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Abstract

Public spending devolution in practice is widely seen as more appropriate for addressing varied political aspirations within state boundaries than is tax devolution. A drawback is that devolved public spending may be subject to irresistible upward pressure, as illustrated by 'formula drift' of the United Kingdom devolved administrations. By crowding out the private sector such public spending can exacerbate the problem it was originally intended to alleviate. When taxpayers do not value increases in government output at least as highly as the private goods and services they must forgo to finance them, then the public sector is too large. This paper estimates a three sector Hecksher-Ohlin model of the economy with the greatest relative rise of the public spending ratio in the United Kingdom, Wales. Simulation of the model shows a net gain in employment from a one percent cut in income tax matched by a corresponding reduction in government spending. This result is consistent with the current level of intergovernmental transfers being excessive.

Keywords: Fiscal Devolution, Small Open Economy Modelling, Crowding Out

JEL Classification: R15, R58.

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1. Introduction

Devolution of public spending may permit local governments to provide public services better adapted to local preferences than their central counterparts (Tiebout 1956; Besley and Coates 1999). They are closer to their residents and information dissipates with distance. Within a given budget possibly they can alter the composition, or change the method of delivery. A second, not exclusive, justification for devolution can be a local predilection for devolved government quite regardless of whether it is more responsive or generally better at meeting local needs. People may prefer to be governed by those with whom they identify, independently of the quality of governance[1].

If expenditure is devolved there is an incentive case that at least some portion of taxes should be also (Sanguinetti and Tommasi, 2004). In practice, while the sub-national government share of public spending has increased in a majority of OECD countries, the share in general government revenues (excluding grants) has failed to rise correspondingly and has even declined in several cases (Journard and Kongsrud 2003). Some institutional arrangements may encourage this trend more than others. An example is where an expenditure ministry bargains on behalf of regional authorities for finance with a ministry that raises national revenue and provides for national level public goods. In this case a regime in which the spending ministry gets political benefits from the expenditure will generate more spending than one where taxes, as well as spending, are devolved (Sato 2002).

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[1] One part of this condition apparently is satisfied for Wales and Scotland according to the 'British Identity' MORI poll for the *Economist* in November 1999. The Welsh and Scottish have a stronger identification with Wales and Scotland than with Britain, in marked contrast to residents in England.

On the other hand stabilisation and redistribution weaken the case for tax devolution. When taxes are not devolved and a region experiences a negative demand shock, tax receipts fall and unemployment pay outs increase, boosting government spending and partly offsetting the private sector contraction. This is a form of risk sharing between regions subject to different shocks (Persson and Tabellini 1996). Hughes Hallett (2005) undercuts the normative risk sharing argument by showing that fiscal autonomy for UK regions would reduce volatility of output and inflation[2]. Interpersonal redistribution also may be reflected in inter-regional net subsidies (Melitz and Zummer 2002; Decressin 2002). Tax competition from other jurisdictions anyway limits the extent to which taxation can effectively be devolved. The extent of factor mobility between fiscally devolved administrations is the principal constraint (Wildasin 2003).

Without devolved taxation, income smoothing by the federal or central government spending, rather than by built-in tax stabilisers, can give rise to higher centrally funded state spending long after negative shocks have dispersed, preventing adjustment (Obstfeld and Peri 1998). Stabilisation presupposes some recovery from shocks and redistribution similarly has no reason to be trended. Soft budget constraints and over-spending biases embedded in political institutions exacerbate a tendency towards upwards drift in devolved public expenditure (Pisauro 2001).

The present paper therefore examines the fiscal performance of the devolved administrations of the UK to assess evidence of such dependency. A test is constructed and a tax and government spending model of the most likely candidate administration is simulated. The employment patterns found are inconsistent with long run regional

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[2] Unless all shocks are on the supply side.

balance of payments equilibrium, suggesting an advantage from balanced reductions in taxation matched by government spending.

2. The Devolved Economy

The model of the devolved 'branch plant' economy is developed from Minford et al. (1994), and Hecksher-Ohlin–Samuleson principles. It consists of two private sectors, producing respectively traded goods (Y_T), all of which are exported, and non-traded goods (Y_{NT}), and a public sector. The private sectors employ intensively unskilled labour (L_T) in the traded good production and skilled labour (L_{NT}) in activities that do not trade across the boundaries. Unskilled labour is immobile across borders but possibly mobile between sectors. Skilled labour is mobile across borders, so that the non-traded wage in the devolved administration equals that of the larger economy, $W_{NT} = W_{NT}^*$.

Labour markets are competitive; employers' real wage costs equal the marginal product of labour in both traded and non-traded sectors:

$$(1 + T_{EMP})W_T = P_T F'(L_T) \text{ and,}$$

$$(1 + T_{EMP})W_{NT} = P_{NT} G'(L_{NT})$$

where F(.) and G(.) are production functions of traded and non-traded goods and services respectively and T_{EMP} is the employment tax rate. The traded product price, P_T is determined in the world market with $P_T = P_T^*$. Non-traded goods and services prices (P_{NT}) can diverge from those in other areas but must remain linked to W_{NT} by production technology. Thus, the real exchange rate is:

$$e = P_{NT} / P_T$$

With mobility between sectors both W_T and W_{NT} are exogenous; consequently the real exchange rate is also. More productive local labour appreciates the exchange rate. Labour supplies depend upon the cost of living, an index of the two prices, P_T and P_{NT}, and on the income tax rate, T_Y.

Without tax autonomy devolved government spending (G) is fixed regardless of tax receipts.

$G = Y_G + B$

The expenditure consists of purchases of goods and services to produce output (Y_G) of public administration, health and/or education, say, plus transfer payments (B). Both create a demand for non-traded goods and services, as does traded good production. Y_G requires labour for production,

$L_T = g_T(Y_G), \quad L_N = g_N(Y_G)$

The government sector can employ workers from either non-traded or traded sectors. The expectation is that mobile labour will be used more intensively than immobile labour.

The demand for nontraded output depends upon traded output and government spending. Employees in exporting or in government service spend money in shops and on local services and send their children to school. In turn this gives rise to other rounds of spending. An income tax effect depends upon the levels of traded output and government spending and their respective nontraded goods multipliers, on the demand side. On the supply side the level of income tax affects labour force participation and therefore private sector output. Government production, by contrast with transfer payments, competes with the private sector for resources.

Net finance comes from the federal or central government. Tax receipts (τ) are paid directly to the central government. They increase with employment, wage levels and tax rates. The region's current account is then:

$Y_T (e) - M(e) = G - T$

where Y_T are exports and M, imports, all tradable consumption. A net subsidy to the economy (NTR) (T<G) allows a current account deficit and a higher level of demand at a given real exchange rate.

Federal or central government income smoothing in the response to a negative shock to exports and thus to employment and income occurs because T falls (by less than X) and G remains unchanged (or may in fact rise). The regional balance of trade deficit widens and tax revenue no longer covers as much of the cost of government output and employment, so there is an expansion of the subsidy. The share of government output and employment in the total rises.

[insert Figure 1 here]

Figure 1 shows the case of mobility between traded and nontraded sectors, where the real exchange rate is determined by technical efficiency and therefore is exogenous. If net intergovernmental transfers pay for interpersonal transfers such as pensions and invalidity benefit then they simply boost consumption, allowing demand to exceed output by the amount of the transfer. They also permit more (tradable consumption) imports than (tradable production) exports.

Again, when some of the net transfer pays for government production and therefore employs local labour, some of which would have worked in the private sector, the capacity to import is still enhanced by the block grant from the central government, regardless of whether those in the devolved jurisdiction value the output as much as in

the first case. However the capacity to export will be reduced insofar as local labour is diverted from the tradable sector. Hence the balance of payments constraint may not be shifted as much as by pure transfers. The willingness of consumers to substitute government output for tradable consumption (imports) determines the level of demand generated by the block grant.

Now consider an increment of government spending not paid for by inter-governmental transfers. Assume that the extra government output is judged an inadequate substitute for private goods forgone as a consequence of the extra taxes paid in the devolved administration[3]. Extra taxes and government output reduce private sector output (tradable and non-tradable) at a given real exchange rate. Exports are cut by the transfer of labour from the private to the public sector. Private consumption and therefore imports do not fall initially despite the higher taxes because the taxes pay for the workforce transferred to the public sector. These people still wish to consume tradables, so that imports are not reduced. The economy therefore deflates as a consequence of the self-financed increment in government spending, unless more intergovernmental transfers are forthcoming; since the real exchange rate cannot adjust, monetary forces exert downward pressure on income, employment and output to restore balance of payments equilibrium (PCA shifts left in figure 1)[4]. Hence government expansion crowds out the private sector and deflates the economy when government output is not valued sufficiently highly by taxpayers.

The solution in such cases is to increase the size of the tradable sector by supply side policies such as tax cuts matched by public spending cuts. The expansion of the

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[3] If increments to what the government was doing were useless in utility terms they would still record a contribution to output because of the way output is measured

[4] PCA , primary current account, balance is the series of output and real exchange rate combinations at which exports equal imports. A given output and real exchange rate determines the demand for imports. If the supply of exports contracts then PCA balance shifts left.

private sector creates more exports, and shifts the PCA balance to the right, permitting more long term output, employment and income. Failure to take into account the monetary forces set in motion by balance of payments adjustment can conceal the asymmetric effects of government expenditure increase and tax cuts on the level of economic activity in devolved administrations and economies.

This devolved government over-expansion possibility can be tested. In practice government output is measured at cost, and so, in an exercise implicitly to assess the value users place on government output, must be ignored. Employment is a better welfare proxy. If tax cuts boost employment by more than the equivalent government spending reduction then the balance of payments will be improved, demand and output will be higher. The balance of advantage indicates the valuation of incremental government output.

3. The Devolved Administrations of the United Kingdom

The UK devolved administrations exercise no tax-raising powers but are primarily funded with block grants from the central government that levies taxes. By contrast the English regions lack authority for devolved spending, as well as for levying taxes. Taxes are typically proportional or progressive (in the UK with the exception of the only local tax, the community charge that accounts for a small proportion of total tax payments). They therefore permit contributions to the finance of services such as heath and education to a common standard according to ability to pay by individual and by jurisdictions. These tax arrangements mean that, unlike central government, there are no electoral advantages for administrations in terms of tax restraint from public spending economy.

Since 1979 the size of the block grant has supposedly been governed by the Barnett formula, intended virtually to eliminate the spending per head gap with England in the very long term. The grant per head of the devolved population increases in absolute terms with spending per head in England. Since the administrations spend more per head than England, their percentage increases in budgets would be less under the formula. However political bargaining, 'formula bypass' (Heald 1994; 2003), ensured that the spending gap is more likely to increase than to diminish[5]. A study of Scottish education spending found that using the English Local Authority approach to assessing 'need', Scottish pupils would receive about 3 percent more than the English – but actual spending is considerably higher (King, Pashley and Ball 2004).

With lower regional incomes the same spending gives rise to a higher ratio of public expenditure to GDP; a region with a 20 percent lower than average income per head would exhibit a ratio of 1.25 if this principle were followed. While temporarily higher ratios might be warranted in response to shocks, permanently higher real government spending, taking the ratio above the warranted level would be a symptom of inefficiency, or of 'gold-plating' relative to rest of the economy, unless the spending ratio in other regions has risen similarly. Stabilisation presupposes some recovery from shocks and redistribution similarly has no reason to be trended. Trends in devolved government spending to income ratios could reflect federal or central government decisions rather than increasing or decreasing dependency. Therefore a test of dependency or inefficiency is whether there is a trend rise in the ratio of government spending to GDP in the devolved administrations relative to the ratio in the core, or to the federal average.

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[5] For Scotland, Midwinter (2002 108) points out that the Scottish Executive was able to accommodate free personal care for elderly and teachers' pay increases within Treasury allocated expenditure growth totals, because its share of the UK budget was rising- despite the Barnett 'squeeze'.

As Table 1 shows, the ratio of government spending to output (in per capita term) in Wales and Scotland has risen relative to England since 1976. The ratio is highest for Northern Ireland, where it has been fluctuating around 1.8 since 1976, despite the narrowing of the income gap over the period. England's poorest region, the North East with approximately the same income per capita as Wales, showed a slightly higher government spending ratio than Wales in 2001, though lower in earlier years. Wales exhibits the strongest trend increase in ratio since 1976, albeit from a low level. Relative to England, the government spending to output ratio has risen from 1.2 in 1976 to 1.54 in 2000. Wales is therefore the most suitable candidate for testing the consequences of rising central government dependency in a devolved administration.

[insert Table 1 here]

4. Model Specification

To operationalise the model of section 3 a CES function is assumed for traded production and Cobb-Douglas technology for the private non-traded sector. There is a perfectly elastic capital supply at the world price, the rental 'r'. It follows that the gross wage or unit labour costs for traded sector must also be fixed- so that traded sector employment is then determined by the supply of labour to this sector. Employment fixes traded sector output and this determines non-traded sector output by creating the demand for it.

Suppressing subscripts the CRS CES manufacturing production function is:

$$Y_T = \gamma\left[\delta K^{-\rho} + (1-\delta)L_T^{-\rho}\right]^{-1/\rho} \tag{4.1}$$

with capital and labour having relative factor shares δ ($0<\delta<1$). The parameter γ measures the state of technology ($\gamma>0$) and denotes the efficiency of production. The elasticity of substitution is $\sigma=1/1+\rho$ with $-1<\rho$.

The determinants of the exogenous traded sector wage W_T, can be inferred by substituting for capital in the production function with the marginal productivity condition:

$$r / P_T = d\gamma^{-\rho} \left(Y_T / K \right)^{(1+\rho)} \tag{4.2}$$

$$\left(Y_T / L_T \right)^{(1+\rho)} = 1 + \left[1 - \gamma^{-\rho(1-\rho\sigma)} \delta^{(1-\delta\sigma)} \left(r / P_T \right)^{\rho\sigma} \right] / \left[\gamma^{-\rho} (1-\delta) \right] \tag{4.3}$$

Output per worker, Y_T / L_T, is fixed by the production function and the world price of capital. Cost minimisation determines the gross cost of labour must equal the marginal revenue productivity of labour. Then:

$$W_T (1 + T_{EMP}) / P_T = (1-\delta)\gamma^{-\rho} \left(Y_T / L_T \right)^{(1+\rho)} \tag{4.4}$$

Substituting for $\left(Y_T / L_T \right)^{(1+\rho)}$ from equation (4.3) into (4.4), real gross labour costs in the traded sector become:

$$W_T (1 + T_{EMP}) / P_T = (1-\delta)\gamma^{-\rho} + \left[1 - \gamma^{-\rho(1-\rho\sigma)} \delta^{(1-\delta\sigma)} \left(r / P_T \right)^{\rho\sigma} \right] \tag{4.5}$$

The lower the elasticity of substitution ($\sigma<1$) the smaller is the (inverse) change in the traded sector wage caused by a given change in the capital rental. When the elasticity of substitution is greater than unity, a reduction in the rental also reduces the wage, because the substitution effect dominates the output effect. If productivity γ is lower in the devolved administration's economy than in the core economy then so will be the regional traded good wage. Otherwise, with a similar capital rental and traded good price, it will be the same.

Non-traded sector output Y_{NT} depends upon aggregate demand (DMD) from the traded or export sector (Y_T) plus components financed by government (G) net of taxes.

$$Y_{NT} = \alpha + \beta_0 DMD + \phi \left(P_{NT} / P_T \right) \tag{4.6}$$

and aggregate demand is determined as follows;

$$DMD = \beta_1 + \beta_2[G(1-T_y)(1-T_{EMP})] + \beta_3[Y_T(1-T_y)]$$ (4.7)

where $\alpha, \beta_j, j = 0,3,\phi$ are parameters

The representative agent consumes a bundle of traded and non-traded goods for which a price P is paid, taken as a weighted average of the traded and non-traded price indexes. Each agent is endowed with a fixed amount of time, which is spent either on leisure. The labour supply to the traded sector is derived from on household utility maximisation, where the after-tax real wage relative to unemployment benefits determines the trade-off between work and leisure.

Employment in the traded sector is fixed by exogenous gross wage and the supply of labour to the sector. Output is then determined by the marginal productivity of labour. In logs the marginal productivity equation is:

$$Ln(Y/L) = Ln[(1-\delta)\gamma^\rho] + [1/(1+\rho)]Ln[w(1+t)/P_T]$$ (4.8)

Thus, average traded sector productivity depends on the real wages and the state of technology.

The demand for employment in non-traded sector is derived from the demand for output. The supply of nontraded labour depends upon opportunities outside the economy and the size of the economy's workforce. The demand for non-traded labour in logs is (CES):

$$Ln(EMP_{NT}) = \ln\vartheta_1 - \vartheta_2 \ln[W_{NT}(1+T_{EMP})/P_{NT}] + \vartheta_3 \ln(Y_{NT})$$ (4.9)

where $\vartheta_i, i = 1-3$ are parameters. The real wage of non-traded labour can be forced up relative to the traded wage if there is imperfect mobility between the sectors. If

government demand is primarily for skilled labour then is this will be the principal determinant of the relative wage: [6]

$$\ln(W_{NT}) = \ln(\vartheta_4) + \vartheta_5 \ln(G) + \ln(W_T) \tag{4.10}$$

Working population depends upon natural increase, net migration and influences upon labour force participation such as administrative regimes for sickness benefit. Only skilled labour migrates across the border in the present model. Net migration is often supposed to depend upon relative wages and or relative unemployment rates (for example Jackman and Savouri 1992). The impact of public sector employment (public administration, health, education) depends on whether the appointments are from the immobile or mobile labour forces. The effect is captured by the coefficient on government employment in the working population equation.

Unemployment is determined by the difference between working population and total employment, both public and private sector. Thus, unemployment is not the gap between labour supply and demand, it is rather the excess of the labour force over the labour supply[7]. Migration may alter the size of the labour force which in turn will affect unemployment.

5. Model Estimation

The above model, estimated for the economy of Wales from annual data between 1971 and 2001, is set out in Table 2 below. Manufacturing industry is the proxy for the traded goods sector[8]. Appendix 1 presents unit root ADF tests for the

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[6] This is a mark-up on manufacturing (traded) sector wages since the traded sector wage is exogenous.
[7] For a discussion on the implications of the two models of unemployment determination see, for instance, Blanchflower and Oswald (1994).
[8] The correspondence with the theoretical sectors is not exact since there is some traded output produced in the non-manufacturing sector (for example mining at the beginning of the period and tourism at the end. Historically coal exports have been of major significance for the Welsh economy. On the one hand relatively little employment and output (11 percent in the Industrial Production index of 1970) was accounted for by mining even at the beginning of the period. On the other, it was more erratic than

variables. The maintained regressions for I(1) included either an intercept and a deterministic trend or an intercept only, as appropriate. The tests show that the unit root hypothesis cannot be rejected at the 5% significance level for all variables. The data series and definitions are described in Appendix 2. All model equations have been estimated by instrumental variables (IV), using various exogenous variables of the model as instruments[9]. Appendix 3 presents the Ljung-Box Q-statistics for the residuals for model equations.

Equation (A1.1), the manufacturing labour supply function, should ideally measure labour supply in hours, rather than in persons, the actual specification. In view of the rise in part-time, primarily female employment and the absence of data either on hours worked or on the proportion of part-time workers in Welsh manufacturing, the ratio of female employees in Welsh working population (FWPOP) is included to control for this change. Demographic shifts and other time-dependent factors are approximated by a time trend.

[insert Table 2 here]

The estimated productivity equation (A1.2) is derived from the labour marginal productivity equation (4.8). The effect of tax-adjusted wages relative to manufacturing prices on manufacturing output is statistically significant. Also highly significant is the lagged productivity term, the coefficient of which implies a strong persistence of productivity effects. As part-time workers displaced full time workers, manufacturing labour productivity measured simply as a ratio of manufacturing output to the number of employees in manufacturing could be misleading.[10] As in equation A1.1 the spread of

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manufacturing- employment and output fell earlier (between 1971 and 1974 output declined 40 percent). So there is an overstatement of buoyancy of export sector in the early years.

[9] It is well known that the OLS estimation of equations with lagged dependent variables, as some equations in our model are, renders the DW statistics unreliable.

[10] Explaining productivity in UK manufacturing as a whole has proved problematic, partly because apparent productivity slowdown in the 1970s stemmed from incorrect measurement of output and from structural change (Cameron, 2000).

female employment is therefore introduced as a control. The negative coefficient estimated for the ratio of female employees in working population (FWPOP) is consistent with this interpretation.

Turning to the non-traded sector, equation (A1.3) explains the demand for output with the two exogenous components of demand, traded output and government spending. The size of the long run coefficient on traded output/manufacturing reflects the declining share of output of this sector over the estimation period. Firms' demand for labour to produce non-traded output is given by a Cobb-Douglas marginal productivity equation (A1.4). The long run equilibrium ensures that this exhibits constant returns to scale. Equation (A1.5) models the real net non-traded wage as a mark-up over real traded wage. The coefficient of government spending is positive but small, consistent with government demand for labour pushing up wages of selected categories of employees.

Equation (A1.6) explains working population. House prices determine the migrant component of working population; higher relative house prices elsewhere discourage migration from Wales but encourage migration to Wales. The net effect on migration may well depend on the region, whether it is a net importer or net exporter of people to or from Wales. Those relative house price terms included are proxies for the whole regional pattern of house price change. Adding in other region house prices does not change the overall impact, even though they are often statistically significant.

The inclusion of numbers on invalidity and sickness benefits (SIB) in the equation is designed to test whether working population is reduced by the high claimant rate. The coefficient indeed has a negative sign; in view of the relative sizes of the two

groups, the elasticity of 0.04 implies that, at the end of the period, for every four entering or leaving receipt of invalidity benefit approximately one person entered or left the working population. Current declines in numbers on benefits are therefore explained by moves into retirement; the majority of male claimants are over 55 years of age. Most net new claimants apparently would have not been part of the workforce if they had not claimed invalidity benefit.

The public sector and non-traded employment variables in the equation capture similar, but larger, displacement effects. In 2001 public sector employment was 27 percent of working population, which together with the elasticity of 0.258, suggests a one for one relationship; increases in public sector employment have raised the working population equivalently, either by greater labour force participation or by migration (which includes preventing emigration). Private non-traded employment, accounting for 57 percent of working population in 2001 yet with a similar coefficient, exercises a much smaller influence. Every two extra workers boosts working population by just under one person, because some non-traded labour comes from the unemployed, the traded sector or the public sector.

The model is closed with the identities (A1.7)-(A1.10). Government spending (Y_G) and government employment (EMP_G) are treated as exogenous. In the unemployment identity 'employment' includes self-employment. Equation (A1.10) constructs the Welsh cost of living index as a weighted average between traded and non-traded regional prices. For simplicity the weights were kept constant over the estimating period.

6. Simulations

To assess the impact of the rise in the government spending ratio over the years 1971-2001, the employment consequences of an income tax reduction compared with an equivalent government spending increase are simulated with the estimated model. The job effects of a one percent cut in employment tax is also considered. Output is less relevant because it includes a substantial government component valued at cost rather than market prices.

As the model of section 2 implies, if on average taxpayers in the devolved economy regard an increment of government services as more than compensation for the private goods foregone, then their demand for imported goods and services will diminish, and the economy will expand. The converse is true if they prefer the private goods. Measuring the size of the economy by employment, the test of the valuation placed on a marginal change of government output is whether the more jobs are created by a tax cut than by an equivalent increase in government expenditure. Another way of putting the matter is that the valuation measure depends on how the 'cost per job' of the employment created by the public spending increase compares with the 'cost per job' of the taxes raised to finance it.

Simulation 1. Income Tax

Table 3 below presents the quantitative effects of a hypothetical cut in Welsh (and UK) tax rates and of a public spending reduction increase corresponding to a one percent or 1p in the pound reduction in income tax, in 2001.

[insert Table 3 here]

A one penny in the pound cut in income tax induces a 0.5 percent (supply side) increase in manufacturing output and employment (col. 1). The expansion of the manufacturing sector, stemming from a greater labour input, boosts demand for non-

traded output by 1.6 percent so that total output rises 0.65 percent, while total employment increases by 0.54 percent, or some 6,700 jobs. Non-manufacturing employment expands by 0.84 percent - or 4,400 jobs. Working population also grows, going up by 0.22 percent because of immigration and increasing labour force participation. Considering the policy as a job creation exercise, a one penny in the pound increase in the after-tax wage in both sectors yields a cost per job of £31,180[11].

Simulation 2 - Employment Tax.

Table 3 (col. 2) shows the effects of a one percent cut in the employment tax rate paid by the firm. Since the gross wage for the traded sector is exogenous, an increase in the employment tax must be accompanied by a corresponding opposite movement of the nominal manufacturing wage rate. Manufacturing employment increases by 0.48 percent - or 1,760 – triggering an expansion of the manufacturing output. Higher activity in the traded sector has a positive impact on non-traded sector output, which rises by 0.92 percent. To produce this output, employment in the non-traded sector goes up by 0.48 percent - or some 2,500 jobs - and unemployment falls by 0.23 percent. From the point of view of a job creation, the overall cost per extra job is £39,248 in revenue forgone

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Simulation 3 - Government Spending

This simulation is based on an increase in government spending approximately equal to a one percent increase in income tax, namely a 1.24 percent rise in G. For the year 2001 this amounts to £208.9 million. Another direct consequence of the shock is a boost to public sector employment, EMP_G. For every one percent increase in Y_G, EMP_G was assumed to rise according to the historical average, by 0.45 percent.

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[11] The figure reported is for the year 2001. For example, for the manufacturing sector the cost is £418/week*0.01*52 weeks per employee. For both sectors combined the cost per job is £31,180.

The expansion of government spending has no impact on the Welsh manufacturing sector (Table 3, col. 3). The direct effect of government spending is around 1,570 jobs which, together with the indirect effects, push up the total employment to 4,070 jobs. The cost per job per year in this case is around £51,327 and the cost per private sector job is much larger.

Comparison of Spending and Tax Simulations

Overall the costs per job are very high – for the income tax cut about equal to the average full time gross wage costs- and especially high for the government spending policy. Since the extra jobs generate more tax revenue in all three simulations, there would be some offset not considered here. The impact on the non-traded private sector is quite powerful and ranges between 0.5% in the government spending simulation to 0.9% in the employment tax simulation. A vital difference though is that the tax reductions expand the traded sector whereas greater government spending has no effect on it at all. Unemployment falls when taxes are cut. The unemployment rate also declines with greater public spending but only because of the induced growth of working population (the denominator of the unemployment ratio).

The simulation shows that a one penny in the £ cut in Welsh income tax (with a corresponding reduction in UK tax) matched by an equivalent cut in Welsh government spending raises employment (and leaves apparent output virtually unchanged). But the spillover effects of public spending on the private non-traded sector are relatively weak. Consequently the greater part of employment creation in the public spending scenario comes from government jobs; the private 'export' sector only expands in a tax cutting

scenario and private sector jobs in total are crowded out by balanced tax and spending increases.

The inference is that, because of the substantial size of the government sector allowed by the net transfers from the central to the devolved economy, at the margin Welsh taxpayers do not value an increment of average government spending as highly as the private goods forgone because of the corresponding increase in tax payments. A tax-cutting strategy would expand the devolved economy.

7. Conclusion

Devolution of public spending is increasingly seen as an appropriate response to heterogeneous political aspirations within current sovereign state boundaries. Tax devolution is less widespread because of limited or inappropriate tax bases, adverse consequences of tax competition and reduced possibilities for regional stabilisation. But against these considerations must be weighed the efficiency/moral hazard case for devolving taxes. The political economy of increasing government spending, for instance in 'frontier' regions with secessionist challenges, can encourage excessive government spending in devolved economies in the sense that private sector economic activity is crowded out and the possibilities for autonomous economic development unsubsidised by central government are reduced. In the case of the United Kingdom's devolved administrations, 'formula drift' has prevented reining public spending into line with that of the English economy, despite the existence of a rule intended to achieve this end.

The present paper has developed a test for over-expansion of the public sector in devolved economies. It turns on whether taxpayers value increases in government output at least as highly as the private goods and services they must forgo to finance

them. If they do not, they will try to import more private sector goods and services than can be financed and thereby create deflationary pressure in the economy, unless more central government dept transfers are provided. When a balanced expansion (contraction) of government spending and taxation reduces (increases) employment then the size of the public sector is greater than optimal; the valuation of the increment of government output is less than that of the matched tax payments. The test can be represented also in relative 'cost per job' terms. If the implied 'cost per job' of government expansion is greater than that of the corresponding tax change then the public sector is too large.

Of the three devolved administrations in the United Kingdom, two of them increased their ratios of government spending to GDP relative to the English economy over a quarter of a century. The third maintained a ratio 80 percent higher than the English over the period. The paper has estimated a three sector Hecksher-Ohlin model of the economy with the greatest relative rise of the public spending ratio, Wales. Simulation of the model showed a net gain in employment from a one percent cut in income tax matched by a corresponding reduction in government spending. The result is consistent with the current level of intergovernmental transfers being excessive.

References

Besley T and Coates S. (1999) 'Centralised Versus Decentralised Provision of Local Public Goods: A Political Economy Analysis' *NBER working paper 7084.*

Blanchflower D. G. and Oswald, A.J. (1994) *The Wage Curve*, MIT Press.

Box, G.E.P., Pierce, D. A., (1970). Distribution of residual autocorrelations in autoregressive integrated moving average time series models. *Journal of the American Statistical Association*, 65, pg. 1509-1526.

Cameron G (2000), 'Why Did UK Manufacturing Productivity Growth Slow Down in the 1970s and Speed Up in the 1980s?' *Economica* Feb. 70, 121-41

Decressin J (2002), 'Regional Income Redistribution and Risk Sharing: How Does Italy Compare in Europe?' *Journal of Public Economics* 86 (2002) 287–306.

Enders, W., *Applied Econometric Time Series*, New York: John Wiley & Sons, 2004.

Heald D (2003), '*Funding the Northern Ireland Assembly: Assessing the Options'*, Research monograph 10 Northern Ireland Development Office.

Heald, D. (1994), 'Territorial Public Expenditure in the United Kingdom', *Public Administration*, 72, Summer, 148-175.

Hughes Hallett, A. (2005), 'Political Devolution without Fiscal Devolution', *Vanderbilt University, Department of Economics,Working paper 0505.*

Jackman, R. and S. Savouri (1992). 'Regional Migration versus Regional Commuting: The Identification of Housing and Employment Flows', *Scottish Journal of Political Economy* 39(3), pg. 272-87.

Journard, I. and P.M. Kongsrud (2003), 'Fiscal Relations Across Government Levels', *OECD Economic Studies* 36, 2003/1.

King D, Pashley M, and Ball R (2004) **'**An English Assessment of Scotland's Education Spending Needs' *Fiscal Studies* 25 4 439-467.

Ljung, G. and Box, G. (1978). "On a Measure of Lack of Fit in Time Series Models", *Biometrika*, 67, 297-303.

Melitz , J and Zummer F (2002) 'Regional Redistribution and Stabilization by the Center in Canada, France, the UK and the US: A reassessment and new tests' *Journal of Public Economics* 86 263–286

Midwinter A (2002) 'The Limits to Fiscal Autonomy under the Devolution Settlement' *Scottish Affairs* 41 102-120

Minford P., Stoney. P, Riley J. and Webb B. (1994). "An Econometric Model of Merseyside: Validation and Policy Simulations" *Regional Studies*, 28, 563-575.

Obstfeld M and Peri G (1998) Asymmetric Shocks; Regional Non-Adjustment and Fiscal Policy, *Economic Policy* 207-259

Persson T and Tabellini G (1996) 'Federal Fiscal Constitutions: Risk Sharing and Redistribution' *Journal of Political Economy* October

Pisauro, Giuseppe, (2001), 'Intergovernmental Relations and Fiscal Discipline – Between Commons and Soft Budget Constraints', *IMF Working Paper* 01/65.

Sanguinetti P and Tommasi M (2004) 'Intergovernmental Transfers and Fiscal Behaviour: Insurance versus Aggregate Discipline', *Journal of International Economics* 62 149– 170

Sato M (2002), 'Intergovernmental Transfers, Governance Structure and Fiscal Decentralization', *Japanese Economic Review* 53 1 March 55-76.

Tiebout, C M. (1956). 'A Pure Theory of Public Expenditures', *Journal of Political Economy* 64, 416-424.

Wildasin D E (2003) 'Fiscal Competition in Space and Time', *Journal of Public Economics* 87, pg. 2571– 2588.

Appendix 1

Unit Root Tests

Variable[#]	ADF Value for I (1)
EMP_T^*	-1.730881
EMP_{NT}^*	-2.890787
$WPOP^*$	-2.751787
Real net manufacturing wage[*]	-2.671702
Y^*	-2.199194
Y_{NT}^*	-2.032721
Y_G^*	-2.77875
Y_T^*	-2.653456
$FWPOP^*$	-1.273380
EMP_G^*	-2.178411
SIB^*	-1.371440
u_UK^{**}	-2.096756
u_W^{**}	-1.905140
EMP^*	-2.256045
G^*	-1.901133
LOW^{**}	-1.683851
SEW^{**}	-2.010703
Firms Unit Labour Costs[*]	-3.445898

Notes:

[#]Unemployment rates, un_W and un_Uk, and the share of female employees in working population, FWPOP are in percentages. All other variables are in logs.

*MacKinnon critical values for rejection of hypothesis of a unit root (intercept and a trend, 2 lags included).

1% Critical Value*   -4.3226

5% Critical Value -3.5796

10% Critical Value -3.2239

**MacKinnon critical values for rejection of hypothesis of a unit root (only intercept, 2 lags included).

1% Critical Value**   -3.6852

5% Critical Value -2.9705

10% Critical Value -2.6242

Appendix 2

Data Sources and Definitions:

NES	New Earnings Survey
DWHS1	Digest of Welsh Historical Statistics 1931-1975
DWHS	Digest of Welsh Historical Statistics 1974-1996
ONS	Office for National Statistics, ONS web site: www.statistics.gov.uk
DWS	Digest of Welsh Statistics
RT	Regional Trends
NAW	National Assembly for Wales website ,
	http://www.wales.gov.uk/keypubstatisticsforwales/index.htm
OECD	OECD National Accounts, volume 2.
DWP	Department of Work and Pensions
MDS	Monthly Digest of Statistics, ONS
ODPM	Office of the Deputy Prime Minister website, www.odpm.gov.uk

Definitions:

Manufacturing wages (WMAN) – £/week. This is "average weekly earnings, full time manual and non-manual male". For the 1986-2001 period the data is from NES. For the 1971-1985 period no such series is available. However, the NES reports separate time series for manual and non-manual male weekly earnings so that we re-constructed the series by assuming a constant share of manual males in total male employment of 0.7. This ratio was obtained (approximated) for year 1990 from Table 8.2, pg 159 in DWHS. To get the real wage the series was deflated by the CPI.

CPI –UK consumer price index ONS, (1990=100).

GDP deflator (GDPD) – ONS, (1990=100)

Price of UK manufactures output (PM) – ONS, 1990=100.

Working population (WPOP) – Thousands. Data for 1974-1996 from DWHS, Table 7.2, pg 137.

Manufacturing, total employment (EMPT) – Thousands. Data for 2000 and 2001 was taken from the NAW. For other periods data is from RT.

Total employment (EMP) – RT. Thousands.

Welsh Output (Y) – £ millions, GDP at factor cost, current prices. Data from 1999 to 2001 are estimates and was taken from NAW. Data from 1974-1996 is from DWHS, Table 2.1, pg. 25.

Manufacturing Output (YMAN) - £ Millions. For the 1971-1990 period data is from RT (it has been multiplied by a coefficient of 1.075 for consistency because from 1996 the series has been revised backwards to 1989 by the Welsh Assembly Government to reflect the new European System of Accounts 1995 requirements, ESA95). For the 1989-1997 period it is from DWS 1999 issue, pg. 231. The 1998-2001 data from the NAW.

Employment tax rate borne by the firm (taxfirm) – Percentage. To get an approximation for this we took the ratio of two indexes, namely total labour costs per unit of output divided by wages and salaries per unit of output (for the UK, whole economy). The latter is series LNNK and the former is series LNNL, both are from the ONS web site. Alternatively unit wage costs for the 1960-2001 period are in Table 3.8 in the Economic Trends Annual Supplement 2002.

Income tax (taxinc) – Percentage. This has been computed as (DT+SS)/HCR where DT is direct taxes on household income, SS is the household's contribution to social security schemes, and HCR is households' current receipts minus employer contributions to social security schemes. All three time series were taken from the OECD National Accounts, vol 2.

Ratio of females in employment (FWPOP) – Percentages. The female employees in employment series (which does not include the self-employed) obtained from RT was divided by the WPOP and multiplied by 100.

Ratio of house prices Wales/South East (HP) – ODPM.

Public sector employment (EMPPS) – Thousands. This is from DWHS, Table 7.3, pg 139 for the 1974-1996 period. To get a consistent time series we added employment from 'other services' to 'public administration, education, and health' for the 1974-1980 period. For the 1971-1973 period we assumed that public sector employment follows the same trend with public sector data. This is published in the row 27 in the table reporting data on insured employees from the WDHS1. Data for the 1997-2001 period was taken from various issues of DWS.

Sickness and invalidity benefits (SIB) – Thousands. For the 1978-2001 period data is from DWP (e-mail). For the period prior to 1978 we used the data from RT. The table 'Sickness and Invalidity benefit: days of certified incapacity in period' in RT reports Wales data on both males and females. The time series was extended backwards for the period 1971-1978 by assuming that the 1982 ratio of the number of people who received SB to the number of days (i.e. 116/36.3) remained unchanged over the period.

An alternative way would be to take a fraction of the number of people who received SB in the UK during that period.

Population (POP) – RT and DWHS, Thousands.

Unemployment Benefits (UB) – In real terms, from the Liverpool model data file.

Welsh Government Consumption (YG) - £ Millions. Obtained by multiplying the public sector average yearly wage by the number of public sector employees.

Welsh Government Total Spending (G) -   1982-1996 DWHS (p.36). After 1996 various editions of DWS (DWS 1999, p.232 and DWS 2001, p.28). Public spending data for Wales was in considerable disarray in the 1970s and no consistent series could be found. Prior to 1982, G data is therefore constructed assuming that the Welsh government spending is a constant fraction of the total UK government spending.

Appendix 3.

The Ljung-Box Q-statistics for the residuals for model equations

The choice of Ljung-Box Q-statistics (Ljung and Box, 1978) is motivated by the fact that this test yields superior small sample performance compared to the original Box and Pierce (1970) Q-statistics. Following Enders (2003), who suggests that the number of sample autocorrelations and partial autocorrelations should not be higher than T/4, for our 30 dataset sample we set this to 6. The results are presented below.

The Ljung-Box Q-statistics for the residuals for model equations

Eq. A1.1	Eq. A1.2	Eq. A1.3	Eq. A1.4	Eq. A1.5	Eq. A1.6
0.01	2.02	3.16*	0.05	1.27	0.06
4.94*	2.13	3.36	1.47	1.27	0.42
4.94	6.10	3.89	1.73	1.27	2.45
5.59	7.27	6.18	2.36	6.22	2.79
7.86	7.50	9.88*	3.51	11.02*	3.01
10.27	8.44	11.85*	3.79	11.02*	3.12

* Significant at 10% level.

The calculated values of Q in Table 4 do not exceed the appropiate 5% values in the chi-squared table so the null of no significant autocorrelation cannot be rejected at this level of significance.

123456789...60 (line numbers in left margin)

Figure 1. Intergovernmental transfers and state employment
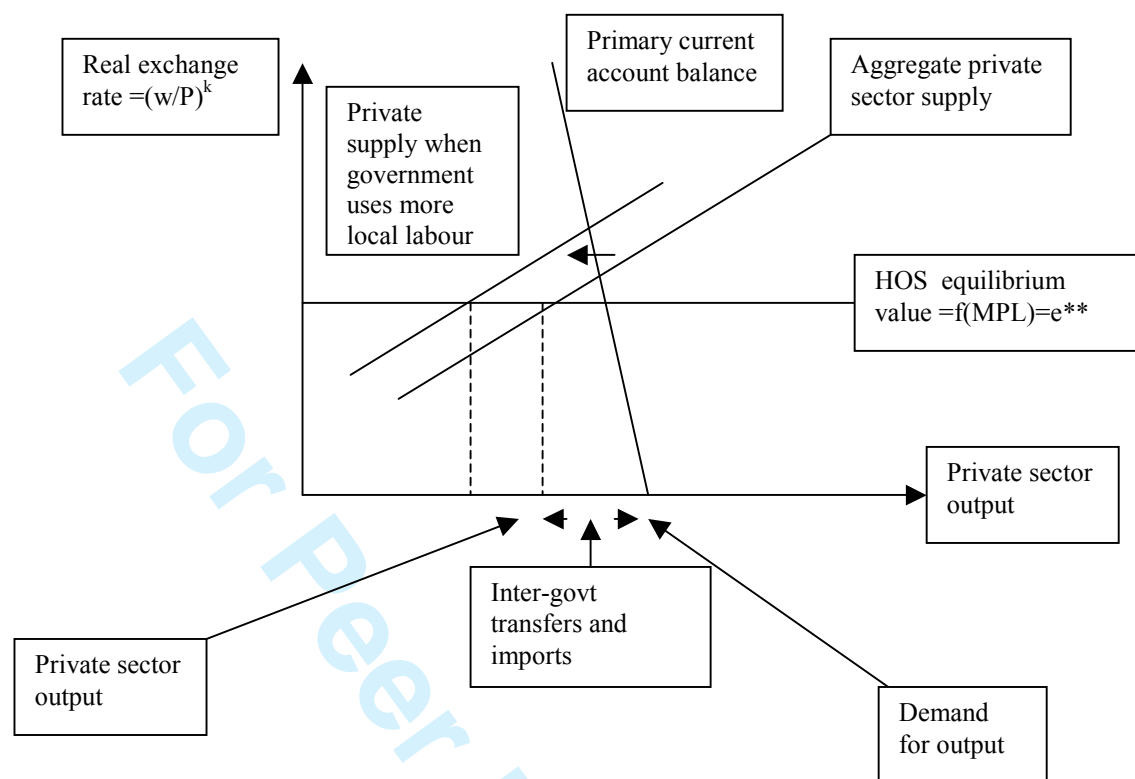
Table 1. Regional UK public expenditure to GDP as a ratio of England's public expenditure to GDP, 1976-2001

Year	Scotland	Wales	Northern Ireland	North East England
1976	1.27	1.20	1.88	n/a
1992	1.24	1.46	1.83	n/a
1997	1.27	1.49	1.78	n/a
2001	1.34	1.51	1.80	1.56

Source: Public Expenditure Statistical Analysis (PESA) HM Treasury, various issues (PESA 1998-1999 Tables 7.2B, 7.3B, 7.4B, 7.5B and 7.6B; PESA 2002-2003 Tables 8.3B and 8.4B, PESA 2004-2005 Table 8.1). The 1976 figure has been calculated by multiplying the ratio of devolved spending per head (taken from Table 3, HM Treasury, 1979) by the GDP per capita ratio (England relative to region).

Table 2: *Estimated Model Equations*

A1.1 $\log(EMP_T) = 101.28 - \underset{(11.28)}{} \underset{(-10.23)}{0.05} * TIME + \underset{(2.36)}{0.54} * \log[W_T * (1 - T_Y) / RPI_W] - 0.54 * \log(BEN) + \underset{(6.42)}{0.085} * FWPOP$

A1.2 $\log(Y_T / P_M) = \underset{(0.34)}{0.16} + \log(EMP_T) + \underset{(6.81)}{0.88} * [\log(Y_T / P_M) - \log(EMP_T)]_{-1} + \underset{(2.31)}{0.94} * \log[W_T * (1 + T_{EMP}) / P_M] - \underset{(-2.60)}{0.036} * (FWPOP)$

A1.3 $\log(Y_{NT} / RPI_W) = -\underset{(-0.67)}{0.71} + \underset{(7.28)}{0.80} \log[G(1 - T_Y)(1 - T_{EMP}) / RPI_W]_{-1} + \underset{(1.71)}{0.48} \log[Y_T(1 - T_Y) / P_M]_{-1} - \underset{(-2.78)}{0.73} \log(P_{NT} / P_M)$

A1.4 $\log(EMP_{NT}) = \underset{(2.31)}{1.57} - \underset{(-2.31)}{0.48} * \log[W_{NT} * (1 + T_{EMP}) / P_{NT}] + \underset{(2.24)}{0.52} * \log(Y_{NT} / P_{NT}) + 0.48 * \log(EMP_{NT})_{-1}$

A1.5 $\log(W_{NT} / RPI_W) = -\underset{(-1.31)}{0.15} + \log(W_T / RPI_W) + \underset{(2.01)}{0.053} * \log(G / RPI_W)$

A1.6 $\log(WPOP) = \underset{(20.81)}{4.154} + \underset{(6.69)}{0.259} * \log(EMP_{NT}) - \underset{(-3.08)}{0.037} \log(SIB) - \underset{(-2.32)}{0.087} * \log(LOW) + \underset{(2.15)}{0.106} * \log(SEW) + \underset{(4.29)}{0.003} * u\_UK + \underset{(6.85)}{0.258} * \log(EMP_G)$

A1.7 $Y = Y_T + Y_{NT} + Y_G$

A1.8 $EMP = EMP_T + EMP_{NT} + EMP_G$

A1.9 $u\_W = [1 - EMP / WPOP] * 100$

A1.10 $RPI_W = 0.75 * P_{NT} + 0.25 * P_M$

(t – statistics in parentheses)

Y – Welsh output (billions £)
Y_{NT} – Welsh non-manufacturing output (billions £)
Y_T – Welsh manufacturing output (billions £)
Y_G – Welsh government spending (billions £)
G – Welsh government spending, including transfer payments (billions £)
EMP – Welsh Employment (thousands)
EMP_T – Welsh manufacturing employment (thousands)
EMP_{NT} – Welsh non-manufacturing employment (ths.)
EMP_G – Welsh public sector employment (thousands)
u_UK – UK unemployment rate (%)
u_W – Welsh unemployment rate (%)
W_T – Welsh manufacturing wage (£, weekly, gross)
W_{UK} – Average UK wage (£, gross, weekly)

W_{NT} – Non-traded Welsh wage (£, gross, weekly)
T_Y – Welsh employees' income tax
T_{EMP} – Welsh employers' income tax
T_{YUK} – UK income tax
BEN – Unemployment benefits
FWPOP – Welsh ratio of females in working population
SIB – Welsh claimants of sickness benefits (thousands)
LOW – London-Wales relative house prices
SEW – South-East – Wales relative house prices
WPOP = Welsh working population (thousands)
P_M – Manufactures prices (1990=100)
P_{NT} – Welsh non-treaded price index (1990=100)
RPI – UK Retail Price Index (1990=100)
RPI_W – Welsh Cost of Living Index (1990=100)

Equation number	DW	R squared
A1.1	2.00	0.90
A1.2	2.45	0.97
A1.3	1.17	0.69
A1.4	2.00	0.85
A1.5	1.60	0.12
A1.6	2.00	0.97

123456789...60

Table 3. Impact of Hypothetical Reductions of Devolved Taxes and Increases in Public Spending (differences from the base run)

	(1) -1p in £ Income tax	(2) -1% Employment tax (and fall in manufacturing wage)*	(3) +1.24% Government spending
GDP	+0.65%	+0.42%	+0.68%
Manufacturing output	+0.63 %	+0.48 %	-
Public sector output	-	-	+1.24%
Non-Manufacturing output	+1.60%	+0.92%	+0.99%
Employment	+0.54 % (6,700)	+0.34 % (4,260)	+0.33% (4,070)
Non-Manufacturing Employment	+0.84 % (4,400)	+0.48 % (2,500)	+0.48% (2,500)
Manufacturing employment	+0.63 % (2,300)	+0.48 % (1,760)	-
Public sector employment	-	-	+0.44% (1,570)
Working population	+0.22 %	+0.12 %	+0.24%
Unemployment rate	-0.33 %	-0.23 %	-0.09%

Source: Simulations of the model of Table 3.

Notes: Number of jobs in parentheses - the estimates are for the year 2001

* The yield of the one percent cut in employment tax is less than that of the one percent income tax.