrac{w^R}{cpi^R}\right)$

[18] A wage curve elasticity of around -0.1 has been found over a large number of empirical studies across different countries and time periods (Blanchflower and Oswald, 2005).

[19] This balanced budget change is equivalent to revenue recycling in this case because income tax is here assumed to be the only devolved tax.

The permanent rise in the income tax rate is applied in period 1 and the model is run for 50 periods.

Aggregate model results

Table 2 shows the long-run impacts generated by a balanced-budget fiscal expansion following an increase in the average rate of income tax of 7.4 percentage points. Results are presented for the Conventional Macro, Conventional Micro and Social Wage cases within a single, aggregated labour market, as outlined in Sections 2 and 3. The figures are given as percentage changes from the initial steady state. The stimulus to government consumption is positive in the long run in each case, but is noticeably greater in the Social Wage model. The overall impacts on the other broad macroeconomic indicators shown in Table 2 are similar for the Conventional Macro and Micro cases, but the Social Wage results differ markedly.

The first column of Table 2 reports results for the Conventional Macro model. In this case, neither potential migrants nor workers value public consumption. Accordingly, migrants respond to the post-tax real wage, as do workers who seek to restore the initial value of their real take home pay and in the long-run succeed in doing so. Therefore there is no change in the post-tax real wage or in the unemployment rate in the long run, corresponding to the shift in long-run equilibrium from A to B in Figure 1. While public expenditure rises by 10.9%, the long run impact of the fiscal expansion is contractionary, with a fall of 8.3% in Gross Value Added (GVA) and 8.4% in employment. It is clear that, for Scotland, the adverse competitiveness effect of the balanced budget fiscal stimulus dominates the net stimulus to demand, reflecting the degree of openness of the Scottish economy, with exports to both RUK and ROW falling substantially (11.9% and 12.1% respectively).

The adverse competitiveness effect is apparent in the substantial rise in the nominal gross wage (of 15.3%) and the CPI (of 4.6%), as workers successfully restore the initial value of their real take home pay. Due to the zero net migration condition, which is binding in long-run equilibrium, the unemployment and real wage rates are ultimately restored to their initial values through a process of net outmigration, confirming the analysis of Figure 1. The rise in the average rate of income tax naturally lowers household consumption, in this case by 5.8% in the long run.

Table 2. The long run impact of a balanced-budget 7.4 percentage point rise in the average income tax rate

	Conventional Macro	Conventional Micro	Social Wage
Gross Value Added	-8.3%	-7.6%	1.0%
Consumer Price Index	4.6%	4.2%	0.0%
Unemployment Rate	0.0%	0.7%	0.0%
Employment	-8.4%	-7.6%	2.7%
Gross Nominal Wage	15.3%	14.0%	0.0%
Nominal Wage after Tax	4.6%	3.4%	-9.3%
Gross Real Wage	10.2%	9.4%	0.0%
Real Wage after Tax	0.0%	-0.8%	-9.3%
Labour Income	5.6%	5.3%	2.7%
Capital Income	-4.9%	-4.5%	0.6%
Labour supply	-8.4%	-6.9%	2.7%
Household Consumption	-5.8%	-5.6%	-3.5%
Gov Consumption	10.9%	11.1%	15.9%
Exports RUK	-11.9%	-11.0%	0.0%
Exports ROW	-12.1%	-11.2%	0.0%

The second column in Table 2 reports the long-run results for the Conventional Micro model. Here potential migrants value the increase in public consumption, but workers do not moderate their wage claims accordingly. Typically, Conventional Micro models abstract from the presence of imperfect competition in labour markets, so that the improved amenity is an externality from the individual worker's perspective and, in effect, $\alpha = 0$. The fiscal expansion results in a rise in public consumption of 11.1% in the long run, but GVA and employment both fall by 7.6%. Given the predominant adverse competitiveness effect observed in the Conventional Macro model, the scale of the resultant contraction in this case is less. As before, in the short run real wages fall and unemployment rate rises, inducing net outmigration. However, the scale of the response is now less than before since migrants are, in effect, motivated by the Social Wage in Scotland, not by the post-tax wage. Accordingly, migration does not continue until real net of tax wages and unemployment rates return to their initial levels. While workers continue to attempt to restore their real wage this increases the unemployment rate and lowers their bargaining power. A lower real take home wage rate is now compatible with the zero net migration equilibrium, given that potential migrants in Scotland and RUK value their higher Social Wage, as reflected in the move from long-run equilibrium A to C in Figure 1.

Workers are in this case unable to restore their net take home pay, although the pressure on wages remains significant, with the nominal gross wage rising by 14.0%. Essentially, labour supply remains greater in this scenario than in the Conventional Macro case because migrants

are less willing to move out of Scotland at any given net of tax real wage, and so the upward pressure on the real wage due to outmigration is less in this case. Consequently, the unemployment rate increases even over the long run, (by 0.7%).

Overall, the aggregate results of the Conventional Macro and Micro models are very similar, reflecting the predominance of adverse competitiveness effects in both cases, although the behaviour of the real wage and unemployment rates differs, reflecting the different models of migration embedded within them. However, the results of the Social Wage model, summarized in the last column of Table 2, are very different from both Conventional models. In this case neither workers nor migrants need to restore their take-home wage, since the increase in government expenditure compensates them for the income tax increase. The economy remains in a long-run equilibrium such as A in Figure 1, where neither the nominal wage nor the employment (or unemployment) rate change. However, we know that in this case there is no adverse supply effect, and so the (net) stimulus to demand predominates. Here the balanced budget fiscal expansion produces a rise of 15.9% in government consumption in the long run and generates a rise of 1.0% in GVA and 2.7% in employment.

Since workers do not seek to restore their net take home pay there is no upward pressure on the nominal wage or the CPI in the long run and the *pre-tax* real wage is constant. The *post-tax* real wage therefore experiences a substantial fall of 9.3% in the long run (which accounts for the rise in employment exceeding that in GVA). Due to this fall and the tax hike, household consumption declines by 3.5% in this case. Exports are unchanged in the long run as the competitiveness of the region is ultimately unaffected.

The social wage model effectively eliminates any adverse supply shock associated with the fiscal stimulus, by preventing any upward pressure on the nominal wage. However, this implies a willingness by workers to accept a substantial cut in their real take home pay. In the long-run this model operates "as if" it is an input-output system, in which the supply side is entirely passive and pre-tax wages and prices are unaffected. We obtain results very similar to simple Keynesian balanced-budget multipliers, which are positive, although here both population and capital stocks are endogenous.

It is clear that the overall impact of a balanced budget fiscal expansion is crucially dependent on the public's valuation of the amenity associated with the greater public expenditure, and especially to the extent to which this is reflected in workers' wage bargaining behaviour.

Figure 2. Adjustment Paths: Conventional Macro versus Social Wage
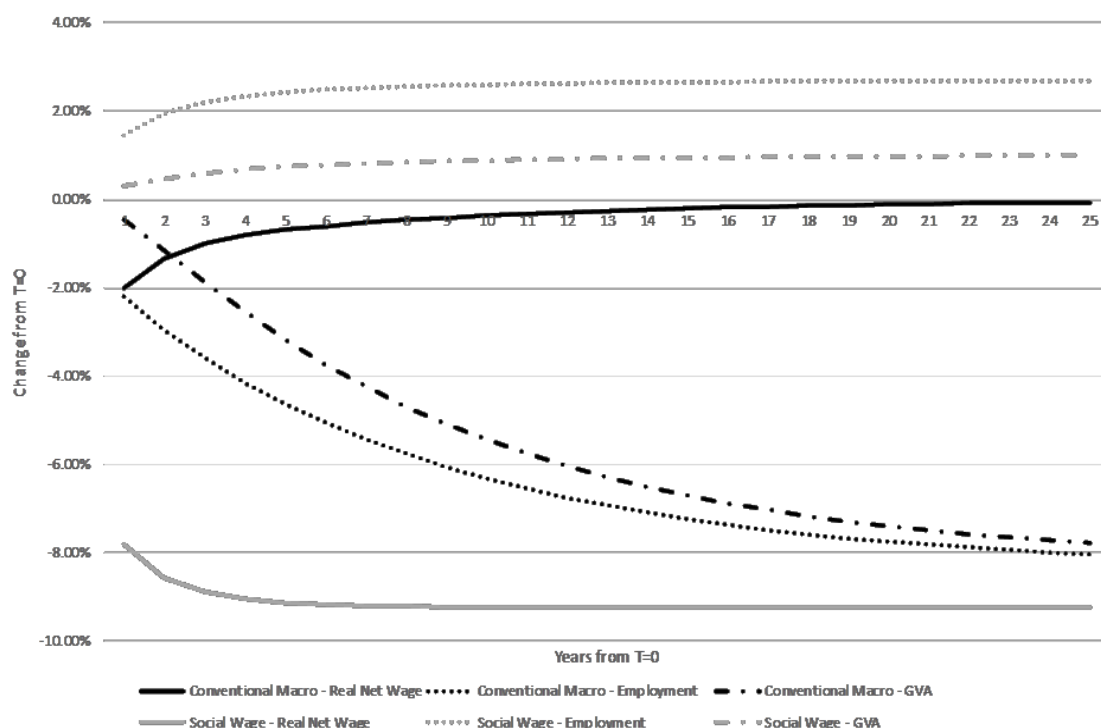
The adjustment paths for GVA, the real wage and employment for the Conventional Macro and Social Wage models are presented in Figure 2.[20] Adjustment to the new long-run equilibrium values (which are shown in Table 2) takes somewhat longer in the Conventional Macro case, in part reflecting the scale of the changes, particularly in wages and prices. The period-by-period results show that the contraction induced by the predominant adverse competitiveness effect in the Conventional Macro model leads to a fall in GVA and, given the upward pressure on the real wage following the tax hike (Figure 2), the greater fall in employment observed in Table 2. In contrast GVA and employment both rise in the Social Wage model, with the impact on employment greater given the fall in the real post-tax wage. Initially, the social wage increases which, together with the fall in unemployment rate, induces in-migration. This process pushes down the private element of the social wage until the nominal gross wage is restored to its original level. The very different movements in nominal wages in the two models reflect the contrasting motivations for wage bargaining: with significant upward pressure in the Conventional Macro model, and a return to base year levels in the Social Wage case (following an initial rise). These largely account for the contrast in competitiveness changes in the two models. While real wage and unemployment rates ultimately return to their base year levels in

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[20] The dynamics of the Conventional Micro and Macro models are very similar, except that unemployment and real wage rates do not return to their initial levels in the former case.

the Conventional Macro model, the levels of employment and population are much lower than in the base year.

Sensitivity analysis

We consider three sources of potential sensitivity of our results. First, we explore the impact of varying the scale of the fiscal expansion. Second, we analyse the impact of the Scottish labour market being characterised by distinct bargaining systems for private and public sectors. Finally, we consider the effects of a balanced budget fiscal *contraction* to reflect the likely effects of a shift towards the "low tax and spend" Baltic economies.[21]

Varying the fiscal stimulus

Recall that the simulation analysed so far relates to a 7.4 percentage point increase in the average income tax rate in Scotland, with income tax revenues being recycled to allow an expansion in current government expenditure. Figure 3 shows the long run percentage change in GVA resulting from a range of balanced budget 1 to 10 percentage point rises in the average rate of income tax under the three models.

The results indicate that only in the Social Wage model are higher average rates of income tax associated with increases in GVA. In contrast, in the Conventional Macro and Micro models higher average rates of income tax generate falling GVA, although the extent of the contraction is always greater in the former model for the reasons discussed above. The greater sensitivity of GVA to balanced budget fiscal expansions in the Conventional Macro and Micro models reflects the degree of openness of the Scottish economy, which is crucial in determining the relative strength of the adverse competitiveness effect associated with any increase in taxation.

Figure 3. Change in the income tax rate (percentage points)

Change in income tax rate (percentage point)

— · Conventional Macro ······· Conventional Micro —— Social Wage
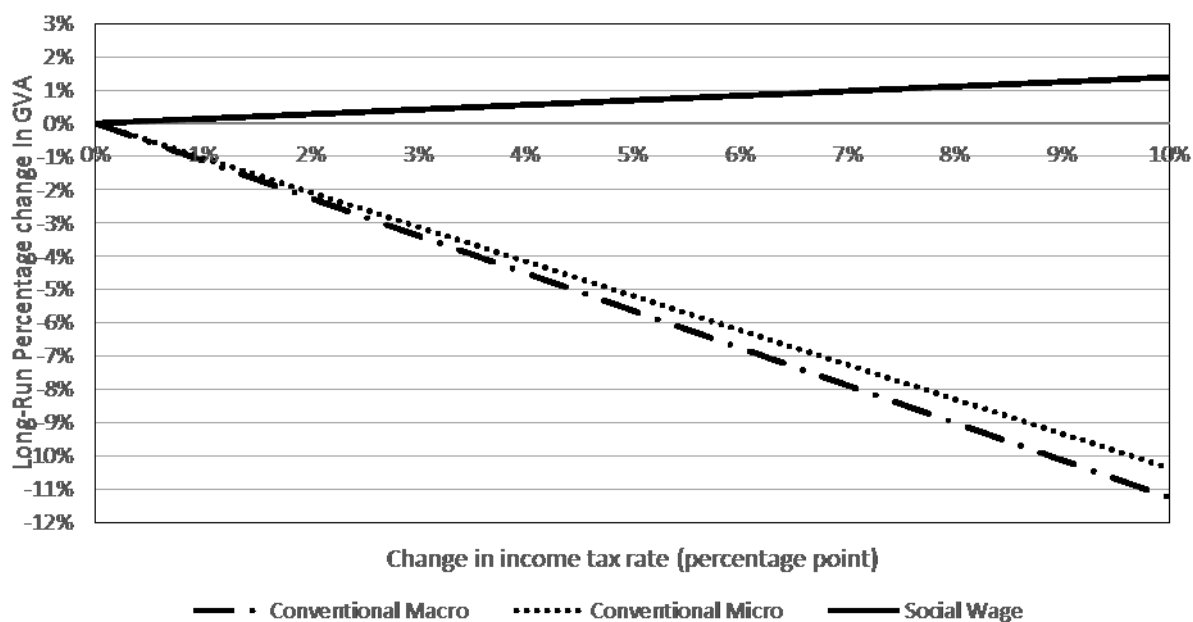
Disaggregating wage bargaining in the public and private sectors

We already noted that trade union density is much higher in the public sector and there is greater scope for centralised bargaining given a single employer – conditions that facilitate bargaining over a social wage. In the private sector trade union density is considerably lower and there is a large number of employers, so we take α to be zero. However, given the evidence on social attitudes and, for simplicity, we consider only those cases where β=1.

Accordingly, we report in Table 3 the results for a model with separate bargaining processes within the public and private sectors. Column 1 reports the results for the case where both sectors reflect the Conventional Microeconomic model (α=0; β=1). This replicates the macroeconomic results for the aggregate labour market reported in the first column of Table 2, although we now report the results for the private and public sectors which exhibit identical wage changes, but experience different employment changes. In particular, employment does expand in the public sector given the substantial increase in public expenditure. However, in the second column we report the results of the presence of Social Wage bargaining in the public sector (α=1), combined with the α=0 case for the private sector.[22] The aggregate results reflect a weighted average of the Social Wage and Conventional Macro results of Table 2. However, the influence of the Social Wage in the public sector is muted: while the scale of the contraction is inhibited by the presence of social wage bargaining in the public sector, where the *pre-tax* real wage is maintained[23], there is a significant contraction in GVA of 6.6% and in

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[22] In the limiting competitive labour market case the wage curve can be interpreted as a labour supply function.
[23] The 3.7% rise in the public gross nominal wage is matched by a 3.7% rise in the cpi.

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total employment of 5.9%. Sectoral employment changes are markedly different with an 8.7% expansion in the public sector and a contraction of 10.9% in the private sector, reflecting the major fall in the real *post-tax* wage in the former case of 9.6% (- 5.9% -3.7%). The presence of Social Wage bargaining in the public sector proves to be insufficient to counter the negative effects of a balanced budget fiscal expansion.

Table 3. The long run impact of a balanced-budget 7.4 percentage point rise in the average income tax rate with distinct wage bargaining in the public and private sectors.

	Conventional Micro	Public Sector Social Wage
Gross Value Added	-7.6%	-6.6%
Consumer Price Index	4.2%	3.7%
Unemployment Rate	0.2%	0.0%
Total Employment	-7.6%	-5.9%
Private Employment	-11.6%	-10.9%
Public Employment	4.0%	8.7%
Gross Nominal Wage	14.0%	10.6%
Nominal Wage After Tax	3.4%	0.3%
Private Gross Nominal Wage	14.0%	13.4%
Private Wage after Tax	3.4%	2.9%
Public Gross Nominal Wage	14.0%	3.7%
Public Wage after Tax	3.4%	-5.9%
Labour Income	5.3%	4.1%
Capital Income	-4.5%	-4.1%
Labour supply	-6.9%	-5.4%
Household Consumption	-5.6%	-5.8%
Gov Consumption	11.1%	14.5%
Exports RUK	-11.0%	-10.2%
Exports ROW	-11.2%	-10.4%

The impact of a symmetric fiscal contraction

As already noted, the "low-tax, low-expenditure" Baltic model is one that has to date found little support from political parties or the public in Scotland. Nevertheless, we explore the impact of a symmetric 7.4 percentage point reduction in the average rate of income tax. The qualitative results are exactly as we would expect, with the Social Wage in this instance limiting the stimulus to competitiveness that is apparent in the Conventional Macro (and Micro) models, with the unchanged gross real wage resulting in a substantial rise in the post-tax real wage of 9.3% and a fall in GVA and employment of 1.0% and 2.6% respectively. In contrast the

Conventional Macro model is associated with an 8.1% expansion in GVA and 8.3% in employment, as in this case the beneficial competitiveness effect outweighs the adverse demand impact of the fiscal contraction.[24]

5. Conclusions

Scotland has recently acquired very substantial powers over income tax. This paper explores the likely impact of a radical shift in the direction of the "high-tax, high-spend" Scandinavian model. We explore this option primarily because the Scandinavian model has often been held up as one that Scotland, and perhaps other regions, might wish to emulate if they had sufficient fiscal autonomy. However, our analysis highlights the factors that even those regions considering far less radical shifts in the same direction should take into account. Currently, all political parties in Scotland, with the sole exception of the Conservatives, support some increase in taxes and public spending. Our analysis is also of direct policy relevance to Wales and Northern Ireland whose Assemblies are about to enjoy greater fiscal powers, as well as to regions in Europe and elsewhere that enjoy a degree of tax autonomy and where national governments are pursuing austerity policies.

The main message from our analysis is that the nature of the wage bargaining system seems crucial to the likely macroeconomic outcome of a significant rise in income taxes and public spending. If the public amenity created by higher public spending is not valued by migrants or workers, and bargaining is not restricted by weak labour market conditions, the openness of regional economies such as Scotland is likely to result in a balanced budget fiscal expansion having contractionary aggregate effects. If, on the other hand, the higher public spending is valued as much as the forgone private consumption, and this is reflected in workers effectively bargaining over the Social Wage, there is no adverse competitiveness effect, and the result is an expansion in economic activity. The Scottish Government's plan to make the tax system more progressive may make the Social Wage outcome less likely: high income earners would have to value incremental public services more to feel as well off.

The Social Wage outcome is, however, necessarily associated with a significant fall in real take home pay, and the key question is how likely it is that host-region workers would be willing to accept that in return for the maintenance or enhancement of public services. The current wage

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[24] While the absolute values of the results are of similar magnitude to the fiscal expansion, they are not exactly symmetric. In particular, the results for the reduction in tax rates are slightly smaller in absolute value (by up to 5% of the changes in the level of GVA). Such asymmetry reflects the non-linearities (and non-log-linearities) present in the model.

bargaining system in Scotland seems unlikely to deliver Social Wage outcomes, for the system as a whole, especially over the longer term. Conditions are most propitious for this within the highly unionised and more centralised bargaining system that characterises the public sector, but we find that this in itself would not suffice to ensure the success of an expansionary fiscal policy. Accordingly, a move towards Scandinavian levels of public services and taxes is likely to require reform of the bargaining system if adverse macroeconomic consequences are to be avoided. Alternatively, some form of incomes policy linked to the provision of public services might be proposed as part of a "social contract" embedded in a manifesto that would embrace private as well as public sector workers' pay restraint in response to improved public services. The more centralised institutional structure of some other economies may be more conducive to social wage outcomes.

Of course, the case we consider here – of an immediate hike in taxes to Scandinavian levels - is unrealistic in that any move in that direction would likely be much more cautious and gradual. Furthermore, attitudes to increased public spending, and therefore to reforms, appear to depend on the composition of that spending. For example, recent evidence suggests that there is now a substantial majority (two thirds) who would be prepared to pay more tax to help fund the National Health Service (The King's Fund, 2017).

It is clearly important for regional governments of whatever hue to understand the likely consequences of any deviation from income tax parity within the host nation. Without such an understanding there can be no appreciation of the potential costs and benefits of maintaining the status quo, as against alternative policies. While we have begun to address this issue here, there are a number of aspects that need to be more thoroughly explored in future research.

First, it would be interesting to examine some of the alternative tax and spend policies that are now available to the regional governments that enjoy a degree of fiscal autonomy, including a possible move towards the "low-tax, low-spend" Baltic economies. Our brief analysis here finds that an "expansionary fiscal contraction" may be achievable, but this requires further exploration of the underlying assumptions. In particular, there is a requirement for a better understanding of any immediate supply-side consequences of changes in government spending. This is perhaps most obviously relevant when we consider government capital expenditure (Lecca et al, 2017), but would also apply to those aspects of current government spending which, in fact, represent investment in human capital and so would also be expected to have important supply-side impacts (e.g. Hermannsson et al, 2014). Such beneficial supply

side impacts tend to counter any adverse competitiveness effects, but the former takes time to emerge, which could lead policy makers to underestimate their importance.

Second, there is a need to explore the valuation of public expenditure more systematically, in particular its dependence on the composition of government spending, and on the source of that spending, in terms of the level of government.[25] In this context political parties may seek to alter public attitudes towards changes in taxes and public spending, perhaps through some degree of incremental hypothecation. Third, identifying the impact of fiscal changes on the distribution of income across households is clearly relevant to the growing emphasis on inclusive growth. Fourth, it would be instructive to move away from the strictly balanced-budget changes considered here to explore the impact of fiscal policy within the Scottish Government's (2016) new Fiscal Framework. Finally, extension to an interregional setting to explore the direction and scale of spillovers would provide valuable insights for the impact of differential tax regimes among regions.[26]

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[25] There is also scope for examining a range of alternative models, reflecting different valuations of government expenditure (by category), and different wage bargaining responses.

[26] In the Scotland-UK context this would allow a systematic assessment of the "no detriment" principle of the Smith Commission (Lecca et al, 2015).

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