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THREE AND FOUR REGION MULTI-SECTOR LINEAR MODELLING USING UK DATA: SOME PRELIMINARY RESULTS

BY

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Three and Four Region Multi-Sectoral Linear Modelling Using UK Data: Some Preliminary Results

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I. Introduction

Recent government policy in the United Kingdom (UK) has moved some political and economic powers and responsibilities from the control of the UK government at Westminster to the devolved administrations of Scotland, Wales and Northern Ireland. While each devolved administration holds slightly different powers, all have some responsibility for policy delivery in their own region. In this paper we identify key elements of the economic interaction between these devolved regions and the Rest of the UK. Specifically we spatially disaggregate a set of UK national accounts to identify the inter-regional trade and income flows, using Input-Output (IO) and Social Accounting Matrix (SAM) methods.

Scotland and Wales have relatively up-to-date, independently generated, IO tables. These can be separated out from a UK national IO table to construct an inter-regional table. We therefore undertake the detailed analysis at this three-region (Scotland, Wales and the Rest of the UK (RUK)) level, where the Rest of the UK is England and Northern Ireland. However, we also construct a more rudimentary four-region (Scotland, Wales, England and Ireland) set of IO and SAM accounts by constructing a separate Northern Ireland accounts. The inter-regional IO and SAM models are produced for the year 1999. This was determined by the availability of consistent data.

In Section II we describe the construction of a three-region Input-Output model for the United Kingdom, which includes the regions of Scotland, Wales and the Rest of the UK (RUK). In Section III we extend the three-region model to construct an inter-regional Social Accounting Matrix. Section IV reports some results using the three-region IO and SAM models. In Section V, we generate a four-region IO and SAM model for the UK, which disaggregates Northern Ireland from the Rest of the UK, and provide some results using the four-region IO and SAM models. Section VI offers our conclusions.

II. Construction of the UK three-region Input-Output table

For the three-region Input-Output (IO) model for the UK, we take our regions as Scotland, Wales and the Rest of the UK (RUK). These regions either have IO tables already available, or tables that could be constructed relatively easily. First we obtain or construct standalone IO tables for Scotland, Wales and the UK. Second we fill in as much of the inter-regional IO table as possible directly using these single-region and national models or with minor manipulation. Third we estimate the inter-regional trade matrices that are not available from the single-region models.

The availability of Scottish, Welsh and UK Input-Output tables

In recent years, the Scottish Executive has begun to produce annual IO tables for Scotland[1]. We chose 1999 as the base year because this was the most recent year for which the Scottish IO table was available when the research began. For Wales, in collaboration with the Welsh Economy Research Unit (WERU), we estimated an IO table for 1999 by "rolling-back" by one year their 2000 table (Bryan *et al*, 2004).[2] However, the availability of data to construct a national "analytical" IO table is more problematic.

The main difficulty in constructing a UK national table is that only the Supply-Use Table (SUT) is published annually for the UK. The latest set of analytical IO tables for the UK were produced for 1995, a year for which Scottish and Welsh IO tables are unavailable. In order to convert the UK SUT for any year to an analytical IO format, data are required on commodity taxes, distribution margins and sectoral imports. This allows production of a Product-by-Industry (PxI) IO table, which can then be converted to a Product-by-Product (PxP) or Industry-by-Industry (IxI) format using a make matrix (Miller and Blair, 1985). However, apparently due to confidentiality constraints, the Office of National Statistics (ONS) do not make the commodity tax, distribution margin and make matrices publically available, so we are unable to undertake the required conversions. Therefore, we have chosen to roll the 1995 UK analytical IO tables forward to 1999.

The control total data that are suitable for rolling forward the 1995 analytical tables are the column totals of the SUT, which give industry gross outputs. However, only PxI and PxP tables are available for 1995. We cannot roll forward the PxP tables because the SUT only gives product gross outputs in purchaser prices and does not distinguish imports and locally produced goods. Therefore, in the first instance we roll forward the 1995 PxI tables, and then use a mechanical balancing program to produce an IxI table. These processes thus provided us with single-region IO tables for Scotland and Wales and a national IO table for the UK for 1999. The next step was to incorporate these two single-region tables into a three-region national IO table.

Constructing a three-region IO table for the UK for 1999

[1] These can be downloaded at www.scotland.gov.uk/input-output
[2] The Welsh Economy Research Unit published a 2000 Input-Output table in May 2004. This can be downloaded at http://www.weru.org.uk/output.pdf

The schematic structure of the three-region IO table is given in Tables 1 and 2. There are four different types of data that have been used to construct the three -region IO tables for the UK.

1. Data directly available from the existing standalone tables for Scotland and Wales.
2. Data that can be calculated for the Rest of the UK (RUK) directly from the standalone regional tables and the national (UK) table.
3. Data that have to be calculated for Scotland and Wales indirectly using regional import matrices.
4. Data from the residual that makes up the RUK elements.

Table 1 partitions the three-region table. Table 2 uses the same structure but identifies the particular matrix notation used for each, and also indicates, through appropriate shading, the sources of different data. The notation is as follows. Matrices are identified as X, C, and T. The X matrices show the matrix of purchases made by the production sectors in each region and the C matrices the matrix of purchases by final demand categories. T indicates total row or column vectors, where the superscript I, F, ROW and P denote intermediate sectors, final demand, Rest of the World and primary inputs respectively. Superscripts denote the producing region and subscripts denote the consuming region, where S, W and RUK represent Scotland, Wales and RUK (the UK without Scotland or Wales) respectively. The key for the shading is given below.

	Type of data used to complete inter-regional IO table	**Shading**
1.	Data directly available from existing standalone region tables of Scotland and Wales	
2.	Data that can be calculated for the Rest of the UK (RUK) directly from the standalone regional tables and the national UK table.	
3.	Data that have to be calculated for Scotland and Wales indirectly using regional import matrices.	
4.	Data from a residual element to represent the RUK.	

Step 1: Data from existing standalone region models of Scotland and Wales

Some of the matrices in Table 2 can be completed directly from the appropriate standalone Scottish and Welsh tables. These are indicated by white cells. From the

standalone regional tables we can read the matrices $\mathbf{X^S_S}$, $\mathbf{X^W_W}$, $\mathbf{C^S_S}$ and $\mathbf{C^W_W}$ directly. Similarly, from the Scottish and Welsh primary inputs matrices we can take the matrices $\mathbf{X^{ROW}_S}$, $\mathbf{X^{ROW}_W}$, $\mathbf{C^{ROW}_S}$, $\mathbf{C^{ROW}_W}$, $\mathbf{X^P_S}$, $\mathbf{X^P_W}$, $\mathbf{C^P_S}$ and $\mathbf{C^P_W}$. The $\mathbf{C^S_{ROW}}$ and $\mathbf{C^W_{ROW}}$ export data can also come directly from the standalone tables, as can the sectoral gross output and input totals ($\mathbf{T^Q_S}$ and $\mathbf{T^Q_W}$) and the gross demands for the Welsh final demand categories ($\mathbf{T^D_S}$ and $\mathbf{T^D_W}$). The data for the total UK imports from ROW, total primary UK exports to ROW, total UK exports to ROW and UK primary inputs ($\mathbf{T^{ROW}_{UK}}$, $\mathbf{C^P_{ROW}}$, $\mathbf{T^D_{ROW}}$ and $\mathbf{T^P_{UK}}$) are taken from the UK table.

Step 2: Data for the Rest of the UK (RUK) that can be calculated at this stage

Some RUK matrices can be calculated directly from the standalone regional tables of Scotland and Wales, and the UK national table. The matrices we can calculate at this stage are those for the RUK primary inputs matrix and imports from the Rest of the World, plus those for exports from the RUK to the Rest of the World.

The RUK primary expenditure matrices, $\mathbf{X^P_{RUK}}$ and $\mathbf{C^P_{RUK}}$ can be determined from the existing single-regions' IO data, as the residual after taking the Scottish and Welsh entries for these matrices away from those in the UK IO table.

$$X^P_{RUK} = X^P_{UK} - X^P_S - X^P_W$$

$$C^P_{RUK} = C^P_{UK} - C^P_S - C^P_W$$

The matrices of RUK imports from the Rest of the World, $\mathbf{X^{ROW}_{RUK}}$ and $\mathbf{C^{ROW}_{RUK}}$ can similarly be constructed by subtracting the row vectors for Scotland and Wales imports from the Rest of the World, away from the UK matrix.

$$X^{ROW}_{RUK} = X^{ROW}_{UK} - X^{ROW}_S - X^{ROW}_W$$

$$C^{ROW}_{RUK} = C^{ROW}_{UK} - C^{ROW}_S - C^{ROW}_W$$

We can also calculate the production sector gross input/output totals, and the final demand totals, $\mathbf{T^Q_{RUK}}$ and $\mathbf{T^D_{RUK}}$, for the Rest of the UK sectors by subtracting the totals for

each production and final demand sector in Scotland and Wales from the UK totals for production sector and final demand category.

The vector of RUK exports to ROW, $\mathbf{C^{RUK}_{ROW}}$, can be determined from the existing single regional IO data, as the residual after taking the Scottish and Welsh entries away from those in the ROW exports from the UK IO table.

$$C^{\mathrm{RUK}}_{\mathrm{ROW}} = C^{UK}_{ROW} - C^{S}_{ROW} - C^{W}_{ROW}$$

The scalar $\mathbf{C^{ROW}_{ROW}}$, direct UK imports that go enter direct UK exports, is also taken from the UK IO table.

Step 3: Inter-regional trade calculated for Scotland and Wales using regional import matrices

The next step is to complete the necessary inter-regional trade matrices. Formally, what we have for Scotland and Wales from their standalone IO tables is a vector of exports to the other regions of the UK and aggregate imports from the other regions of the UK by use. For intermediate inputs we have the sector in which the imports are used, and for final demand we have the category of final demand (consumption, government or investment). For both exports and imports from other regions of the UK, these vectors have to be expanded to two matrices, distinguished by both region and sector or origin or destination.

Step 3.1 Scottish Imports from Wales and the Rest of the UK

Our first step was to identify the sectors from which each of the Scottish production and final demand sectors imported. Secondly, we then disaggregated this matrix between imports to Scotland from Wales, and imports from the Rest of the UK.

We were kindly provided with experimental information from the Scottish Executive for 1999 on Scottish intermediate and final demand imports from the other regions of the UK. These data could be aggregated to the appropriate sectoral definitions. However, they are reported in terms of products imported by Scottish industries and final demand sectors – i.e. PxI, rather than the symmetric PxP or IxI matrices. In the first instance, we have attempted to overcome this by adjusting the row totals (total imports to Scotland of each Welsh and RUK product) of the PxI imports to intermediate and final consumption – the $\mathbf{X^{RUK}_S}$, $\mathbf{C^{RUK}_S}$, $\mathbf{X^{W}_S}$ and $\mathbf{C^{W}_S}$ matrices respectively - using the ratio of the output of each RUK industry to the

corresponding product output to convert the row totals from commodity to industry output. (For example, RUK and Wales manufacturing industry output divided by RUK and Wales manufacturing product output). We then used a RAS mechanical balancing program to adjust the matrix to the revised row totals.

Having derived the Scottish intermediate and final demand import matrixes from RUK and Wales as a whole, we needed to split this matrices into the matrices $\mathbf{X^W_S}$, $\mathbf{C^W_S}$, $\mathbf{X^{RUK}_S}$ and $\mathbf{C^{RUK}_S}$ from Figure 2. The method for disaggregating this matrix ($\mathbf{X^{W+RUK}_S}$) used here was:

$$x_{ij}^{W,S} = x_{ij}^{W+RUK}\left(\frac{q_i^W}{q_i^W + q_i^{RUK}}\right)$$

Where $x_{ij}^{W,S}$ is the value in row i and column j for the imports from Wales to Scotland matrix, x_{ij}^{W+RUK} is the aggregate matrix of Scottish imports from the Rest of the UK, and q_i^W and q_i^{RUK} is the total output of sector i in Wales and RUK respectively. This means that in using imports from the Rest of the UK and Wales of sector i goods and services, each Scottish production or final demand sector makes the same proportionate use of Welsh or RUK outputs, based on the total output shares of the Welsh and RUK sector.

As an example, in the case of Primary and Utilities commodities, the ratio of Welsh produced commodities to total Primary and Utilities production in the Rest of the UK is

$$\frac{q_1^W}{q_1^W + q_1^{RUK}} = \frac{4376.40}{78365.86 + 4376.40} = 0.0529$$

Therefore, we assume that each Scottish production sector, i, and final consumption sector, z, purchases 5.3% of its RUK imports of Primary and Utilities goods and services from Wales and the remaining 94.7% is imported to Scotland from RUK. Doing this for all eight imported goods and services figures from the Scotland-RUK model completes the $\mathbf{X^W_S}$, $\mathbf{C^W_S}$ in Figure 2. Then, by subtracting $\mathbf{X^W_S}$ and $\mathbf{C^W_S}$ from the aggregate $\mathbf{X^{RUK+W}_S}$ and $\mathbf{C^{RUK+W}_S}$ we get the new matrices $\mathbf{X^{RUK}_S}$ and $\mathbf{C^{RUK}_S}$ of Scottish imports from RUK.

Step 3.2: The Welsh Use matrices

We use essentially the same method for Wales to calculate the imports from Scotland and the Rest of the UK. Again, we had a matrix of imports by use by industry for Wales, which we were kindly given by WERU for the year 2000. Therefore, is was not necessary to adjust this matrix from products to industries, but simply to "roll" it back from 2000 to our base year of 1999. Once this process was done, we used exactly the same method for Wales as we had done for Scotland. This process allowed us to calculate the matrices $\mathbf{X^S_W}$, $\mathbf{C^S_W}$, $\mathbf{X^{RUK}_W}$ and $\mathbf{C^{RUK}_W}$

Step 4: Remaining RUK columns

At this stage we have all the matrices from Table 2, apart from $\mathbf{C^S_{RUK}}$, $\mathbf{C^W_{RUK}}$, $\mathbf{C^{RUK}_{RUK}}$, $\mathbf{X^S_{RUK}}$, $\mathbf{X^W_{RUK}}$ and $\mathbf{X^{RUK}_{RUK}}$, but we have the aggregate matrices X and C from the standalone UK IO table for 1999. What we also have from our single-region models of Scotland and Wales is a column vector giving total exports from Scotland to Wales and RUK combined and similarly total exports from Wales to Scotland and RUK combined. Our next step was to calculate the intermediate sectors and final demands in the RUK to which the Scottish and Welsh sectors export. This was calculated in a straightforward method, using the difference between the sum of exports to Wales and RUK for Scotland (Scotland and RUK for Wales) and those imports to Wales from Scotland (imports to Scotland from Wales) that we calculated in steps 3.1 and 3.2.

The difference in these values gave us a column vector of exports to RUK by Scottish and Welsh sectors. We next had to use an estimation procedure to apportion these to RUK intermediate sectors and final demand categories.

Our procedure was to calculate the RUK Use matrices, $\mathbf{X_{RUK}}$ and $\mathbf{C_{RUK}}$, and then use this matrix to allocated exports to RUK from Scotland and Wales between intermediate sectors and final demand categories.

We calculated the RUK Use matrices, $\mathbf{X_{RUK}}$ and $\mathbf{C_{RUK}}$, as the residual from subtracting the Scottish and Welsh Use matrices from the UK single-region IO table matrices, $\mathbf{X_{UK}}$ and $\mathbf{C_{UK}}$. Thus,

$$X_{RUK} = X_{UK} - X_S^S - X_S^W - X_S^{RUK} - X_W^S - X_W^W - X_W^{RUK}$$

$$C_{RUK} = C_{UK} - C_S^S - C_S^W - C_S^{RUK} - C_W^S - C_W^W - C_W^{RUK}$$

To use the matrices above to disaggregate our residual column vectors of exports to RUK from Scotland and Wales, we used the ratio for the RUK of each sector's and final demand's use of the output of sector i to total RUK use of UK sector i. This ratio is calculated for each cell in the RUK Use matrix. The values in each row are then multiplied by the total exports of each Scotland (and Wales) sector to RUK to calculate the amount exported from each Scottish (and Welsh) sector to each intermediate and final demand category in RUK. This process gives us the matrices $\mathbf{X}^{\mathbf{S}}_{\mathbf{RUK}}$, $\mathbf{C}^{\mathbf{S}}_{\mathbf{RUK}}$, $\mathbf{X}^{\mathbf{W}}_{\mathbf{RUK}}$ and $\mathbf{C}^{\mathbf{W}}_{\mathbf{RUK}}$, and, by construction, ensures that the Gross Output values for Scotland and Wales equal their single-region IO values.

To construct the $\mathbf{X}^{\mathbf{RUK}}_{\mathbf{RUK}}$ and $\mathbf{C}^{\mathbf{RUK}}_{\mathbf{RUK}}$ matrices we can now simply subtract the matrices obtained above ($\mathbf{X}^{\mathbf{S}}_{\mathbf{RUK}}$, $\mathbf{C}^{\mathbf{S}}_{\mathbf{RUK}}$, $\mathbf{X}^{\mathbf{W}}_{\mathbf{RUK}}$ and $\mathbf{C}^{\mathbf{W}}_{\mathbf{RUK}}$) from the RUK Use matrices, $\mathbf{X}_{\mathbf{RUK}}$ and $\mathbf{C}_{\mathbf{RUK}}$. Calculating the three-region IO table in this way ensures that we have a balanced three-region IO table for Scotland, Wales and the Rest of the UK with no problem of negative entries in any of the intermediate demand matrices, $\mathbf{X}^{\mathbf{S}}_{\mathbf{RUK}}$, $\mathbf{X}^{\mathbf{W}}_{\mathbf{RUK}}$ or $\mathbf{X}^{\mathbf{RUK}}_{\mathbf{RUK}}$.

Sectoral aggregation

When we calculate the Rest of the UK matrices, we calculate the Rest of the UK values often as the residual from the UK national IO table minus the values for Scotland and Wales. It is important to ensure that each of the single-region tables is constructed in such a way as making each region consistent with the other. To allow this we aggregated the single-region models in each case to an eight-sector aggregation. This aggregation is shown in Table 3.

This process provided us with a balanced three-region model of the economic linkages between production sectors and final demand categories in Scotland, Wales and the Rest of the UK. In Section III we extend the IO database into a Social Accounting Matrix, and then in Section IV we use these IO and SAM data to examine multiplier values and perform some attribution analysis.

III. Constructing the three-region Social Accounting Matrix (SAM)

In this section we introduce the concept of a Social Accounting Matrix (SAM) and look at the main features of such a model. We describe the structure of the inter-regional

SAM and then outline how we have extended the three-region IO table with further information on income transfers to construct a three-region SAM for the UK.

A SAM is a particular representation of the macro and meso economic accounts of a socio-economic system, which captures the transactions and transfers between all economic agents in the system (McGregor *et al*, 2004a,b; Pyatt and Round, 1985; Reinert and Roland-Holst, 1997). In common with other economic accounting systems, such as IO, the SAM records transactions taking place during a particular accounting period, usually one year. This also means that SAMs are typically build around an Input-Output table (or inter-regional IO table), where the (unchanged) IO table records the transactions between production sectors in the economic system. The main features of a SAM are as follows.

First, the accounts are represented as a matrix, where the incomings and outgoings for each account are shown as a row and corresponding column of the matrix. The transactions are shown in the cells, so the matrix displays the interconnections between agents in an explicit way. Second, the SAM is comprehensive, in the sense that it portrays all the economic activities of the system (production, consumption, accumulation and distribution), although not necessarily in equivalent detail. Thirdly, the SAM is flexible (Thorbecke, 2001), in that, although it is usually set up in a standard basic framework, there is a large measure of flexibility both in the degree of disaggregation and in the emphasis place on different parts of the economic system.

A Social Accounting Matrix (SAM) provides a more complete picture of the economy than a conventional IO account. In particular, it more explicitly tracks market and non-market income and resource flows (e.g. transfers). Apart from the productions sectors (which are represented by eight sectors identified in Table 3), there are also factor, institutional, foreign and capital accounts. The structure of the SAM is given in Table 4. For each region, the factor accounts are disaggregated into labour and capital and there are four accounts for institutions (Round, 1995), which are Net Production Taxes, Households, Corporations and Government. The foreign account of our single-region SAMs, which we have constructed for Scotland, Wales and the UK, are divided into imports and exports from the Rest of the UK (RUK) and Rest of the World (ROW) and for each location there are separate trade and transfer accounts.

The schematic structure of the three-region SAM is given in Tables 4. There are four steps, involving different types of data and procedures, which we have used in its construction.

	Type of data used to complete inter-regional SAM table	**Shading**
1	Data directly available from the existing thee-region IO model as shown in Table 2	
2	Matrices that can be completed from the income-expenditure accounts constructed for standalone SAMs for Scotland, Wales and the UK as a whole	
3	The disaggregation of net commodity taxes between regions	
4	The estimation of other inter-regional transfers	

Step 1: Data available from the existing three-region IO model as shown in Table 2.

Step 1.1: Matrices directly from the inter-regional IO table

Some of the matrices in the SAM come directly from the inter-regional IO table as given in Table 2. These are:

Payments from production sectors to production sectors

The matrices showing production linkages between the eight production sectors of Scotland, Wales and the RUK can be read directly from the inter-regional IO table. From this table, we were able to obtain not only each region's domestic matrices $\mathbf{X}^{S}_{S}$, $\mathbf{X}^{W}_{W}$ and $\mathbf{X}^{RUK}_{RUK}$, but also the inter-regional trade matrices $\mathbf{X}^{W}_{S}$, $\mathbf{X}^{RUK}_{S}$, $\mathbf{X}^{S}_{W}$, $\mathbf{X}^{RUK}_{W}$, $\mathbf{X}^{S}_{RUK}$ and $\mathbf{X}^{W}_{RUK}$.

Production sectors to the Rest of the World

The matrices showing expenditure by production sectors to the Rest of the World (ROW) can be read directly from the inter-regional IO table. The matrices are $\mathbf{X^{ROW}_S}$, $\mathbf{X^{ROW}_W}$ and $\mathbf{X^{ROW}_{RUK}}$,

Rest of the World to Production sectors

The matrices showing expenditure by the Rest of the World on production sectors output can also be read from the IO table for three-regions. This provides the matrices $\mathbf{C^S_{ROW}}$, $\mathbf{C^W_{ROW}}$ and $\mathbf{C^{RUK}_{ROW}}$,

Rest of the World to Rest of the World

There are some export expenditures that are directly met by imports. These are given as the scalar $\mathbf{C^{RUK}_{ROW}}$,.

Total production sector output and income

The vectors of total outputs of production sectors, $\mathbf{T^Q_S}$, $\mathbf{T^Q_W}$, and $\mathbf{T^Q_{RUK}}$ can be read directly from the interregional IO table.

Step 1.2: Matrices from the IO table that are separated out in the SAM

These are matrices that are given in Table 2 that need to be divided up for the SAM, but where the information is unchanged.

Institutions and Capital to Production

Payments by institutions and capital to production sectors are identified in the inter-regional IO table as C^S_S, C^W_W, C^{RUK}_{RUK}, C^W_S, C^{RUK}_S, C^S_W, C^{RUK}_W, C^S_{RUK} and C^W_{RUK}. In the SAM, we need to separate out those demands from institutions, that is Households and Government (there are no direct demands from Net Production Taxes or Corporations) from the demands from the Capital account (investment). These are separately identified here using an I superscript for institutions and a K superscript for the capital account. This means that where Institutions in one region purchase the output of Production in that region, the matrices are given as $\mathbf{C^{I,S}_S}$, $\mathbf{C^{I,W}_W}$, $\mathbf{C^{I,RUK}_{RUK}}$, while each region's institutions' purchases from other regions' production sectors are shown in $\mathbf{C^{I,W}_S}$, $\mathbf{C^{I,RUK}_S}$, $\mathbf{C^{I,S}_W}$, $\mathbf{C^{I,RUK}_W}$, $\mathbf{C^{I,S}_{RUK}}$ and $\mathbf{C^{I,W}_{RUK}}$.

For the purposes of our SAM we have aggregated the GDFCF and Change in Inventories values from the inter-regional IO table into a single "Capital" column for each region. This provides us with the purchases of outputs of production sectors by capital in each region, including inter-regional purchases, and allows us to obtain the matrices $\mathbf{C^{K,S}_{S}}$, $\mathbf{C^{K,W}_{W}}$, $\mathbf{C^{K,RUK}_{RUK}}$, $\mathbf{C^{K,W}_{S}}$, $\mathbf{C^{K,RUK}_{S}}$, $\mathbf{C^{K,S}_{W}}$, $\mathbf{C^{K,RUK}_{W}}$, $\mathbf{C^{K,S}_{RUK}}$ and $\mathbf{C^{K,W}_{RUK}}$.

Production sectors to Factors of Production

In the three-region IO table, matrices X^{P}_{S}, X^{P}_{W}, and X^{P}_{RUK} show payments from Production Sectors to Factors of Production. Again for the SAM these matrices need to be disaggregated. The payment to labour and capital is given in matrices $\mathbf{X^{F,S}_{S}}$, $\mathbf{X^{F,W}_{W}}$ and $\mathbf{X^{F,RUK}_{RUK}}$,. Note that production sectors in Scotland (or Wales or RUK) pay factors of production from Scotland (or Wales of RUK) respectively. There are no inter-regional expenditures in this block, thus there are zero matrices off the diagonal in this payments from production sectors to factors of production block.

Capital to Rest of the World

Within the three-region IO table, payments from the Institutions and Capital accounts of Scotland, Wales and the Rest of the UK to the Rest of the World are given as C^{ROW}_{S}, C^{ROW}_{W}, and C^{ROW}_{RUK}. In the SAM these need to be disaggregated. For the Capital account, the appropriate matrices are identified as $\mathbf{C^{K,ROW}_{S}}$, $\mathbf{C^{K,ROW}_{W}}$, and $\mathbf{C^{K,ROW}_{RUK}}$.

Total expenditure by the capital sector

In the Input-Output table data are given as part of final demand for expenditure by the capital sector, that is to say, investment. This is part of the vectors T^{D}_{S}, T^{D}_{W}, and T^{D}_{RUK},. The scalars for total expenditure are extracted from these vectors and given as $\mathbf{T^{K}_{S}}$, $\mathbf{T^{K}_{W}}$, and $\mathbf{T^{K}_{RUK}}$ in Table 4.

Total factor income and expenditure

Again, from the Input-Output Table 2 we can disaggregate those elements of income from the primary input matrices X^{P}_{S}, X^{P}_{W}, and X^{P}_{RUK} that go to factors of production. This

gives the factor of production income and expenditure total vectors $\mathbf{T^F_S}$, $\mathbf{T^F_W}$, and $\mathbf{T^F_{RUK}}$ in Table 4.

Step 2: Matrices in the inter-regional SAM from single-regional income-expenditure accounts

Since we have identified the sources of all the information necessary for our inter-regional SAM that can be read directly from the inter-regional IO table, the next step is to identify the information that can be obtained from income-expenditure accounts. We use the income-expenditure method (Turner, 2002), to estimate most of the remaining data necessary for the inter-regional Social Accounting Matrix. One of the characteristics of this approach is that it embodies double-entry bookkeeping, in that any item of expenditure in one account (a column entry) simultaneously appears as an item of income in another (a row entry). By constructing single region income-expenditure accounts observing this rule it is possible to fulfil much of the additional data requirements and automatically balance the SAM. For the purposes of our inter-regional SAM data requirements we have five income-expenditure accounts to construct. These are made up of three local transactors – households, government and corporations – the external account (defined as the Rest of the UK and Rest of the World in the income-expenditure accounts for Scotland and Wales, and the Rest of the World in the income-expenditure accounts for the UK), and the capital account.

The format used to construct the income-expenditure accounts can be seen in Table 5. As an example of how the income-expenditure accounts were constructed, detailed notes on the sources and methods used for the income-expenditure account for Wales in 1999 can be found in Appendix 1. Using similar methods, income-expenditure accounts for Scotland and the UK were constructed. Having constructed the income-expenditure accounts for Scotland, Wales and the UK, we could now use this information to complete the inter-regional SAM for the UK.

Factors of production payments to Institutions

Payments from factors of production (labour and other value added) to institutions were available from the income-expenditure accounts. Factors of production provided income to institutions, in the form of labour providing income to households, and other value added provides profit income to households, corporations and government. Estimates of these flows of income for Scotland and Wales could all be obtained directly from the income-

expenditure accounts obtained for Scotland and Wales. These are shown as matrices $\mathbf{FT}^{S}_{S}$, $\mathbf{FT}^{W}_{W}$, and $\mathbf{FT}^{RUK}_{RUK}$.

We note that there are no inter-regional transfers in this matrix, such as between factors of production in Scotland and institutions in Wales. All transfers in this block are assumed to be intra-regional. For the intra-RUK transfers, we again use the income-expenditure accounts constructed for the UK national economy and take the RUK-RUK entries as the residual after subtracting the corresponding Scottish and Welsh entries from each UK one.

Diagonal elements in Institutions to Institutions matrices

In the payments from Institutions to Institutions matrix in Table 4, we can complete the elements of this matrix that record Institutions' intra-regional transfers to other Institutions. Due to the way in which income-expenditure accounts are constructed there are no payments made by the Scottish household account, for instance, to the Scottish household account, rather any income or expenditure for the household account will come from, or go to, the other institutions. Thus, the elements in the matrices showing payments from Scottish (Welsh) institutions to other Scottish (Welsh) institutions can be read directly from the Scottish (Welsh) income-expenditure accounts. Once again, the RUK values for payments between RUK institutions is found as the residual after subtracting payments from Scottish to Scottish and Welsh to Welsh institutions from total UK intra-agent payments. These are given as matrices $\mathbf{IT}^{S}_{S}$, $\mathbf{IT}^{W}_{W}$, and $\mathbf{IT}^{RUK}_{RUK}$ in Table 4.

Payments from the Rest of the World to Institutions and Capital

The transfer of income entries in the inter-regional SAM to and from the Rest of the World can be obtained from the Scottish, Welsh and the Rest of the UK income-expenditure accounts. In the case of Scotland (or Wales) these can be read directly from the Scottish (Welsh) income-expenditure accounts. For the RUK, these are equal to the UK income-expenditure account entries for each institutions income from the Rest of the World minus the Scottish and Welsh values. These give the matrices $\mathbf{IT}^{S}_{ROW}$, $\mathbf{IT}^{W}_{ROW}$, $\mathbf{IT}^{RUK}_{ROW}$, $\mathbf{CT}^{S}_{ROW}$, $\mathbf{CT}^{W}_{ROW}$, $\mathbf{CT}^{RUK}_{ROW}$, $\mathbf{CT}^{ROW}_{S}$, $\mathbf{CT}^{ROW}_{W}$, and $\mathbf{IT}^{ROW}_{RUK}$.

Total institutional income and expenditure

These are derived from the standalone regional income-expenditure accounts and form the matrices $\mathbf{T^I_S}$, $\mathbf{T^I_W}$, and $\mathbf{T^I_{RUK}}$.

Total Rest of the World Income and Expenditure

This scalar $\mathbf{T^I_{RUK}}$ is derived from the income and expenditure accounts

Step 3: The disaggregation of net commodity taxes between regions

Production sectors to institutions and capital payments to institutions

As explained under Step 1.2 above, we need to split the single net product and production tax row from the matrices X^P_S, X^P_W, and X^P_{RUK} in the 3-region IO table. This allows taxes paid on goods and services imported from other UK regions to be recorded as going to the net commodity tax and government accounts in the exporting region. This provided us with the information that was necessary for the inter-regional SAM on the expenditure by production sectors from Scotland, Wales and RUK to the Net Commodity Accounts of Scotland, Wales and RUK. These payments were recorded in the Net Commodity Tax institution account of the region to which the tax was paid. This gives the matrices $\mathbf{X^{I,S}_S}$, $\mathbf{X^{I,W}_W}$, and $\mathbf{X^{I,RUK}_{RUK}}$, and also the inter-regional tax flow matrices $\mathbf{X^{I,W}_S}$, $\mathbf{X^{I,RUK}_S}$, $\mathbf{X^{I,S}_W}$, $\mathbf{X^{I,RUK}_W}$, $\mathbf{X^{I,S}_{RUK}}$ and $\mathbf{X^{I,W}_{RUK}}$.

Similarly, the payments of commodity tax by the capital account of each region needed to be separated out from the single row vector identified in the inter-regional IO table. As with the production sectors payments to net commodity taxes in each region, the capital accounts payments to commodity taxes were estimated in the same method. This generates the matrices $\mathbf{KT^S_S}$, $\mathbf{KT^W_W}$, $\mathbf{KT^{RUK}_{RUK}}$, $\mathbf{KT^W_S}$, $\mathbf{KT^{RUK}_S}$, $\mathbf{KT^S_W}$, $\mathbf{KT^{RUK}_W}$, $\mathbf{KT^S_{RUK}}$ and $\mathbf{KT^W_{RUK}}$.

Step 4: Matrices in inter-regional SAM unable to be derived from IO or single-region income-expenditure accounts

The final stage in the construction of the inter-regional SAM is to examine the inter-regional transfers between the institutions of Scotland, Wales and RUK that are identified as "transfers to the Rest of the UK" in the Scottish and Welsh income-expenditure accounts.

These payments need to be disaggregated into transfers to Wales and RUK in the Scottish case, and Scotland and RUK in the Welsh case.

Inter-regional Institutional transfers

The remaining matrices are those that show the inter-regional income transfers between the institutions of Scotland, Wales and RUK. As previously noted, the income-expenditure account approach had external accounts for Scotland and Wales which contained transfers to the Rest of the UK and the Rest of the World. The values showing transfers outwith the region but within the nation need to be disaggregated between Wales and RUK (for Scotland) and Scotland and RUK (for Wales). Note that we only split the RUK transfer entries in the case of the household and corporate accounts. In the case of inter-governmental transfers (all inter-regional transfers, except capital, are assumed to be intra-agent flows, e.g. Scottish households to Welsh households or Welsh corporations to Scottish corporations), we assume that these will be between the devolved administrations of Scotland and Wales and central government located in the Rest of the UK.

The interregional transfers in the household accounts for Scotland and Wales were split between Wales/RUK and Scotland/RUK respectively based on the expenditure entries in the Scottish and Welsh accounts, which are estimates of transfers of wage income. Therefore, we calculate the income from Scotland and Wales to the Welsh and Scottish income accounts respectively based on the share of RUK wage income that is generated in Scotland and Wales. To split the RUK transfers from Scotland and Welsh corporations we use the regional shares in the generation of other value added. This generates the matrices $\mathbf{IT^{W}_{S}}$, $\mathbf{IT^{RUK}_{S}}$, $\mathbf{IT^{S}_{W}}$, $\mathbf{IT^{RUK}_{W}}$, $\mathbf{IT^{S}_{RUK}}$ and $\mathbf{IT^{W}_{RUK}}$.

Institutions payments to capital

The values for each region's institutions payments to capital were estimate as is explained in Allan *et al* (2004). Positive income transfers from any one region to the capital account of another are not allocated as capital-to-capital intra-agent transfers. Instead they are reallocated from the own-region capital account entries for households, government and corporations based on the distribution of savings across these transactors in the income-expenditure account of the home-region. This generates the matrices $\mathbf{CT^{S}_{S}}$, $\mathbf{CT^{W}_{W}}$, $\mathbf{CT^{RUK}_{RUK}}$, $\mathbf{CT^{W}_{S}}$, $\mathbf{CT^{RUK}_{S}}$, $\mathbf{CT^{S}_{W}}$, $\mathbf{CT^{RUK}_{W}}$, $\mathbf{CT^{S}_{RUK}}$ **and** $\mathbf{CT^{W}_{RUK}}$.

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Having constructed the full matrix showing the inter-regional transfers between institutions in Scotland, Wales and the Rest of the UK, this completes the necessary matrices for an inter-regional Social Accounting Matrix. This SAM reveals not only the production linkages between Scotland, Wales and the Rest of the UK, which is shown in the inter-regional IO table, but also the linkages between factors of production, institutions and capital accounts in each of these three regions. The final SAM is presented in Table 6, which has been aggregated from eight to three sectors to conserve space.

In the next section we use models based both on our three-region IO and SAM to examine the economic linkages between Scotland, Wales and the Rest of the UK. We use both multiplier analysis and multiplier methods to attribute output, value added and employment to final demands across the regions of the United Kingdom.

IV: Results from three-region IO and SAM models

The results initially presented here are derived from our 3-region, 8-sector Input-Output (IO) and SAM accounting system for the UK. The three regions are Scotland, Wales and the Rest of the UK (RUK). We discuss the results from our corresponding UK 4-region sets of accounts (whose regional disaggregation is Scotland, Wales, Northern Ireland and England) in Section V, though data constraints limit these accounts to three production sectors.

The inter-regional accounts can be used to derive a model of the UK economy that allows us to examine the spatial and sectoral impact of an exogenous final demand shock in a particular sector in a particular region in the absence of any supply constraints. The effect on each individual region and the country as a whole can therefore be recorded. The inter-regional model is an extension of the single region IO so it is useful to begin by outlining single-region IO multipliers for Scotland, Wales and the UK for 1999. It is then a simple conceptual step to extend this technique to the multi-region model.

4.1 IO Output Multipliers in a Single Region Model

One of the strengths of IO is its ability to model the ultimate impact of marginal changes in final demand. With the necessary caveats regarding fixed technical coefficients and no supply constraints, IO is an extremely useful tool for analysing exogenous final demand shocks. While impact analysis uses the Leontief inverse, $(I-A)^{-1}$, and final demand matrix to estimate changes in economic activity caused by exogenous changes in demands,

Miller and Blair (1985, p101) describe input-output multipliers as "summary measures" for impact analysis, where final demand changes drive changes in economic activity through the interdependencies of the Leontief inverse. We will also use the multiplier values to indicate the degree of interdependence between industrial sectors and regions within the UK.

As Miller and Blair (1985, p102) note, "the issue of multipliers rests upon the difference between the initial effect of an exogenous (final demand) change and the total effects of that change". There are two main types of multiplier. A Type I multiplier quantifies the *direct* and *indirect* effects of a change in exogenous final demand. The indirect effects are the increased intermediate inputs required directly or indirectly to produce the change in final demand. Type II multipliers identify the *direct*, *indirect* and *induced* effects[3]. With Type II multipliers, the input-output system is closed with respect to households, so changes in expenditure by workers employed in the sectors experiencing the exogenous demand change are included. The changes in expenditure of these workers are *induced* by the expansion in demand for the products and the increase in the wages paid in that sector.

The key element in IO analysis is the Leontief Inverse matrix which shows how much of each industry's output is needed, in terms of direct and indirect requirements, to meet one unit of final demand for a given industry's output (Alexander and Whyte, 1994). Using the Leontief Inverse allows us to show how final demand drives total output:

$$X = (I - A)^{-1} Y \tag{4.1}$$

where X is the nx1 vector of industry total gross outputs, $(I-A)^{-1}$ is the nxn Leontief Inverse matrix, and Y is the nxz vector of total final demands, and there are n industrial sectors and z categories of final demand.

The Leontief Inverse matrix, however, serves a further purpose. This matrix can be written in extended form as:

$$(I - A)^{-1} = \begin{bmatrix} z_{11} & z_{12} & \cdots & z_{1n} \\ z_{21} & z_{22} & \cdots & z_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ z_{n1} & z_{n2} & \cdots & z_{nn} \end{bmatrix} \tag{4.2}$$

Each element (z_{ij}) identifies the output supported in sector *i* by a unit of final demand for the output of sector *j*. Summing down each column $\sum z_{ij}$ for production sector *j* gives the total output supported in the economy by one unit of final demand for that sector - the output multiplier. Table 7 shows, for illustrative purposes, the conventional Type I Leontief inverse values for Scotland treated as a stand-alone region.

Taking the Primary & Utilities sector as an example, each £1 of final demand supports £1.188 of output in that sector. The original £1 is the direct effect, while the additional 18.8p is the indirect effect. This £1 of demand also creates output in other sectors, leading to an overall Type I multiplier of 1.741. In other words, each £1 of final demand supports an additional 74p of output in the Scottish economy.

Similarly, Type II output multipliers are calculated by summing down the production sector entries in the columns of the Type II Leontief Inverse, where households have been endogenised. Repeating this process for each region, we derive a set of output multipliers as shown in Table 8.

As we expect, the Type II multiplier values are larger than Type I. This is due to the additional activity attributed to the increased consumption demand for goods and services coming from additional wage payments. Also the relative sizes of multiplier values across regions shown in Table 8 are as we would generally expect. In almost all sectors, the multiplier values for RUK are greater than those for Scotland, which in turn are greater than those for Wales[4]. Larger geographical areas, such as the RUK economy (England plus Northern Ireland here), will source a greater share of the intermediate and consumption demands from within their own geographic boundaries. Hence there are fewer leakages than smaller economies that rely on trade for a greater share of intermediate inputs.

Employment and Value Added Multipliers in a Single Region Model

In addition to output multipliers, it is also possible to calculate a number of other measures to summarise the impact of an external final demand shocks. These include

[3] More complex multipliers, which endogenise other elements of final demand through direct or implied population links (Batey, 1985), can also be calculated. We have limited our analysis to those multipliers outlined above.

[4] Welsh multiplier values are greater than Scottish ones in Manufacturing and Wholesale and Retail Trade. The RUK multiplier values are always above the Scottish or Welsh values.

employment and value added (VA) multipliers, which show the employment/VA supported in the economy by each unit of final demand. The VA in any sector is calculated as the sum of the Compensation of Employees and Gross Operating Surplus rows in the IO table, thus providing a measure of sectoral GDP.

The calculation of employment or VA multipliers involves generating a coefficient vector showing the corresponding employment or VA associated with each unit of sectoral output. Using employment as an example, the ith element of the vector e is given by:

(4.3) $$e_i = \frac{E_i}{X_i}$$

where E_i is employment in industry. If we construct a nxn diagonal matrix, Φ, where the ith diagonal element is e_i, and all off-diagonal elements are zero, then pre-multiply by the Leontief inverse, we can derive an nxn employment inverse, Γ:

(4.4) $$\Gamma = \Phi(I - A)^{-1}$$

where each element, ε_{ij}, is given by:

(4.5) $$\varepsilon_{ij} = z_{ij} e_i$$

It is then possible to attribute employment to different final demand categories through the equation:

(4.6) $$E = \Gamma Y$$

where E is the nx1 column vector of sectoral employment levels. Analogous to output multipliers, by summing down each column of the employment inverse the total employment supported by each unit of output for a particular production sector can be found.

Additional to calculating the employment and value added output multipliers, it is also possible to calculate multipliers showing the employment or value added supported in the economy by each unit of employment or value added directly generated through final demand. For example, in the case of employment, this involves divide each element of the Γ matrix by the employment/output coefficient for the sector

directly generating the final demand. Each element of the resulting matrix, Λ, is the employment supported by a unit increase in direct employment associated with final demand for a particular sector's output. In matrix form this is given as:

$$\Lambda = \Phi(I - A)^{-1}\Phi^{-1} \tag{4.7}$$

where each element, λ_{ij}, is given by:

$$\lambda_{ij} = \frac{z_{ij}e_i}{e_j} \tag{4.8}$$

Three-region Output Multipliers

Using the three-region IO model we have developed for Scotland, Wales and the Rest of the UK, we can analyse the inter-regional spillover effects of output changes in addition to the impact within the region. Equation 4.1 above shows the matrix algebra required to attribute output to final demands, while a similar process can be followed for employment and value added attribution. The major alteration required for multi-region analysis is the introduction of partitioned matrices. The partitioned A-matrix for the three-region model can be illustrated as:

$$A = \begin{bmatrix} A_{11} & A_{12} & A_{13} \\ A_{21} & A_{22} & A_{23} \\ A_{31} & A_{32} & A_{33} \end{bmatrix} \tag{4.9}$$

In Equation (4.9) each element is itself a matrix given by A_{ij} where subscript *i* refers to the producing region and subscript *j* to the consuming region. Thus A_{11}, A_{22} and A_{33} are the domestic A matrices for Scotland, Wales and RUK respectively, while all other matrices are trade matrices[5].

By applying the same process to the other matrices, equation (4.1) can be restated in multi-region format as:

[5] For example, A_{21} shows the technical coefficients for Scottish consumption of Welsh production.

$$(4.10) \qquad \begin{bmatrix} X_{11} & X_{12} & X_{13} \\ X_{21} & X_{22} & X_{23} \\ X_{31} & X_{32} & X_{33} \end{bmatrix} = \begin{bmatrix} 1-A_{11} & -A_{12} & -A_{13} \\ -A_{21} & 1-A_{22} & -A_{23} \\ -A_{31} & -A_{32} & -A_{33} \end{bmatrix}^{-1} \begin{bmatrix} Y_{11} & Y_{12} & Y_{13} \\ Y_{21} & Y_{22} & Y_{23} \\ Y_{31} & Y_{32} & Y_{33} \end{bmatrix}$$

In this case, X_{11} shows the output supported in Region 1 (Scotland) by final demand in Region 1, X_{12} shows the output supported in Region 1 by final demand in Region 2 etc. Similarly, where there are n (8) sectors in each region, the 3nx3n (24x24) Leontief Inverse matrix breaks down the output multiplier for each sector *i* in each region into local output and imports required per unit of final demand for that sector. The 8x8 sub-matrices (1 - A_{11}), (1 - A_{22}) and (1 - A_{33}) measure the impact on each of the regions of changes in exogenous demand in the same region. The column totals from these sub-matrices therefore give the intra-regional impact of final demand shocks, while the other sub-matrices show the impact of trade between regions - the inter-regional effect.

Table 9 shows a summary of Type I and Type II IO output multipliers for each of the three regions. These tables are split into a number of sections, with the first three columns showing the intra-regional impact of an exogenous demand shock. For example, reading down the Scotland column, the Primary & Utilities multiplier is 1.746. Thus, for every £1 of exogenous demand for Primary & Utilities in Scotland, £1.746 of output is supported in Scotland. The equivalent figure for Wales is £1.307, indicating that each £1 of demand for Welsh Primary & Utilities output supports an additional £0.307 of output in Wales.

It is interesting to compare these values to the equivalent single region values shown in Table 8. As can be seen, the intra-regional multipliers are consistently higher, as the intra-regional multipliers include the impact of inter-regional feedback. For instance, given a demand shock, Scottish manufacturers will source some portion of their increased inputs from firms outwith Scotland, which will be included in the inter-regional multipliers. In turn, these firms will obtain some of their increased inputs from Scottish companies and it is this feedback mechanism that causes the intra-regional multipliers to be slightly larger than their single region counterparts.

It is also interesting to note the difference between multipliers for different sectors, indicating that the overall impact of a change in final demand will depend on the sector in which the shock occurs. The full Scottish IO table identifies 128 separate sectors and we would expect multiplier variation to be greater with more disaggregation. However, even with only eight sectors we can see that sectors such as Construction have consistently higher

multipliers than, for example, Wholesale and Retail Trade. This implies that a shock to the Construction sector will have a larger overall impact in the economy that the same magnitude of shock to the Wholesale and Retail Trade sector. It is also interesting to note the large induced effect (difference between Type II and Type I multiplier values) in certain sectors, most notably Public Administration, Health & Social Work and Other Services, indicative of the fact that this sector is highly labour-intensive.

Perhaps most interesting, however, is the pattern of trade between the three regions, represented in the three sections to the right of the intra-regional multipliers in Table 9. The second section shows the multiplier impact of Scottish demand shocks on output in Wales and RUK, giving a measure of trade between the regions. The most obvious trend to note is that Scotland has far stronger linkages to RUK than to Wales. For example, in the Manufacturing sector, the Type I impact of a demand shock in Scotland is to increase Welsh output by £0.024 and RUK output by £0.451. The effect is even more pronounced for a shock in Wales, with the multiplier effect being bigger for RUK than for Wales itself in many cases. On the other hand, the multipliers for RUK trade with Scotland and Wales are very small, reflecting the fact that smaller economic areas often have a greater reliance on trade for inputs to production.

The separate section to the right of the main table shows the total impact throughout the UK of a shock in a particular region. Each figure is calculated by adding the intra- and inter-regional impacts of a change in demand. It is interesting to note that, in contrast to the single region case in Table 8, Scotland now tends to have the largest multiplier values, with RUK now having the smallest multipliers in certain sectors such as Manufacturing and Public Administration, Education, Health & Social Work. However, Welsh multipliers demonstrate the largest percentage change between single- and multi-region multipliers, reflecting the fact that small regions are generally more reliant on external trade than big regions.

Equation (4.10) above also allows us to calculate the output supported by different final demand categories, giving useful information on important sources of demand for different regions. Table 10 shows the conventional Type I and Type II output attribution for each of the three regions. One interesting feature is the difference in importance of inter-regional demand to each region's output. For example, 33% of Welsh output is supported by demand outwith Wales but within the UK, while the equivalent figure for Scotland is 25%. This compares to only 4% for RUK, again highlighting the importance of inter-regional trade to small regions.

Perhaps more interesting, though, is the role of demand from the Rest of the World (ROW) in supporting output. ROW exports account for around 20% of Welsh output, 23% of RUK output and 27% of Scottish output. Thus, Scotland is most reliant on overseas exports to support the economy. This means, however, that Scotland is most susceptible to changes in foreign tastes, exchange rate fluctuations etc. that could impact strongly upon the economy.

Multi-Region Employment and Value Added Multipliers

The calculation of multi-region employment and value added multipliers requires a process similar to that described above for the single region case. Again, we use employment as an example and begin by constructing the inter-regional employment output multiplier matrix, Γ_R. This requires, in addition to the output multiplier matrix, a diagonal matrix of employment/output coefficients. Using these, we can define a 3nx3n (24x24) partitioned matrix of employment/output multipliers as:

$$\Gamma_R = \begin{bmatrix} \Phi_1 & 0 & 0 \\ 0 & \Phi_2 & 0 \\ 0 & 0 & \Phi_3 \end{bmatrix} \begin{bmatrix} 1-A_{11} & -A_{12} & -A_{13} \\ -A_{21} & 1-A_{22} & -A_{23} \\ -A_{31} & \_A_{32} & 1-A_{33} \end{bmatrix}^{-1} \tag{4.11}$$

where Φ_i is the diagonal matrix of employment output coefficients for region i.

Thus, we can attribute total employment in the economy to particular sources of final demand through the expression:

$$\begin{bmatrix} E_{11} & E_{12} & E_{13} \\ E_{21} & E_{22} & E_{23} \\ E_{31} & E_{32} & E_{33} \end{bmatrix} = \Gamma_R \begin{bmatrix} Y_{11} & Y_{12} & Y_{13} \\ Y_{21} & Y_{22} & Y_{23} \\ Y_{31} & Y_{32} & Y_{33} \end{bmatrix} \tag{4.12}$$

where E_{11} is an nxI matrix showing the employment generated in Region 1 (Scotland) by production activities in Region 1 to support Region 1 final demand.

Again the multiplier matrix can be expressed in terms of the employment or value added supported in the economy by each unit of employment or value added directly generated through final demand. Again in the case of employment, this means dividing each element of the Γ_R matrix by the appropriate employment/output coefficient for the

regional sector directly generating the final demand producing the matrix Λ_R. In matrix form this is given as:

$$(4.13) \qquad \Lambda_R = \begin{bmatrix} \Phi_1 & 0 & 0 \\ 0 & \Phi_2 & 0 \\ 0 & 0 & \Phi_3 \end{bmatrix} \begin{bmatrix} 1-A_{11} & -A_{12} & -A_{13} \\ -A_{21} & 1-A_{22} & -A_{23} \\ -A_{31} & \_A_{32} & 1-A_{33} \end{bmatrix}^{-1} \begin{bmatrix} \Phi_1 & 0 & 0 \\ 0 & \Phi_2 & 0 \\ 0 & 0 & \Phi_3 \end{bmatrix}^{-1}$$

Tables 11 and 12 show summaries of employment and value added (VA) multipliers respectively, set out in the same way as the output multipliers described in the previous section. As in the single-region case, these multipliers show the Type I/Type II employment/VA increase in each region associated with a change in final demand for a particular sector's output generating a unit of direct employment or value added.

While the multiplier values are largely in the same order for each region, Financial Intermediation and Business Services differs substantially. This sector has only the 5th largest Type I employment multiplier for Scotland and Wales but the 2nd largest for RUK (largest in Type II). This is probably caused by the concentration of financial services firms in London and the South-East of England and these firms are generally highly labour-intensive. Given that RUK also includes Northern Ireland, the English employment multiplier may be even higher. Furthermore, Financial Intermediation and Business Services has the highest output of any RUK sector and the second highest output in Scotland, implying the sector is a hugely important employer for these regions.

The Construction sector has, quite clearly, the highest VA multipliers in both Scotland and RUK. This is probably due to the fact that this sector is "sheltered" and buys the majority of its inputs from local suppliers. Looking at the intra-regional component would appear to back up this suggestion, with Construction having very large intra-regional multipliers in Scotland and RUK. Although overall in Wales this sector does not have the largest multiplier, the intra-regional component is the biggest, again reinforcing the argument that construction sources its inputs locally. It is also interesting that the Construction sector has a large induced effect, suggesting that it is labour-intensive and/or its sources of supply are labour-intensive.

In terms of employment, Table 13 shows both Type I and Type II attribution. From this we can see that 28% of Welsh, 26% of Scottish and 21% of RUK employment is supported by Government spending throughout the UK. This means the government can have

a significant impact on employment throughout the economy by adjusting their spending levels. It is also worth noting that, while Scotland and RUK both have around 21% of their employment supported by ROW exports, the equivalent value for Wales is just 16%. Thus, in employment terms, Wales should be the most resistant to poor exchange rates etc.

As explained earlier, Value Added (VA) gives a measure of GDP in each region. Table 14 shows the attribution for VA in our inter-regional model. We can see that households from outwith the region support almost half as much VA as do home-region households in both Scotland and Wales. This compares to around a third for the equivalent figure for RUK. Again, this tends to support the view that small geographic regions rely more on external trade than do large regions.

Using the Inter-Regional Social Accounting Matrix

We can also use the three-region Social Accounting Matrix constructed in Section III, to examine the inter-linkages between Scotland, Wales and the Rest of the UK. As with the results presented using the inter-regional IO table, our initial results use the inter-regional SAM to examine multiplier values for output, value added and employment, while also examining output, value added and employment which can be attributable to final demand categories in Scotland, Wales and the Rest of the UK. We calculate Type 2 values for the multipliers in each case, where the household account is made endogenous to the SAM model – the government, capital and Rest of the World account remains exogenous, as in the IO Type 2 case.

SAM Type II multipliers for Output, Employment and Value Added are shown in Table 15, while the attribution of Output, Employment and Value Added to final demand categories across the three regions is shown in Table 16.

V: Incorporating Northern Ireland to construct a four-region Input Output and SAM model of the UK

Having constructed an inter-regional IO and SAM for the UK for three regions – Scotland, Wales and the Rest of the UK – our next step was to construct a four-region model which separately identifies Northern Ireland (and therefore also England) into our analysis. We had to construct independently an IO table for Northern Ireland as no official, or unofficial, IO tables exist for this devolved region. This section details our methods for calculating the four-region IO and SAM models and recalculates the results from Section IV,

using these four-region models. For more details on the construction of the four-region IO and SAM models see Allan *et al* (2004).

Construction of single-region IO table for Northern Ireland

Our initial needs for a four-region model of the UK – involving Scotland, Wales, Northern Ireland and England – were determined by the capacity of AMOSUK, our inter-regional Computable General Equilibrium model (Ferguson *et al*, 2004). The AMOSUK model uses the SAM data as a key input. Given both the modelling needs and data limitations, we have restricted ourselves in the first instance to a 3-sector, 4-region Input-Output tables The sectors chosen corresponded to IOC classification of production activities, as shown in Table 17.

Therefore our first step was to aggregate the three-region IO and SAM calculated in Sections II and III to these three-sectors. We next estimated the single-region IO table for Northern Ireland, given the lack of official published tables. Our approach was, wherever possible, to use Northern Ireland-specific published data as control totals for individual rows and columns. Then for the column coefficients we used the coefficients from the aggregated three-sector model for Wales. Wales is a similar sized economy to Northern Ireland and we felt would provide an indication of the linkages between Northern Ireland and the rest of the UK. We then used a balancing program to construct the single-region Northern Ireland IO table. This table could then be used as an element in the four-region IO table. However, as with the IO tables of Scotland and Wales, disaggregation of imports from and exports to the Rest of the UK was necessary.

We are aware that Northern Ireland, like Wales, shares a border with a larger economic region – the Rest of the UK (specifically England) in the case of Wales, the Republic of Ireland in the case of Northern Ireland. The differences here is that imports and exports between Northern Ireland and the Republic of Ireland are treated as coming from/going to the Rest of the World, while imports and exports for Wales to England come from/go to the Rest of the UK. This is one issue that we have attempted to consider when we obtained the control total data for Northern Ireland.

In the specific case of exports to the Rest of the UK and the Rest of the World, our method was to obtain as much official published Northern Ireland specific data as possible and then make appropriate adjustments using information from the other regions of the UK. Specifically, we used the "Northern Ireland Manufacturing Sales and Exports Survey

1999/00-2000/01" which gave estimates for the manufacturing sector around our base year. Estimated exports in manufacturing to the Rest of the UK were £3,248million, while £3,732million of manufacturing was exports to the Rest of the world.

Figures for Scotland showed that manufacturing exports to the Rest of the UK represented 43.79% of all exports to the Rest of the UK, while for exports to the Rest of the world, manufacturing exports represented 75.06% of all exports. Using these shares and the Northern Ireland figures for total manufacturing exports, we estimated that Northern Ireland exports as £7,417.9million to the Rest of the UK and £4,972million to the Rest of the World.

Similar methods were used to obtain control totals for the other final demand categories - Households, General Government, GDFCF and Inventories - as well as primary inputs – imports from RUK and ROW, net production and commodity taxes, compensation of employees and gross operating surplus. Estimates for the total gross inputs for the three sectors in the model of Northern Ireland.

Tables 18, 20, and 22 show the Type I and Type II output, employment and value-added inter-regional I-O and SAM multipliers for the 4-region model. These correspond to Tables 9, 11 and 12 in the three-region case. The own multiplier values for Northern Ireland are relatively high. Although the economy is small, this perhaps reflects its rather isolated status. Tables 19, 21 and 23 show the supported output in the four regions. Again these figures correspond to those given in Tables 10, 13 and 14 for he three region model. The importance of government expenditure in Northern Ireland for supporting output and employment in the province is shown clearly in these figures.

Section VI: Conclusions

In this paper we detail the way in which we have constructed a disaggregated 3 and 4 region set of I-O and SAM accounts for the UK for the year 1999. These accounts indicate the flows of goods, services and income both within and between regions of the UK and also between the regions of the UK and the Rest of the world. These data are of great value in themselves and are also required for more sophisticated, inter-regional multi-sectoral modelling and analysis.

Based upon these accounts, we have calculated various multiplier values. We recommend that in this context, these should be used as indicators of the degree and nature of interdependence between regions. We have also undertaken attribution analysis. This is an

accounting technique and, in this case, shows, for the year 1999, the extent to which regional gross output, employment and gross value-added can be attributed to exogenous demands both from within and outwith individual regions. These analyses are clearly only preliminary but lay the foundation for a better understanding of the economic relationships between regions which are likely to become more important as the institutions of devolution develop.

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Appendix 1: Income and Expenditure Accounts for Wales (1999)[6]

A set of income-expenditure accounts for Wales in 1999 have been constructed to meet all additional data requirements for construction of a Social Accounting Matrix (SAM). Hence, the data necessary for extending the Welsh 1999 Input-Output (IO) table into a SAM would come from within these income and expenditure accounts.

Completion of a set of internally consistent income-expenditure accounts means that the SAM will automatically balance. Balancing is constrained by the fixed IO entries and it is therefore necessary to manually balance the SAM on the basis of the additional entries in the income-expenditure accounts alone.

One of the key characteristics of a SAM is that it is the embodiment of double-entry bookkeeping, in that any item of expenditure in one account (a column entry) must appear as an item of income in another (the corresponding row entry). By constructing the five sets of income-expenditure accounts observing this rule it is possible to fulfil all the additional data requirements and automatically balance the SAM.

In constructing the income-expenditure accounts it is best to begin with the three local transactors – households, government and corporate – for which data are more readily available from existing published data sources. Table 5 in the text provides a detailed outline of the common format used for all three of these accounts.

The Household Account

The household account is constructed first, as this account was the one for which information was most readily available. The fixed IO entries in the household income-expenditure account are:

- income from employment (from the Welsh IO table) – £18,932.06million
- final demand expenditure by households (final consumption from Welsh IO table) – £24,100million

The Household Income and Expenditure account for 1999 is shown in the table below, where all figures are in £millions, 1999 prices).

[6] These notes follow the method used in Turner (2002).

Income	**37,169.00**		**Expenditure**	**37,169.00**
Income from employment	18,932.06		IO expenditure	24,100.00
Profit income (OVA)	2,049.00		Payments to corporations	5,649.51
Payments from corporations	8,441.33		Payments to government	5,548.15
Payments from government	6,548.77		Payments to capital	1,784.00
Transfers from RUK	598.92		Payments to RUK	58.15
Transfers from ROW	598.92		Payments to ROW	29.08
Total Household income	**37,169.00**		**Total expenditure**	**37,169.00**

The remaining items in the household account are:

Household Income:

- **Profit income (Other Value Added (OVA)).** The share of total OVA income accruing to Welsh households is taken to be equivalent to households Gross Operating Surplus published in a regional household income and consumption data supplement by the Office of National Statistics (Clifton-Fearnside, 2001). This gives a figure of £2,049million.

- **Payments from corporations.** This item is estimated using data taken from published sources: ONS data on regional household sector income and consumption, ONS data on UK dividend payments, and pension data in the Digest of Welsh Statistics. The final figure consists of three main elements: dividend payments by Welsh companies going to Welsh households, income generated from private pensions, and any other mixed income. First, dividends by Welsh companies going to households are estimated by taking the Welsh share of UK dividend payments using its proportion of UK value added. Welsh companies are estimated to pay dividends of £2936.37million. Of this 15.3% is equity owned by individuals in the UK as a whole. The Welsh share of this population is 4.94%, with the rest of dividends paid by Welsh companies going to individuals elsewhere in the UK. This gives a figure for dividends by Welsh companies going to Welsh households of £22.18million. Secondly, a private pension figure is estimated from data on total pensions to households and subtracting a figure for public pensions (where public pensions are the difference between total Social Security payments and Other Social Payments). This gives a figure for private pensions to Welsh households from Welsh corporations of £3185.3million. The last element in this account takes account of any other mixed income. This consists of a proportion (50%) of net other income from the

ONS Regional Household Income data – giving £777million – but also includes mixed and property income taken from ONS regional household and income consumption data – adding a final £4456.9million. We estimated a total figure for payments to corporations of £8441.3million by summing these three values.

- **Payments from government.** This item is estimated using a similar method to that used to estimate payments from corporations, except here we focus on the public sector element of income generation. The first, and major, element of this figure is total Social Security payments to households. These are available from Public Expenditure Statistical Analysis (HM Treasury, 2001, Table 8.2a-8.6a) and are annualised for calendar years. This is done in the following way. When converting financial figures with a year-end of the 31st of March into the 1999 calendar year the following formula was applied.

$$V_{1999} = \frac{1}{4} V_{1998-9} + \frac{3}{4} V_{1999-2000}$$

This formula simply takes one quarter of the 1998-9 financial year and three quarters of the 1999-2000 financial year. We here assume that the timing of any payments is constant over the financial year and thus any change in payments from one year to another occur as a step-change from the 1st of April onwards. This gives a figure for 1999 of £5771.8million. Secondly, the remaining 50% of "other mixed income" is allocated to households through government, giving £777 million. We calculate dividends from public sector corporations in Wales going to Welsh households in the same way as for private dividends shown above, giving an extra £0.02million in public dividends to households. This gives a total figure for household receipts from government of £6548.8million.

- **Payments from the external sector.** The entries for household income coming from the Rest of the UK (RUK) and the Rest of the World (ROW) mainly use ONS data on income generated abroad. The total estimated share of ROW income flowing to Wales consists of two main components. The first component of income from ROW is made up of UK employment income from ROW published in the "Blue Book" multiplied by the proportion of Welsh wage income (from the Welsh IO table) as a share of UK compensation of employees. This contributes £36.8million to the total figure. The second component of income from ROW consists of Wales's share of UK property and entrepreneurial income from ROW. This is the total UK figure multiplied by the Welsh share of total UK Other Value Added, with households share of this total Welsh figure being £562.1million – the remainder being allocated later as the corporations income

from ROW. Information on RUK income transfers to Wales is difficult to estimate and, as an interim measure, this entry is taken to be equal to estimated ROW transfers.

When an initial set of income-expenditure accounts were prepared for Wales for 1996 it was felt that RUK and ROW income transfers were interim estimates in the household income account and would be improved upon once better information has been sourced. At the current time the estimates for 1999 use the same method as that for 1996 and should similarly be regarded as interim until we have better data.

Household expenditure:

- **Payments to corporations.** This item is a balancing entry in the household income-expenditure account. It has a value of £5,649.51million.

Payments to government. Using data published by the Inland Revenue, household payments to government are made up of all household tax payments, consisting of income tax, capital gains tax, inheritance tax, stamp duties, insurance premium tax, council tax and social security contributions. The total figure for all these payments from Welsh households is £5548.15million. Each of these values has been worked out in the same way. First the UK total tax for each type is calculated and converted to a calender year value. This gives the UK tax take for 1999. The Welsh share of this tax take is then estimated, giving the total amount of each tax paid by households in Wales.

- The Inland Revenue publishes region-specific data on Income Tax take in the annual publication – "Inland Revenue Statistics". This gives figures of the amount of income tax paid by Welsh residents for tax years 1998-1999 and 2000-01. The data for the tax year 1999-2000, which are crucial for our 1999 figure, have been withdrawn by the Inland Revenue, so we have estimated this as the midpoint between the figures for 1998-9 and 2000-1.

- The Welsh share for three of the taxes we consider are estimated by taking the Welsh share of total UK income tax paid in 1999 and multiplying this ratio by the total UK value of each tax. Previously the Welsh share of each tax was calculated by taking the average tax paid per tax payer in the UK and multiplying by the number of Welsh taxpayers. Following comments, we have changed this apportionment mechanism to reflect the possibility that Welsh tax payers will pay a lower portion than the UK

average – perhaps reflecting average incomes being lower in Wales than the UK. This new apportionment mechanism is used for capital gains tax, inheritance tax and stamp duties. Council tax paid by households comes from Table 11.4 in the Digest of Welsh Statistics 2002. Insurance premium tax paid in Wales is calculated as the UK total multiplied by the Welsh share of UK population and then multiplied by one-half to give that amount accruing from households. The other half is apportioned to corporations in their income-expenditure account.

- The Welsh share of National Insurance contributions we previous calculated using the average amount paid by each tax payer in the UK multiplied by the number of taxpayers in Wales. This apportioned £2525.0million to government from Welsh households. We have revisited this apportionment mechanism using the Welsh share of total UK income tax payments, since income tax and National Insurance contributions are both dependent on gross income. Thus, we have taken the annualised UK total NI contributions for 1999 and multiplied this by the share of total income tax receipts that came from Wales. This gives a figure for NI contributions from Wales of £1752.2million for 1999.

- **Payments to the External sector.** These payments include income flows to both RUK and ROW. Household expenditure transfers from Wales to ROW are calculated as UK income transfers to ROW multiplied by the proportion of Welsh income from employment to UK income from employment. Transfers to RUK are assumed to be higher than transfers from Wales to ROW, and are taken to be twice as large (£58.2million) as the estimated figure for transfers to ROW (£29.1million).

  Information on household expenditure transfers out of Wales are difficult to estimate and better information is required. We essentially need data on the use of migrant labour in the private and public sectors in Wales. For these workers, a share of their income from employment in Wales will be repatriated to either RUK or ROW, where they are permanently resident. It is noted that this is may be a significant issue specifically in the Construction sector in the South-West of Wales, but there is no immediately available data on this issue.

- **Payments to capital.** This entry is estimated by allocating a proportion of total household income as investments to capital using the household savings rate. Until we have Welsh specific data, we assume that Welsh households save at the same rate at the

UK. Thus, estimated payments to capital in Wales are taken as 4.8 per cent of total household income. This gives us a figure of £1,784.1million for household payments to capital.

The Government Account

The Government Income and Expenditure account is shown in the table below.

Income	**19,130.56**		**Expenditure**	**19,130.56**
Profit income (OVA)	1,085.75		IO expenditure	9,912.00
Payments from corporations	2,148.00		Payments to corporations	283.15
Net commodity taxes	4,751.95		Payments to households	6,548.77
Income from RUK	5,596.72		Payments to capital	503.18
Payments from households	5,548.15		Transfers to RUK	1,883.46
Total Government income	**19,130.56**		**Total expenditure**	**19,130.56**

Total government expenditure (£19130.56 million) is the sum of three elements from Public Expenditure Statistical Analyses (PESA):

1. Total identifiable expenditure for Wales (£14,709.5million).
2. Estimated non-identifiable expenditure (£1,883.5million) - the Welsh population share of total UK population multiplied by the total non-identifiable expenditure.
3. Other estimated expenditure (£2,537.6million) - the Welsh share of total UK identifiable expenditure multiplied by total UK other expenditure.

The fixed IO entries in the government income-expenditure account are:

- Final demand expenditure by government (General Government Final Consumption column in the Welsh IO table) - £9,912.00million
- Net commodity tax income (the net production and commodity taxes row in the Welsh IO table) - £4,751.95

In previous Social Accounting Matrices for Wales we calculated item 3 above - the Welsh share of other estimated expenditure - to be the UK figure multiplied by the Welsh/UK ratio

GDP ratio (3.7% in 1999). Using this method for the third figure gave us a control total for government expenditure of £18,138.6million. We have changed this method to reflect the greater level of government expenditure in Wales relative to the UK average – using the Welsh share of total UK identifiable expenditure (6.1%). This gives us the expenditure control total of £19,130.6million for the Government Account in Wales in 1999.

The main reason for this change was that the previous method seems inconsistent in that it leads to a negative balancing entry in payments to corporations cell.

The final element above – total government expenditure of £19,130.56 – is the control total used to balance income and expenditure in the government account.

We take Income from Other Value Added (OVA) to be the sum of OVA from the two public sectors in the ten sector Welsh IO table for 1999 (Public Administration and Education, Health and Social Work). These sum to £1085.75 million.

The remaining items in the government account are:

Government income:

- **Payments from corporations.** This figure corresponds to the payments to government entry in the corporate expenditure account. The determination of this item is discussed in the corporate account section. This item comprises Welsh firms' share of different types of corporate taxes – corporation tax, windfall tax, half of the insurance tax premium (where the other half is allocated as household payments for government), landfill tax, non-domestic rates, other taxes and royalties and interest and dividends payments. The apportionment mechanism for each of these will be discussed in the corporate expenditure notes. The figure here sums to £2,148.0million.

- **Payments from households.** This item corresponds to the payments to government entry in the household expenditure account. The method used to estimate this item is discussed in the household account section, and is made up of income tax payments, capital gains tax, inheritance tax, stamp duties, half of insurance premium tax, council tax and social security contributions through National Insurance payments paid by Welsh households in 1999. Inland Revenue statistics were used to estimate these figures for Wales. Full details are given under "Payments to Government" in the household expenditure account. This figure sums to £5,548.15 million.

- **Transfers from the external sector.** The remaining income item in the government account consists of transfers from RUK. This item is taken to be a balancing entry in the government income account until better data are available. This item would ideally consist of Welsh government income that was transferred in from the RUK government. RUK government income in Wales may also include share income generated by the Welsh government from investments in RUK companies. This level of detailed information is very difficult to estimate at the regional level, and therefore, this item is a balancing item in the government income account. It is estimated at £5,596.7million.

Government expenditure:

- **Payments to corporations.** This figure is difficult to estimate, so it remains a balancing entry in the government expenditure account, with a value of £283.15million.

- **Payments to households.** This item corresponds to the household income account figure for payments from government. The method used to generate this figure is explained in detail in the household income account section and consists of social security income, public sector dividend income and income from public sector pensions. We estimate this has a value of £6,548.77million.

- **Payments to the external sector.** This item relates to transfers to RUK. Using information published in Public Expenditure Statistical Analysis (PESA) this entry is taken to be equivalent to the Welsh/UK population share of "Estimated non-identifiable expenditure", giving a figure of £1883.46million.

- **Payments to capital (savings).** While savings cannot be the balancing entry in this account, given the problems estimating the figure for government's payments to corporations, we need to estimate government savings. This is done using OVA shares across the ten sectors to allocate total investment (Gross Domestic Fixed Capital Formation (GDFCF) from the IO table minus Net Commodity and Production Taxes) across sectors. The estimates for the Public Administration, Education, Health and Social Work sectors (sectors 21-24) are taken as the government's payments to capital in this expenditure account. This is estimated at £503.18million.

The Corporate Account

The Corporate Income and Expenditure account appears as below.

Income	**14,429.04**		**Expenditure**	**14,429.04**
Profit income (OVA)	6,667.23		Payments to households	8,441.33
Payments from households	5,649.51		Payments to government	2,148.00
Payments from government	283.15		Transfers to RUK	4,116.83
Income from RUK	914.58		Transfers to ROW	1,764.36
Income from ROW	914.58		Payments to capital	-2,041.48
Total Corporate income	**14,429.04**		**Total expenditure**	**14,429.04**

Income from OVA in the corporate account is equal to total OVA for all sectors from the 1999 Welsh IO table minus OVA in the government and household income accounts. We have discussed in the relevant section above the way in which we have calculated OVA in each of these accounts. This provides us with a figure for OVA in the corporate account of £6,667.23million.

By definition, payments from corporations to other corporations are zero in an aggregate account. All outlays for one firm to another firm in Wales will be offset in the income-expenditure accounts by a symmetrical entry in the income accounts for another firm in Wales, thus the sum of these will be zero.

Corporate income:

- **Payments from government.** This figure corresponds to the entry for government expenditure to corporations from the government expenditure account – which is £283.15million. This is the balancing item in the government expenditure account, which is not ideal, although estimates of payments from government to corporations have been difficult to identify.

- **Payments from households.** This entry corresponds to the entry for household expenditure to corporations in the household expenditure account, which is £5,649.51million. This is the balancing item in the household expenditure account.

- **Transfers from the external sector.** This consists of income flows from both RUK and ROW. While it is very difficult to calculate these flows directly, the method employed here is consistent with previous method used for the Welsh income-expenditure accounts for 1996 and Scotland for 1999. First, income transfers to Wales from the ROW and RUK are based on the Welsh share – using Wales's share of UK OVA - of UK property and entrepreneurial income from the Rest of the World, multiplied by the corporate share of corporate and household OVA. We then split this value (£1829.15million) between corporate flows from ROW (50% - £914.58million) and RUK (50% - £914.58million).

Corporate expenditure

- **Payments to government.** These data are the same as the payments from corporations figure in the income side of the government income-expenditure account. This figure is made up of a series of different taxes. For each one the Welsh corporations' share of the total UK tax receipts is estimated. The different taxes considered are corporation tax, windfall tax, half of the insurance tax premium (with the other half allocated to the household account as payments to government), landfill tax, non-domestic rates, other taxes and royalties and interest and dividend payments. We will consider the method of estimation for each of these below. The estimated total is £2,148.0million.
  - On corporation tax, we calculate the Welsh figure using the fact that for the UK as a whole, corporation tax in 1999 was 36% of the value of income tax. Thus, the figure of Welsh income tax for 1999 is multiplied by this ratio to estimate a Welsh figure for corporation tax. This method is a second attempt at estimating this figure. The previous version used the Welsh share of UK GDP. This increases the amount of corporation tax paid from £982million to £1038.9million.
  - The windfall tax was paid in December 1997 and December 1998 in two equal payments. Hyder plc, a Welsh utility company which runs the privatised Welsh Water and South Wales electricity and gas firms, paid £282million in windfall tax overall. This works out at an annualised figure for 1999 of £35.25million. At present, no further information is available on what other privatised companies based in Wales paid in windfall tax payments. Therefore this figure is used as the estimate of windfall tax payments made by Welsh companies in 1999.

  - The insurance tax premium method is as given in the household expenditure account for payments to government. The Welsh population share of total UK population is multiplied by the UK total for insurance premium tax. Half of this Welsh figure goes

as payments to government from households, the other half is included in this account as payments to government from corporations.

- We calculate the Welsh landfill tax amount by multiplying the estimated UK annual amount by the ratio of Welsh population share of UK population. This ratio assumes that the amount of waste landfilled is directly related to the size of the population and that landfilled waste per head in Wales is the same as a UK average.
- Non-domestic rates are available directly for Wales from Table 11.4 in the Digest of Welsh Statistics. These have been annualised to give estimates of the 1999 value for this.
- The Welsh figure for other taxes and royalties is estimated using the UK total tax figure and assuming that each income tax payer in Wales pays, on average, the same as a UK income tax payer. Thus, we divided the annualised UK figure by the UK population and multiply this by the number of Welsh taxpayers.
- For interest and dividend payments, we estimated the Welsh share by multiplying the annualised UK total tax figure by the Wales share of total UK GDP for 1999.

- **Payments to households.** This figure corresponds to the payments from corporations figure in the household account, whose determination is discussed in the household income account section above. The figure is £8,441.33million.

- **Payments to the external sector.** Information on transfers of income from Welsh firms to external transactors in RUK is based on information from the IO table. We assume that sixty per cent of total Welsh OVA is repatriated. Of this £5881.2million amount, we make the further assumption that seventy per cent goes to the Rest of the UK (£4,116.83million), with the remaining thirty per cent to the Rest of the World (£1,764.36million).

- **Payments to capital.** This item is the balancing entry in the corporate expenditure account. This balances the expenditure account with the income account which has no balancing entries in it. We need a figure of -£2,041.48million to balance this account.

The External Account

The External Income and Expenditure account appears as the table below.

RUK income from Wales	25,445.20		RUK expenditure in Wales	25,157.21
Goods and services	19,386.75		Goods and services	18,047.00
Transfers	6,058.45		Transfers	7,110.21
ROW income from Wales	13,178.98		ROW expenditure in Wales	8,919.56
Goods and services	11,385.54		Goods and services	7,406.06
Transfers	1,793.43		Transfers	1,513.49
Total Income	**38,624.17**		**Total Expenditure**	**34,076.77**
			Surplus/(deficit)	**4,547.40**

Income from the sale of goods and services in Wales by each of the external transactors are given by the import rows in the IO table. Similarly, the export expenditure columns in the IO table give expenditure on Welsh goods and services by each external transactor. The additional items to account for in the SAM are transfers of income in both directions between firms operating in Wales, local households and government and each external transactor. However, these are all accounted for in the government, corporate and household accounts above.

The only remaining item to account for is savings by external transactors in Wales – i.e. the trade balance). The income earned by external transactors in Wales exceeds its expenditure (i.e. it runs a trade surplus with Wales), which amounts to positive savings by the transactor in Wales in 1999. The external income-expenditure account shows the aggregate balance for all transactors with Wales. This is a positive number, showing that the Rest of the world as a whole runs a trade surplus with Wales and effectively saves in Wales. Wales also runs a deficit in its interactions with all external transactors. Note that the value of income earned in Wales by the UK exceeds the value of the corresponding expenditure items (this is the same position as for the Welsh income-expenditure accounts for 1996.

The Capital Account

The Capital Income and Expenditure account appears as below. Receipts to the capital account consist of savings from the household, government, corporate and the external accounts. Capital expenditures are gross domestic fixed capital formation and stock building, which are determined in the IO table for Wales for 1999. The extra information required for

the income part of this account come from the payments to capital in the expenditure accounts of the other transactors already constructed. Note that the total savings by the three local aggregate transactors – households, government and corporate – is lower than the level of capital formation in Wales. Thus, Wales effectively borrows from the RUK and ROW via its trade deficit.

Income	**4,793.22**		**Expenditure**	**4,793.22**
Households	1,784.11		IO expenditure	4,793.22
Corporate	-2,041.48			
Government	503.18			
RUK/ROW	4,547.40			

The Welsh SAM for 1999

All the new entries in the five income-expenditure accounts map directly to entries for each of the local and external transactors in the Welsh SAM for 1999.

		Scotland		Wales		RUK		ROW	
	Input to	Intermediate demand	Final demand	Intermediate demand	Final demand	Intermediate demand	Final demand		
	Output from	Scot sector i=1...8	Scot sector z=1...4	Wales sector i=1...8	Wales sector z=1...4	RUK sector i=1...8	RUK sector z=1...4	ROW export demand	Gross Output
Scot	Scot sector 1								
	↓	nxn Scottish local intermediate demand matrix	nxz Scottish local final demand matrix	nxn Wales intermediate imports from Scotland matrix	nxz Wales final demand imports from Scotland matrix	nxn RUK intermediate imports from Scotland matrix	nxz RUK final demand imports from Scotland matrix	nx1 Scottish exports to ROW	Total output of Scottish sectors
	...8								
Wales	Welsh sector 1								
	↓	nxn Scot intermediate imports from Wales matrix	nxz Scot final demand imports from Wales matrix	nxn Welsh local intermediate demand matrix	nxz Welsh local final demand matrix	nxn RUK intermediate imports from Wales matrix	nxz RUK final demand imports from Wales matrix	nx1 Wales exports to ROW	Total output of Welsh sectors
	...8								
RUK	RUK sector 1								
	↓	nxn Scot intermediate imports from RUK matrix	nxz Scot final demand imports from RUK matrix	nxn Welsh intermediate imports from RUK matrix	nxz Welsh final demand imports from RUK matrix	nxn RUK local intermediate demand matrix	nxz RUK local final demand matrix	nx1 RUK exports to ROW	Total output of RUK sectors
	...8								
		1xn Scot intermediate	1xz Scot final demand	1xn Welsh intermediate	1xz Welsh final demand	1xn RUK intermediate	nxz RUK final demand	1x1 ROW imports	Total imports
ROW	ROW imports	imports from ROW	imports from ROW	imports from ROW	imports from ROW	imports from ROW	imports from ROW	from ROW	from ROW
Primary	Prod/ comm tax	5xn Scot primary exp	5xz Scot primary exp	5xn Welsh primary exp	5xz Welsh primary exp	5xn RUK Primary exp	5xz RUK primary exp	5x1 ROW primary exp	Total Primary
Inputs	VA								Inputs
		Gross inputs of	Gross inputs of	Gross inputs of	Gross inputs of	Gross inputs of	Gross inputs of	Gross inputs of	
	Gross Inputs	Scottish sectors	Scottish final demands	Welsh sectors	Welsh final demands	RUK sectors	Welsh final demands	ROW export demand	

Table 1: Schematic structure of the Scotland/Wales/RUK inter-regional IO table

Table 2: Matrix components of the three-region IO table

		Scotland		Wales		RUK		ROW	
	Input to Output from	Intermediate demand Scot sector i=1…8	Final demand Scot sector z=1…4	Intermediate demand Welsh sector i=1…8	Final demand Welsh sector z=1…4	Intermediate demand RUK sector i=1…8	Final demand RUK sector z=1…4	ROW export demand	Total Gross Output
Scot	Scot sector 1 ↓ 8	X^S_S Scottish IO	C^S_S Scottish IO	X^S_W Step 3.2	C^S_W	X^S_{RUK} Step 4	C^S_{RUK}	C^S_{ROW} Scottish IO	T^Q_S Scottish IO
Wales	Welsh sector 1 ↓ 8	X^W_S Step 3.1	C^W_S	X^W_W Welsh IO	C^W_W Welsh IO	X^W_{RUK} Step 4	C^W_{RUK}	C^W_{ROW} Welsh IO	T^Q_W Welsh IO
RUK	RUK sector 1 ↓ 8	X^{RUK}_S Step 3.1	C^{RUK}_S	X^{RUK}_W Step 3.2	C^{RUK}_W	X^{RUK}_{RUK} Step 4	C^{RUK}_{RUK}	C^{RUK}_{ROW} Step 2	T^Q_{RUK}
ROW	ROW imports	X^{ROW}_S Scottish IO	C^{ROW}_S Scottish IO	X^{ROW}_W Welsh IO	C^{ROW}_W Welsh IO	X^{ROW}_{RUK} Step 2	C^{ROW}_{RUK}	C^{ROW}_{ROW} UK IO	T^{ROW}_{UK} UK IO
Primary Inputs	prod/ comm tax Wages and OVA	X^P_S Scottish IO	C^P_S Scottish IO	X^P_W Welsh IO	C^P_W Welsh IO	X^P_{RUK} Step 2	C^P_{RUK}	C^P_{ROW} UK IO	T^P_{UK} UK IO
	Total gross inputs	T^Q_S Scottish IO	T^D_S Scottish IO	T^Q_W Welsh IO	T^D_W Welsh IO	T^Q_{RUK} Step 2	T^D_{RUK}	T^D_{ROW} UK IO	

Table 3: Sectoral breakdown for Scotland, Wales and rest of the UK inter-regional framework

	Sector name	IOC
1	Primary and Utilities	1-7, 85-87
2	Manufacturing	8-84
3	Construction	88
4	Wholesale and Retail Trade	89-92
5	Transport and Communication	93-99
6	Financial Intermediation and Business	100-114
7	Public administration, Education, Health and Social Work	115-118
8	Other services	119-123

Table 4: Structure of the inter-regional Social Accounting Matrix (SAM)

Expenditure / Income for		Production sectors			Factors of production			Institutions			Capital				
		Scotland	Wales	RUK	Scotland	Wales	RUK	Scotland	Wales	RUK	Scotland	Wales	RUK	ROW	Total Income
Production sectors	Scotland	X^{S}_{S}	X^{S}_{W}	X^{S}_{RUK}	0	0	0	$C^{I,S}_{S}$	$C^{I,S}_{W}$	$C^{I,S}_{RUK}$	$C^{K,S}_{S}$	$C^{K,S}_{W}$	$C^{K,S}_{RUK}$	C^{S}_{ROW}	T^{Q}_{S}
	Wales	X^{W}_{S}	X^{W}_{W}	X^{W}_{RUK}	0	0	0	$C^{I,W}_{S}$	$C^{I,W}_{W}$	$C^{I,W}_{RUK}$	$C^{K,W}_{S}$	$C^{K,W}_{W}$	$C^{K,W}_{RUK}$	C^{W}_{ROW}	T^{Q}_{W}
	RUK	X^{RUK}_{S}	X^{RUK}_{W}	X^{RUK}_{RUK}	0	0	0	$C^{I,RUK}_{S}$	$C^{I,RUK}_{W}$	$C^{I,RUK}_{RUK}$	$C^{K,RUK}_{S}$	$C^{K,RUK}_{W}$	$C^{K,RUK}_{RUK}$	C^{RUK}_{ROW}	T^{Q}_{RUK}
Factors of production	Scotland	$X^{F,S}_{S}$	0	0	0	0	0	0	0	0	0	0	0	0	T^{F}_{S}
	Wales	0	$X^{F,W}_{W}$	0	0	0	0	0	0	0	0	0	0	0	T^{F}_{W}
	RUK	0	0	$X^{F,RUK}_{RUK}$	0	0	0	0	0	0	0	0	0	0	T^{F}_{RUK}
Institutions	Scotland	$X^{I,S}_{S}$	$X^{I,S}_{W}$	$X^{I,S}_{RUK}$	FT^{S}_{S}	0	0	IT^{S}_{S}	IT^{S}_{W}	IT^{S}_{RUK}	KT^{S}_{S}	KT^{S}_{W}	KT^{S}_{RUK}	IT^{S}_{ROW}	T^{I}_{S}
	Wales	$X^{I,W}_{S}$	$X^{I,W}_{W}$	$X^{I,W}_{RUK}$	0	FT^{W}_{W}	0	IT^{W}_{S}	IT^{W}_{W}	IT^{W}_{RUK}	KT^{W}_{S}	KT^{W}_{W}	KT^{W}_{RUK}	IT^{W}_{ROW}	T^{I}_{W}
	RUK	$X^{I,RUK}_{S}$	$X^{I,RUK}_{W}$	$X^{I,RUK}_{RUK}$	0	0	FT^{RUK}_{RUK}	IT^{RUK}_{S}	IT^{RUK}_{W}	IT^{RUK}_{RUK}	KT^{RUK}_{S}	KT^{RUK}_{W}	KT^{RUK}_{RUK}	IT^{RUK}_{ROW}	T^{I}_{RUK}
Capital	Scotland	0	0	0	0	0	0	CT^{S}_{S}	CT^{S}_{W}	CT^{S}_{RUK}	0	0	0	CT^{S}_{ROW}	T^{K}_{S}
	Wales	0	0	0	0	0	0	CT^{W}_{S}	CT^{W}_{W}	CT^{W}_{RUK}	0	0	0	CT^{W}_{ROW}	T^{K}_{W}
	RUK	0	0	0	0	0	0	CT^{RUK}_{S}	CT^{RUK}_{W}	CT^{RUK}_{RUK}	0	0	0	CT^{RUK}_{ROW}	T^{K}_{RUK}
ROW		X^{ROW}_{S}	X^{ROW}_{W}	X^{ROW}_{RUK}	0	0	0	CT^{ROW}_{S}	CT^{ROW}_{W}	CT^{ROW}_{RUK}	$C^{K,ROW}_{S}$	$C^{K,ROW}_{W}$	$C^{K,ROW}_{RUK}$	C^{ROW}_{ROW}	T^{ROW}_{UK}
Total expenditure		T^{Q}_{S}	T^{Q}_{W}	T^{Q}_{RUK}	T^{F}_{S}	T^{F}_{W}	T^{F}_{RUK}	T^{I}_{S}	T^{I}_{W}	T^{I}_{RUK}	T^{K}_{S}	T^{K}_{W}	T^{K}_{RUK}	T^{ROW}_{UK}	

Table 5: Template for constructing income-expenditure accounts for each institution

Income	Expenditure
Income from employment (H)*	IO final demand expenditure
Net commodity taxes (G)*	(including expenditure taxes)*
Payments from corporations**	Payments to corporations**
Payments from government**	Payments to government**
Payments from households**	Payments to households**
Transfers from RUK**	Transfers to RUK**
Transfers from ROW**	Transfers to ROW**
	Payments to capital (savings)***

Notes:

1. Items marked * are fixed by the balanced IO table (using a share parameter in the case of OVA)
2. Items marked ** are constrained only by the corresponding entry in another account – e.g. payments to corporations in the household account must correspond to payments from households in the corporate account.
3. Items marked *** are balancing entries which ensure that income equals expenditure.

Table 6: Three-Region Social Accounting Matrix for Scotland, Wales and the UK in 1999, £million

			Production Sectors								
			Scotland			Wales			RUK		
			Man.	NmT	NmNT	Man.	NmT	NmNT	Man.	NmT	NmNT
Production Sectors	Scotland	Manufacturing	2458.2	2790.2	1656.1	339.6	72.6	57.2	3254.6	1998.0	1076.8
		Non-manufacturing, traded	4981.2	18200.5	5988.2	119.1	343.0	53.8	1473.7	5406.9	664.7
		Non-manufacturing, non-traded	124.8	2544.1	6429.0	5.8	19.7	104.1	2.6	30.4	118.6
	Wales	Manufacturing	356.9	173.1	150.6	2855.5	1083.5	796.0	3497.3	2147.1	1157.2
		Non-manufacturing, traded	83.5	119.2	28.1	3124.7	4445.5	1718.7	683.0	1468.5	177.5
		Non-manufacturing, non-traded	6.3	13.8	7.6	188.3	613.4	2231.2	5.4	73.5	237.3
	RUK	Manufacturing	5090.3	2468.5	2147.6	3240.4	693.0	545.5	65596.6	40270.8	21703.8
		Non-manufacturing, traded	2479.4	4135.0	902.1	1297.1	3567.7	669.4	74865.9	294792.2	44966.7
		Non-manufacturing, non-traded	134.1	347.7	220.3	53.7	184.1	951.3	1647.2	20160.5	74162.8
Factors of Production	Scotland	LABOUR	7328.1	18864.0	14222.9	0.0	0.0	0.0	0.0	0.0	0.0
		OTHER VALUE ADDED	4336.1	16254.8	1618.0	0.0	0.0	0.0	0.0	0.0	0.0
	Wales	LABOUR	0.0	0.0	0.0	5627.8	6928.3	6376.0	0.0	0.0	0.0
		OTHER VALUE ADDED	0.0	0.0	0.0	1782.6	6822.1	1197.3	0.0	0.0	0.0
	RUK	LABOUR	0.0	0.0	0.0	0.0	0.0	0.0	98167.3	221406.2	115265.4
		OTHER VALUE ADDED	0.0	0.0	0.0	0.0	0.0	0.0	31973.5	187063.0	32898.6
Institutions	Scotland	NET PRODUCT & PRODUCTION TAXES	660.8	2368.8	775.5	25.1	41.6	10.8	242.6	364.4	89.2
		HOUSEHOLDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		CORPORATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		GOVERNMENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Wales	NET PRODUCT & PRODUCTION TAXES	26.4	17.6	8.0	332.7	623.1	238.5	105.4	98.9	42.7
		HOUSEHOLDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		CORPORATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		GOVERNMENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	RUK	NET PRODUCT & PRODUCTION TAXES	455.9	394.6	141.1	247.6	436.5	109.4	2494.0	26119.2	11590.1
		HOUSEHOLDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		CORPORATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		GOVERNMENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital	Scotland	Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Wales	Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	RUK	Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		ROW	7364.6	1327.7	1038.9	4768.8	1306.9	1195.3	58378.3	46576.7	18527.7
		Total	35886.8	70019.7	35334.2	24008.8	27181.0	16254.7	342387.5	847976.2	322679.1

Factors of Production – Scotland LABOUR	Factors of Production – Scotland Ova	Factors of Production – Wales LABOUR	Factors of Production – Wales OVA	Factors of Production – RUK LABOUR	Factors of Production – RUK OVA	Institutions – Scotland NP+PT	Institutions – Scotland HH	Institutions – Scotland COPR	Institutions – Scotland GOV	Institutions – Wales NP+PT	Institutions – Wales HH	Institutions – Wales COPR	Institutions – Wales GOV	Institutions – RUK NP+PT	Institutions – RUK HH	Institutions – RUK COPR	Institutions – RUK GOV
0.0	0.0	0.0	0.0	0.0	0.0	0.0	1009.1	0.0	0.0	0.0	343.8	0.0	0.0	0.0	2335.8	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	20554.5	0.0	423.1	0.0	122.4	0.0	0.0	0.0	4179.1	0.0	112.5
0.0	0.0	0.0	0.0	0.0	0.0	0.0	2596.6	0.0	17556.3	0.0	4.3	0.0	0.0	0.0	64.5	0.0	234.5
0.0	0.0	0.0	0.0	0.0	0.0	0.0	438.2	0.0	0.0	0.0	1649.9	0.0	0.0	0.0	2510.1	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	96.3	0.0	0.0	0.0	11249.7	0.0	300.2	0.0	1523.9	0.0	28.1
0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.0	945.2	0.0	9611.8	0.0	94.6	0.0	311.7
0.0	0.0	0.0	0.0	0.0	0.0	0.0	6249.3	0.0	0.0	0.0	3280.1	0.0	0.0	0.0	47079.2	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	2920.8	0.0	0.0	0.0	1512.5	0.0	0.0	0.0	311374.8	0.0	5418.1
0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.1	0.0	0.0	0.0	38.7	0.0	0.0	0.0	37199.3	0.0	132297.6
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	2093.4	0.0	83.0	0.0	45.5	0.0	0.0	0.0	364.8	0.0	19.4
40415.0	3413.0	0.0	0.0	0.0	0.0	0.0	0.0	14015.8	10957.1	0.0	7.4	0.0	0.0	0.0	1127.0	0.0	0.0
0.0	17262.8	0.0	0.0	0.0	0.0	0.0	10326.1	0.0	828.3	0.0	0.0	121.4	0.0	0.0	0.0	3121.3	0.0
0.0	1533.1	0.0	0.0	0.0	0.0	8010.2	13350.0	5550.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5356.7
0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.7	0.0	0.0	0.0	1337.4	0.0	0.0	0.0	107.1	0.0	8.1
0.0	0.0	18932.1	2049.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	8486.7	6548.8	0.0	576.1	0.0	0.0
0.0	0.0	0.0	7033.7	0.0	0.0	0.0	0.0	75.0	0.0	0.0	5649.5	0.0	453.1	0.0	0.0	850.9	0.0
0.0	0.0	0.0	719.2	0.0	0.0	0.0	0.0	0.0	0.0	3335.4	5548.2	2148.3	0.0	0.0	0.0	0.0	7379.5
0.0	0.0	0.0	0.0	0.0	0.0	0.0	801.1	0.0	0.0	0.0	466.7	0.0	0.0	0.0	61916.7	0.0	-110.5
0.0	0.0	0.0	0.0	434838.9	45735.0	0.0	22.9	0.0	0.0	0.0	50.7	0.0	0.0	0.0	0.0	128230.5	105459.1
0.0	0.0	0.0	0.0	0.0	204269.7	0.0	0.0	3256.3	0.0	0.0	0.0	3995.4	0.0	0.0	70563.9	0.0	42561.8
0.0	0.0	0.0	0.0	0.0	1930.4	0.0	0.0	0.0	3219.0	0.0	0.0	0.0	1883.5	111791.4	144157.1	47126.7	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	3365.1	4161.9	720.9	0.0	0.0	0.0	0.0	0.0	1354.0	3335.5	285.9
0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.1	70.6	12.2	0.0	1365.6	-1169.6	255.1	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	418.5	-358.4	78.2	0.0	35821.9	88248.0	7564.5
0.0	0.0	0.0	0.0	0.0	0.0	0.0	7289.2	7773.1	0.0	0.0	3132.9	1764.4	0.0	0.0	53931.5	85956.5	3181.0
40415.0	22208.9	18932.1	9802.0	434838.9	251935.1	8010.2	71296.0	34902.7	33800.0	3335.4	37169.0	14988.1	19130.6	111791.4	776281.2	356869.5	310108.1

Table 6: Three-Region Social Accounting Matrix for Scotland, Wales and the UK in 1999, £million (continued)

Table 6: Three-Region Social Accounting Matrix for Scotland, Wales and the UK in 1999, £million (continued)

Capital				
Scotland	Wales	RUK		
Capital	Capital	Capital	ROW	Total
312.1	120.8	1144.5	16917.1	35886.8
1113.0	6.5	262.6	6014.9	70019.7
5207.3	0.0	70.0	221.5	35334.1
166.2	354.2	1229.9	5443.1	24008.8
4.7	356.6	83.0	1689.9	27181.0
0.0	1615.2	247.2	47.8	16254.7
2370.4	1152.7	23067.7	117431.5	342387.5
176.1	85.3	20599.3	78213.7	847976.2
0.0	0.0	53517.4	1689.1	322679.1
0.0	0.0	0.0	0.0	40415.0
0.0	0.0	0.0	0.0	22208.9
0.0	0.0	0.0	0.0	18932.1
0.0	0.0	0.0	0.0	9802.0
0.0	0.0	0.0	0.0	434838.9
0.0	0.0	0.0	0.0	251935.1
409.4	8.6	74.7	332.5	8010.2
0.0	0.0	0.0	1360.7	71296.0
0.0	0.0	0.0	3242.7	34902.7
0.0	0.0	0.0	0.0	33800.0
10.6	165.7	39.5	127.0	3335.4
0.0	0.0	0.0	576.2	37169.0
0.0	0.0	0.0	925.9	14988.1
0.0	0.0	0.0	0.0	19130.6
157.6	83.8	6987.8	-500.1	111791.4
0.0	0.0	0.0	61944.0	776281.2
0.0	0.0	0.0	32222.3	356869.5
0.0	0.0	0.0	0.0	310108.1
0.0	0.0	0.0	-1794.9	11428.4
0.0	0.0	0.0	4268.4	4859.4
0.0	0.0	0.0	12552.5	144325.1
1501.1	910.0	37001.4	9092.0	352018.0
11428.5	4859.4	144325.1	352018.0	4790173.2

Table 7: Single Region Leontief Inverse for Scotland, 1999

Purch Sector / Prod Sector	PRIMARY & UTILITIES	MANUFACT-URING	CONSTRUC-TION	WHOLESALE & RETAIL TRADE	TRANSPORT & COMMUNICATION	FINANCIAL INT & BUSINESS	PUB ADMIN, EDUC, HEALTH & SOC W	OTHER SERVICES
PRIMARY & UTILITIES	1.188	0.061	0.048	0.050	0.019	0.015	0.023	0.085
MANUFACTURING	0.082	1.084	0.152	0.058	0.051	0.046	0.046	0.146
CONSTRUCTION	0.067	0.011	1.209	0.029	0.029	0.070	0.043	0.077
WHOLESALE & RETAIL TRADE	0.047	0.037	0.033	1.022	0.040	0.016	0.022	0.021
TRANSPORT & COMMUNICATION	0.094	0.030	0.045	0.038	1.281	0.083	0.034	0.091
FINANCIAL INT & BUSINESS	0.231	0.077	0.346	0.091	0.212	1.236	0.121	0.191
PUBLIC ADMIN, EDUC, HEALTH & SOCIAL WORK	0.012	0.003	0.005	0.002	0.009	0.009	1.204	0.004
OTHER SERVICES	0.021	0.008	0.027	0.005	0.016	0.009	0.025	1.023
	1.741	**1.311**	**1.865**	**1.295**	**1.657**	**1.484**	**1.517**	**1.638**

Table 8: Single Region Type I and Type II Output Multipliers for Scotland, Wales and RUK, 1999

	Scotland		Wales		RUK	
	Type I	Type II	Type I	Type II	Type I	Type II
PRIMARY & UTILITIES	1.741	2.128	1.299	1.556	1.767	2.495
MANUFACTURING	1.311	1.634	1.338	1.750	1.718	3.033
CONSTRUCTION	1.865	2.389	1.503	1.929	2.024	3.218
WHOLESALE & RETAIL TRADE	1.295	1.798	1.308	1.820	1.742	3.179
TRANSPORT & COMMUNICATION	1.657	2.220	1.308	1.855	1.753	3.136
FINANCIAL INT & BUSINESS	1.484	1.901	1.252	1.623	1.706	2.883
PUBLIC ADMIN, EDUC, HEALTH & SOCIAL WORK	1.517	2.258	1.368	2.088	1.658	3.454
OTHER SERVICES	1.638	2.194	1.405	1.975	1.680	3.061

Table 9: IO Type 1 and Type II Inter-Regional Output Multipliers for Scotland, Wales and RUK, 1999, £million output per £million output generated

Type 1 IO/SAM inter-regional output multipliers

	Own multiplier			Inter-regional shocks (Region in which the shock occurs named first)						Total IO/SAM type 1 output mults		
	Scotland	Wales	RUK	Scot/Wal	Scot/RUK	Wal/Sco	Wal/RUK	RUK/Sco	RUK/Wal	Scotland	Wales	RUK
PRIMARY & UTILITIES	1.746	1.307	1.783	0.015	0.335	0.086	0.623	0.042	0.024	2.096	2.016	1.849
MANUFACTURING	1.319	1.344	1.734	0.024	0.451	0.044	0.449	0.032	0.024	1.794	1.836	1.790
CONSTRUCTION	1.871	1.508	2.038	0.018	0.357	0.048	0.490	0.027	0.021	2.246	2.046	2.086
WHOLESALE & RETAIL TRADE	1.300	1.311	1.751	0.012	0.254	0.033	0.368	0.026	0.013	1.566	1.712	1.790
TRANSPORT & COMMUNICATION	1.662	1.311	1.761	0.014	0.295	0.036	0.392	0.026	0.011	1.971	1.739	1.797
FINANCIAL INT & BUSINESS	1.488	1.254	1.712	0.011	0.282	0.026	0.304	0.018	0.008	1.781	1.583	1.738
PUBLIC ADMIN, EDUC, HEALTH & SOCIAL WORK	1.521	1.370	1.664	0.013	0.257	0.030	0.309	0.014	0.009	1.792	1.709	1.688
OTHER SERVICES	1.642	1.407	1.688	0.009	0.206	0.021	0.238	0.021	0.009	1.857	1.666	1.718

Type 2 IO inter-regional output multipliers

	Own multiplier			Inter-regional shocks (Region in which the shock occurs named first)						Total IO type 2 output mults		
	Scotland	Wales	RUK	Scot/Wal	Scot/RUK	Wal/Sco	Wal/RUK	RUK/Sco	RUK/Wal	Scotland	Wales	RUK
PRIMARY & UTILITIES	2.158	1.581	2.570	0.047	1.044	0.148	1.341	0.080	0.047	3.249	3.070	2.697
MANUFACTURING	1.669	1.774	3.129	0.057	1.185	0.113	1.359	0.092	0.060	2.912	3.247	3.281
CONSTRUCTION	2.425	1.954	3.304	0.059	1.250	0.121	1.424	0.080	0.054	3.733	3.499	3.438
WHOLESALE & RETAIL TRADE	1.829	1.843	3.263	0.049	1.044	0.109	1.352	0.088	0.048	2.922	3.304	3.399
TRANSPORT & COMMUNICATION	2.255	1.879	3.217	0.055	1.197	0.118	1.452	0.087	0.044	3.506	3.450	3.347
FINANCIAL INT & BUSINESS	1.929	1.639	2.946	0.042	0.994	0.083	1.040	0.069	0.035	2.964	2.762	3.050
PUBLIC ADMIN, EDUC, HEALTH & SOCIAL WORK	2.297	2.115	3.541	0.063	1.339	0.130	1.562	0.087	0.051	3.700	3.807	3.678
OTHER SERVICES	2.224	1.996	3.137	0.046	1.023	0.097	1.201	0.079	0.042	3.293	3.294	3.259

Table 10: Attribution of Output to Final Demand Categories

	Type 1 IO/SAM output attribution		Supported Output				
	£million		Scotland	Wales	RUK		Total
Final demand category	Scotland	Households	35289.90	1208.79	22848.48		59347.17
		Government	27399.35	237.97	4603.47		32240.79
		Stocks (GFCF and change in inventories)	11869.41	403.93	6787.62		19060.96
		ROW Exports	32105.50	494.56	9435.32		42035.37
	Wales	Households	1259.98	18280.56	13544.90		33085.43
		Government	293.56	13595.03	3040.60		16929.20
		Stocks (GFCF and change in inventories)	316.99	3404.88	3296.01		7017.88
		ROW Exports	307.19	9574.02	3112.13		12993.34
	RUK	Households	19362.50	10653.13	688761.04		718776.66
		Government	2548.61	1745.93	229479.52		233774.07
		Stocks (GFCF and change in inventories)	4731.04	4056.88	185667.14		194455.07
		ROW Exports	5756.60	3788.87	342466.60		352012.07
		Total	141240.64	67444.55	1513042.82		

	Type 2 IO output attribution		Supported Output				
	£million		Scotland	Wales	RUK		Total
Final demand category	Sco	Government	41272.69	1133.07	23942.58		66348.34
		Investment	15568.85	827.30	16192.19		32588.35
		ROW exports	41071.43	1266.59	26679.36		69017.38
	Wales	Government	1277.54	20929.46	15372.91		37579.90
		Investment	600.92	4469.39	7222.74		12293.05
		ROW exports	804.34	12684.14	9548.61		23037.09
	RUK	Government	12730.19	7682.14	486363.20		506775.53
		Investment	10775.38	7983.21	315834.68		334593.26
		ROW exports	17139.31	10469.25	611886.53		639495.09
		Total	141240.64	67444.55	1513042.81		

Table 11: IO Type 1 and Type II Inter-Regional Employment Multipliers for Scotland, Wales and RUK, 1999, 000s of jobs per 000s of jobs generated

Type 1 IO/SAM inter-regional employment multipliers

	Own Multiplier			Inter-regional Shocks (Region in which shock occurs named first)						Total IO/SAM Type 1 emp mults		
Sector	Scotland	Wales	RUK	Scot/Wal	Scot/RUK	Wal/Sco	Wal/RUK	RUK/Sco	RUK/Wal	Scotland	Wales	RUK
PRIMARY & UTILITIES	2.285	1.632	2.058	0.028	0.574	0.134	1.002	0.054	0.032	2.89	2.77	2.14
MANUFACTURING	1.425	1.424	1.695	0.032	0.577	0.041	0.466	0.027	0.023	2.03	1.93	1.75
CONSTRUCTION	1.791	1.433	1.781	0.017	0.315	0.032	0.360	0.016	0.015	2.12	1.82	1.81
WHOLESALE & RETAIL TRADE	1.131	1.171	1.540	0.006	0.112	0.014	0.157	0.017	0.010	1.25	1.34	1.57
TRANSPORT & COMMUNICATION	1.772	1.289	1.723	0.017	0.335	0.025	0.282	0.023	0.011	2.12	1.60	1.76
FINANCIAL INT & BUSINESS	1.516	1.291	1.884	0.012	0.283	0.023	0.266	0.022	0.010	1.81	1.58	1.92
PUBLIC ADMIN, EDUC, HEALTH & SOCIAL WORK	1.422	1.302	1.496	0.009	0.161	0.019	0.202	0.008	0.006	1.59	1.52	1.51
OTHER SERVICES	1.289	1.316	1.550	0.005	0.095	0.011	0.126	0.018	0.008	1.39	1.45	1.58

Type 2 IO inter-regional employment multipliers

	Own multiplier			Inter-regional Shocks (Region in which shock occurs named first)						Total IO Type 2 emp mults		
Sector	Scotland	Wales	RUK	Scot/Wal	Scot/RUK	Wal/Sco	Wal/RUK	RUK/Sco	RUK/Wal	Scotland	Wales	RUK
PRIMARY & UTILITIES	3.307	2.449	3.443	0.097	1.904	0.279	2.501	0.129	0.079	5.31	5.23	3.65
MANUFACTURING	2.063	2.115	3.153	0.087	1.598	0.123	1.480	0.093	0.067	3.75	3.72	3.31
CONSTRUCTION	2.471	1.894	2.694	0.060	1.142	0.088	1.030	0.057	0.042	3.67	3.01	2.79
WHOLESALE & RETAIL TRADE	1.461	1.528	2.749	0.025	0.482	0.051	0.613	0.070	0.042	1.97	2.19	2.86
TRANSPORT & COMMUNICATION	2.717	1.913	3.237	0.074	1.416	0.091	1.086	0.090	0.050	4.21	3.09	3.38
FINANCIAL INT & BUSINESS	2.153	1.824	3.590	0.051	1.059	0.081	0.969	0.095	0.053	3.26	2.87	3.74
PUBLIC ADMIN, EDUC, HEALTH & SOCIAL WORK	2.102	1.940	2.684	0.047	0.870	0.081	0.941	0.055	0.035	3.02	2.96	2.78
OTHER SERVICES	1.672	1.781	2.756	0.026	0.497	0.055	0.649	0.069	0.039	2.19	2.48	2.86

Table 12: IO Type 1 and Type II Inter-Regional Value Added Multipliers for Scotland, Wales and RUK, 1999, £million of value added per £million value added

Type 1 IO/SAM inter-regional value added multipliers

	Own Multiplier			Inter-regional Shocks (Region in which shock occurs named first)						Total IO/SAMType 1 value added mults		
Sector	Scotland	Wales	RUK	Scot/Wal	Scot/RUK	Wal/Sco	Wal/RUK	RUK/Sco	RUK/Wal	Scotland	Wales	RUK
PRIMARY & UTILITIES	1.932	1.379	1.778	0.017	0.433	0.099	0.819	0.036	0.019	2.38	2.30	1.83
MANUFACTURING	1.423	1.461	1.848	0.027	0.596	0.055	0.623	0.033	0.022	2.05	2.14	1.90
CONSTRUCTION	2.262	1.588	2.205	0.023	0.517	0.053	0.588	0.029	0.020	2.80	2.23	2.25
WHOLESALE & RETAIL TRADE	1.208	1.298	1.734	0.007	0.178	0.029	0.343	0.023	0.010	1.39	1.67	1.77
TRANSPORT & COMMUNICATION	1.733	1.319	1.806	0.013	0.312	0.033	0.384	0.026	0.009	2.06	1.74	1.84
FINANCIAL INT & BUSINESS	1.412	1.210	1.657	0.008	0.235	0.019	0.236	0.016	0.006	1.66	1.47	1.68
PUBLIC ADMIN, EDUC, HEALTH & SOCIAL WORK	1.483	1.357	1.627	0.010	0.216	0.027	0.286	0.012	0.007	1.71	1.67	1.65
OTHER SERVICES	1.549	1.392	1.670	0.007	0.186	0.018	0.209	0.018	0.007	1.74	1.62	1.70

Type 2 IO inter-regional value added multipliers

	Own Multiplier			Inter-regional Shocks (Region in which shock occurs named first)						Total IO Type 2 value added mults		
Sector	Scotland	Wales	RUK	Scot/Wal	Scot/RUK	Wal/Sco	Wal/RUK	RUK/Sco	RUK/Wal	Scotland	Wales	RUK
PRIMARY & UTILITIES	2.531	1.767	2.589	0.054	1.361	0.183	1.786	0.075	0.040	3.95	3.74	2.70
MANUFACTURING	1.964	2.135	3.557	0.070	1.626	0.156	1.967	0.104	0.062	3.66	4.26	3.72
CONSTRUCTION	3.206	2.189	3.810	0.079	1.883	0.144	1.775	0.095	0.057	5.17	4.11	3.96
WHOLESALE & RETAIL TRADE	1.640	1.824	3.231	0.031	0.756	0.098	1.258	0.083	0.041	2.43	3.18	3.35
TRANSPORT & COMMUNICATION	2.458	1.913	3.373	0.053	1.302	0.113	1.425	0.089	0.041	3.81	3.45	3.50
FINANCIAL INT & BUSINESS	1.821	1.518	2.780	0.032	0.828	0.061	0.790	0.060	0.028	2.68	2.37	2.87
PUBLIC ADMIN, EDUC, HEALTH & SOCIAL WORK	2.252	2.087	3.381	0.049	1.172	0.116	1.438	0.077	0.041	3.47	3.64	3.50
OTHER SERVICES	2.148	1.936	3.057	0.038	0.937	0.082	1.043	0.073	0.035	3.12	3.06	3.17

Table 13: Attribution of Employment to Final Demand Categories

Type 1 IO Employment attribution							
000's			Scotland	Wales	RUK		Total
Final demand category	Scotland	Households	563.4	14.6	260.6		838.7
		Government	465.2	2.8	52.2		520.3
		Stocks (GFCF and change in inventories)	147.9	4.6	77.1		229.6
		ROW Exports	331.0	5.7	104.3		441.0
	Wales	Households	13.5	316.2	153.3		483.0
		Government	3.7	259.7	39.8		303.2
		Stocks (GFCF and change in inventories)	3.1	50.1	37.9		91.2
		ROW Exports	3.1	118.2	34.2		155.5
	RUK	Households	221.8	130.3	8453.3		8805.4
		Government	31.4	24.7	3960.4		4016.5
		Stocks (GFCF and change in inventories)	48.4	48.7	2491.7		2588.8
		ROW Exports	57.8	42.3	3904.2		4004.3
		Total	1890.4	1018.0	19569.0		

Type 2 IO employment attribution							
000's			Scotland	Wales	RUK		Total
Final demand category	Sco	Government	685.3	15.1	281.7		982.1
		Investment	206.0	10.8	190.4		407.2
		ROW exports	472.5	16.6	310.9		800.1
	Wal	Government	15.9	386.0	185.9		587.8
		Investment	6.9	68.3	85.3		160.5
		ROW exports	9.4	171.7	110.9		292.0
	RUK	Government	161.2	107.0	7110.1		7378.3
		Investment	128.1	106.2	4086.7		4320.9
		ROW exports	205.0	136.4	7207.0		7548.4
		Total	1890.4	1018.0	19569.0		

Table 14: Attribution of Value Added to Final Demand Categories

	Type 1 IO/SAM value added attribution		Supported Value Added				
	£million		Scotland	Wales	RUK		Total
Final demand category	Sco	Households	17865.3	446.3	9869.7		28181.3
		Government	13590.6	86.9	1974.9		15652.3
		Stocks (GFCF and change in inventories)	4497.7	141.5	2835.7		7474.9
		ROW Exports	12325.2	181.6	4083.7		16590.5
	Wal	Households	509.1	8870.5	5927.4		15307.0
		Government	129.5	6649.4	1390.0		8169.0
		Stocks (GFCF and change in inventories)	119.2	1316.3	1380.0		2815.4
		ROW Exports	121.8	3571.4	1351.9		5045.0
	RUK	Households	8228.0	3989.1	320955.0		333172.1
		Government	1095.7	705.5	111698.8		113499.9
		Stocks (GFCF and change in inventories)	1846.9	1431.4	77242.4		80520.7
		ROW Exports	2295.0	1344.2	148064.6		151703.8
		Total	62623.9	28734.0	686774.0		

	Type 2 IO value added attribution		Supported Value Added				
	£million		Scotland	Wales	RUK		Total
Final demand category	Sco	Government	20588.3	449.6	10682.2		31720.1
		Investment	6353.1	321.1	7137.1		13811.4
		ROW exports	16835.9	502.3	11923.0		29261.2
	Wal	Government	561.3	10195.6	6978.4		17735.3
		Investment	248.7	1827.0	3185.7		5261.4
		ROW exports	342.7	5072.9	4283.4		9699.0
	RUK	Government	5657.0	3139.9	231299.1		240096.0
		Investment	4602.7	3109.3	137808.1		145520.0
		ROW exports	7434.1	4116.5	273477.0		285027.6
		Total	62623.9	28734.0	686774.0		

Table 15: SAM Type II Inter-Regional Output, Employment and Value Added Multipliers for Scotland, Wales and RUK, 1999, £million output per £million output, 000s of jobs per 000s jobs and £millions of value added per £million of value added

Output multipliers	Own multiplier			Inter-regional shocks (Region in which shock occurs named first)						Total SAM Type 2 output mults		
Sector	Scotland	Wales	RUK	Scot/Wal	Sco/RUK	Wal/Sco	Wal/RUK	RUK/Sco	RUK/Wal	Scotland	Wales	RUK
PRIMARY & UTILITIES	2.083	1.567	2.528	0.038	0.837	0.140	1.237	0.078	0.045	2.958	2.944	2.650
MANUFACTURING	1.573	1.626	2.565	0.046	0.921	0.089	1.011	0.069	0.046	2.540	2.727	2.681
CONSTRUCTION	2.249	1.845	2.907	0.044	0.904	0.101	1.140	0.064	0.043	3.197	3.085	3.015
WHOLESALE & RETAIL TRADE	1.694	1.692	2.685	0.037	0.773	0.086	1.024	0.065	0.034	2.504	2.801	2.785
TRANSPORT & COMMUNICATION	2.066	1.689	2.658	0.039	0.841	0.089	1.054	0.065	0.031	2.947	2.832	2.754
FINANCIAL INT & BUSINESS	1.864	1.646	2.596	0.034	0.802	0.078	0.962	0.055	0.027	2.700	2.687	2.678
PUBLIC ADMIN, EDUC, HEALTH & SOCIAL WORK	1.992	1.808	2.686	0.042	0.847	0.087	0.999	0.054	0.032	2.881	2.895	2.772
OTHER SERVICES	2.055	1.839	2.603	0.033	0.721	0.075	0.894	0.059	0.030	2.809	2.808	2.692

Employment multipliers	Own multiplier			Inter-regional Shocks (Region in which shock occurs named first)						Total SAM Type 2 emp mults		
Sector	Scotland	Wales	RUK	Scot/Wal	Sco/RUK	Wal/Sco	Wal/RUK	RUK/Sco	RUK/Wal	Scotland	Wales	RUK
PRIMARY & UTILITIES	3.122	2.410	3.370	0.078	1.512	0.258	2.281	0.123	0.074	4.71	4.95	3.57
MANUFACTURING	1.889	1.877	2.564	0.068	1.228	0.094	1.091	0.068	0.050	3.19	3.06	2.68
CONSTRUCTION	2.257	1.781	2.408	0.044	0.820	0.072	0.825	0.045	0.033	3.12	2.68	2.49
WHOLESALE & RETAIL TRADE	1.377	1.427	2.287	0.019	0.354	0.040	0.461	0.051	0.029	1.75	1.93	2.37
TRANSPORT & COMMUNICATION	2.416	1.704	2.656	0.052	0.988	0.068	0.782	0.066	0.035	3.46	2.55	2.76
FINANCIAL INT & BUSINESS	2.060	1.834	3.105	0.042	0.847	0.076	0.892	0.076	0.041	2.95	2.80	3.22
PUBLIC ADMIN, EDUC, HEALTH & SOCIAL WORK	1.835	1.677	2.143	0.030	0.546	0.054	0.608	0.034	0.022	2.41	2.34	2.20
OTHER SERVICES	1.562	1.658	2.312	0.018	0.347	0.042	0.481	0.051	0.027	1.93	2.18	2.39

Value added multipliers	Own multiplier			Inter-regional Shocks (Region in which shock occurs named first)						Total SAM Type 2 VA mults		
Sector	Scotland	Wales	RUK	Scot/Wal	Sco/RUK	Wal/Sco	Wal/RUK	RUK/Sco	RUK/Wal	Scotland	Wales	RUK
PRIMARY & UTILITIES	2.422	1.748	2.546	0.044	1.088	0.171	1.644	0.072	0.038	3.55	3.56	2.66
MANUFACTURING	1.816	1.904	2.867	0.055	1.253	0.120	1.452	0.077	0.046	3.12	3.48	2.99
CONSTRUCTION	2.908	2.042	3.307	0.058	1.351	0.118	1.413	0.075	0.046	4.32	3.57	3.43
WHOLESALE & RETAIL TRADE	1.531	1.675	2.659	0.024	0.556	0.077	0.952	0.061	0.029	2.11	2.70	2.75
TRANSPORT & COMMUNICATION	2.228	1.714	2.771	0.038	0.910	0.085	1.032	0.066	0.029	3.18	2.83	2.87
FINANCIAL INT & BUSINESS	1.761	1.524	2.461	0.026	0.666	0.058	0.730	0.048	0.021	2.45	2.31	2.53
PUBLIC ADMIN, EDUC, HEALTH & SOCIAL WORK	1.950	1.786	2.582	0.032	0.735	0.078	0.920	0.048	0.025	2.72	2.78	2.65
OTHER SERVICES	1.975	1.792	2.546	0.027	0.657	0.063	0.776	0.054	0.025	2.66	2.63	2.62

Table 16: Output, value added and employment attributable to final demand categories using inter-regional SAM for the UK

Type 2 SAM output attribution							
			Supported Output				
	£million		Scotland	Wales	RUK		Total
Final demand category	Sco	Government	43428.24	1111.55	22651.35		67191.14
		Capital	14450.42	675.75	12585.47		27711.65
		ROW - Scotland	40538.44	1107.22	22541.72		64187.39
	Wales	Government	1333.91	22660.03	15482.55		39476.49
		Capital	515.93	4205.39	5869.29		10590.62
		ROW - Wales	728.78	12516.48	8328.15		21573.41
	RUK	Government	14453.75	8413.64	539602.52		562469.91
		Capital	8866.30	6662.63	271558.09		287087.01
		ROW - RUK	16924.87	10091.85	614423.68		641440.40
		Total	141240.64	67444.55	1513042.83		

Type 2 SAM employment attribution							
			Supported employment				
	£million		Scotland	Wales	RUK		Total
Final demand category	Sco	Government	720103.11	14516.11	264679.95		999299.16
		Capital	188569.71	8562.35	146746.74		343878.80
		ROW - Scotland	464548.05	14246.28	260418.83		739213.17
	Wales	Government	16362.08	416021.59	186011.87		618395.54
		Capital	5793.69	63815.17	68905.20		138514.06
		ROW - Wales	8382.64	168881.22	96082.86		273346.72
	RUK	Government	181970.02	115428.22	7763489.79		8060888.02
		Capital	103313.73	86876.85	3544058.80		3734249.38
		ROW - RUK	201357.05	129652.22	7238625.10		7569634.37
		Total	1890400.09	1018000.01	19569019.14		

Type 2 SAM value added attribution							
			Supported value added				
	£million		Scotland	Wales	RUK		Total
Final demand category	Sco	Government	21686.10	434.85	10032.47		32153.41
		Capital	5794.03	256.61	5480.68		11531.32
		ROW - Scotland	16575.37	433.18	10005.96		27014.51
	Wales	Government	580.16	11037.45	6993.43		18611.03
		Capital	210.05	1701.04	2560.94		4472.03
		ROW - Wales	308.03	4993.50	3718.62		9020.15
	RUK	Government	6408.76	3402.79	256104.92		265916.46
		Capital	3739.86	2545.38	117203.09		123488.32
		ROW - RUK	7321.58	3929.26	274673.93		285924.76
		Total	62623.93	28734.04	686774.03		

Table 17: Sectoral breakdown for Scotland, Wales, Northern Ireland and England inter-regional model

	Sector name	*IOC*
1	*Manufacturing*	*8-84*
2	*Non-manufacturing, traded*	*1-7, 85-87, 89-114 and 119-123*
3	*Non-manufacturing, non-traded*	*88 and 115-118*

Table 18: IO Type 1, Type II and SAM Type 2 Inter-Regional Output Multipliers for Scotland, Wales, Northern Ireland and England, 1999

Type I IO/SAM

	Own multiplier				Inter-regional Shocks (Region in which shock occurs named first)											
	Scotland	Wales	NI	England	Scot/Wales	Scot/NI	Scot/Eng	Wales/Scot	Wales/NI	Wales/Eng	NI/Scot	NI/Wales	NI/Eng	Eng/Scot	Eng/Wales	Eng/NI
MANUFACTURING	1.310	1.344	1.568	1.717	0.024	0.015	0.431	0.041	0.015	0.428	0.030	0.018	0.329	0.028	0.023	0.009
NON-MANUFACTURING TRADED	1.504	1.300	1.568	1.723	0.012	0.009	0.264	0.035	0.011	0.364	0.027	0.012	0.304	0.021	0.011	0.005
NON-MFR NON-TRADED	1.612	1.397	1.665	1.756	0.015	0.010	0.271	0.033	0.011	0.335	0.027	0.013	0.279	0.017	0.013	0.005

	Total IO/SAM Type I Output Mults			
	Scotland	Wales	NI	England
MANUFACTURING	1.781	1.829	1.945	1.777
NON-MANUFACTURING TRADED	1.789	1.711	1.912	1.760
NON-MFR NON-TRADED	1.908	1.776	1.984	1.792

Type II IO

	Own multiplier				Inter-regional Shocks (Region in which shock occurs named first)											
	Scotland	Wales	NI	England	Scot/Wales	Scot/NI	Scot/Eng	Wales/Scot	Wales/NI	Wales/Eng	NI/Scot	NI/Wales	NI/Eng	Eng/Scot	Eng/Wales	Eng/NI
MANUFACTURING	1.677	1.773	2.186	3.107	0.058	0.038	1.164	0.113	0.043	1.334	0.082	0.047	0.997	0.089	0.059	0.028
NON-MANUFACTURING TRADED	2.021	1.745	2.247	3.025	0.047	0.033	1.025	0.106	0.038	1.235	0.081	0.041	0.987	0.076	0.043	0.021
NON-MFR NON-TRADED	2.359	2.078	2.649	3.425	0.063	0.042	1.291	0.130	0.048	1.515	0.097	0.051	1.155	0.085	0.053	0.025

	Total IO Type II Output Mults			
	Scotland	Wales	NI	England
MANUFACTURING	2.936	3.263	3.313	3.283
NON-MANUFACTURING TRADED	3.126	3.125	3.355	3.165
NON-MFR NON-TRADED	3.754	3.772	3.952	3.588

Type II SAM

	Own multiplier				Inter-regional Shocks (Region in which shock occurs named first)											
	Scotland	Wales	NI	England	Scot/Wales	Scot/NI	Scot/Eng	Wales/Scot	Wales/NI	Wales/Eng	NI/Scot	NI/Wales	NI/Eng	Eng/Scot	Eng/Wales	Eng/NI
MANUFACTURING	1.575	1.626	1.955	2.545	0.046	0.030	0.894	0.087	0.032	0.983	0.063	0.036	0.740	0.066	0.045	0.020
NON-MANUFACTURING TRADED	1.902	1.667	2.070	2.601	0.036	0.025	0.774	0.090	0.031	1.008	0.066	0.032	0.790	0.059	0.033	0.016
NON-MFR NON-TRADED	2.075	1.811	2.237	2.721	0.042	0.028	0.837	0.090	0.033	1.005	0.068	0.035	0.780	0.057	0.036	0.017

	Total SAM Type II Output Mults			
	Scotland	Wales	NI	England
MANUFACTURING	2.545	2.728	2.793	2.676
NON-MANUFACTURING TRADED	2.738	2.795	2.959	2.708
NON-MFR NON-TRADED	2.983	2.940	3.120	2.831

			IO/SAM Type I Supported Output (£m)				
			Scotland	**Wales**	**NI**	**England**	**TOTAL**
Final Demand Sector	**Scot**	Households	36689.71	1201.07	789.62	22251.76	60932.17
		General Govt.	28942.11	261.18	174.06	4877.63	34254.98
		Investment (GFCF + Change in Inventories)	10556.73	381.25	233.18	6161.80	17332.96
		ROW Exports	31569.82	480.77	316.75	8946.22	41313.56
	Wales	Households	1264.41	18265.11	462.96	13375.51	33367.99
		General Govt.	328.24	13820.77	113.57	3325.81	17588.40
		Investment (GFCF + Change in Inventories)	283.14	3226.17	110.34	2940.38	6560.04
		ROW Exports	285.38	9579.84	103.23	2960.66	12929.12
	NI	Households	486.50	256.61	15137.97	5339.83	21220.90
		General Govt.	171.49	82.80	10628.65	1792.84	12675.78
		Investment (GFCF + Change in Inventories)	127.08	77.97	2856.05	1334.57	4395.67
		ROW Exports	137.96	74.53	7373.50	1509.25	9095.24
	England	Households	18734.17	10567.47	4688.51	663964.07	697954.22
		General Govt.	2724.15	2269.85	945.36	230484.19	236423.55
		Investment (GFCF + Change in Inventories)	4091.57	3435.21	1421.31	165683.86	174631.94
		ROW Exports	4848.17	3463.94	1468.36	331271.03	341051.49
		TOTAL	141240.63	67444.55	46823.42	1466219.41	**1721728.01**

			IO Type II Supported Output (£m)				
			Scotland	**Wales**	**NI**	**England**	**TOTAL**
Final Demand Sector	**Scot**	General Govt.	42263.34	1121.46	749.49	23090.36	67224.65
		Investment (GFCF + Change in Inventories)	15296.54	847.05	540.62	16157.68	32841.89
		ROW Exports	41042.51	1270.72	846.12	26146.34	69305.69
	Wales	General Govt.	1284.61	20499.85	476.30	14937.06	37197.82
		Investment (GFCF + Change in Inventories)	612.40	4685.76	241.48	7254.15	12793.80
		ROW Exports	799.90	12698.94	300.77	9419.75	23219.36
	NI	General Govt.	615.62	325.30	16838.85	7342.58	25122.35
		Investment (GFCF + Change in Inventories)	287.66	171.65	4387.69	3448.68	8295.68
		ROW Exports	384.06	211.61	10371.86	4677.18	15644.72
	Eng	General Govt.	11751.52	7750.54	3666.29	448335.50	471503.84
		Investment (GFCF + Change in Inventories)	10831.75	7710.53	3584.05	312651.84	334778.17
		ROW Exports	16070.74	10151.12	4819.89	592758.30	623800.05
		TOTAL	141240.64	67444.55	46823.42	1466219.42	**1721728.03**

			SAM Type II Supported Output (£m)				
			Scotland	**Wales**	**NI**	**England**	**TOTAL**
Final Demand Sector	**Scot**	General Govt.	45095.50	1123.59	745.11	22325.05	69289.25
		Investment (Capital + Stocks)	13595.38	663.55	417.03	11994.48	26670.44
		ROW Exports	40410.79	1098.12	726.05	21824.31	64059.27
	Wales	General Govt.	1376.37	22597.05	499.45	15479.73	39952.59
		Investment (Capital + Stocks)	492.20	4155.78	189.92	5519.54	10357.43
		ROW Exports	715.17	12515.44	261.45	8104.84	21596.90
	NI	General Govt.	665.58	344.60	18792.59	7760.55	27563.33
		Investment (Capital + Stocks)	228.47	135.21	3789.07	2603.94	6756.69
		ROW Exports	335.96	180.93	9942.79	3977.47	14437.15
	Eng	General Govt.	14121.72	8814.92	4148.88	517420.90	544506.43
		Investment (Capital + Stocks)	8321.60	6048.25	2727.26	253811.68	270908.79
		ROW Exports	15881.91	9767.13	4583.82	595396.95	625629.81
		TOTAL	141240.64	67444.57	46823.42	1466219.44	**1721728.08**

Table 19: Attribution of Output to Final Demand Categories

Table 20: IO Type 1, Type II and SAM Type 2 Inter-Regional Employment Multipliers for Scotland, Wales, Northern Ireland and England, 1999, 000s of jobs per 000s jobs

Type I IO/SAM

	Own multiplier				Inter-regional Shocks (Region in which shock occurs named first)											
	Scotland	Wales	NI	England	Scot/Wales	Scot/NI	Scot/Eng	Wales/Scot	Wales/NI	Wales/Eng	NI/Scot	NI/Wales	NI/Eng	Eng/Scot	Eng/Wales	Eng/NI
MANUFACTURING	1.458	1.453	1.577	1.707	0.035	0.018	0.605	0.044	0.014	0.484	0.035	0.023	0.403	0.026	0.023	0.008
NON-MANUFACTURING TRADED	1.490	1.286	1.653	1.761	0.011	0.006	0.227	0.029	0.007	0.269	0.039	0.019	0.404	0.023	0.013	0.004
NON-MFR NON-TRADED	1.532	1.340	1.396	1.581	0.011	0.006	0.201	0.023	0.008	0.239	0.015	0.008	0.161	0.011	0.009	0.003

	Total IO/SAM Type I Employment Mults			
	Scotland	Wales	NI	England
MANUFACTURING	2.116	1.994	2.038	1.764
NON-MANUFACTURING TRADED	1.735	1.591	2.115	1.801
NON-MFR NON-TRADED	1.750	1.610	1.581	1.604

Type II IO

	Own multiplier				Inter-regional Shocks (Region in which shock occurs named first)											
	Scotland	Wales	NI	England	Scot/Wales	Scot/NI	Scot/Eng	Wales/Scot	Wales/NI	Wales/Eng	NI/Scot	NI/Wales	NI/Eng	Eng/Scot	Eng/Wales	Eng/NI
MANUFACTURING	2.052	2.083	2.217	3.120	0.090	0.044	1.649	0.129	0.041	1.523	0.103	0.065	1.237	0.091	0.066	0.023
NON-MANUFACTURING TRADED	2.001	1.713	2.412	3.156	0.045	0.023	0.886	0.084	0.023	0.922	0.114	0.063	1.321	0.085	0.052	0.018
NON-MFR NON-TRADED	2.162	1.894	1.824	2.651	0.051	0.026	0.953	0.087	0.027	0.988	0.053	0.031	0.619	0.056	0.038	0.013

	Total IO/SAM Type I Employment Mults			
	Scotland	Wales	NI	England
MANUFACTURING	3.835	3.776	3.622	3.300
NON-MANUFACTURING TRADED	2.955	2.743	3.910	3.311
NON-MFR NON-TRADED	3.192	2.995	2.527	2.759

Type II SAM

	Own multiplier				Inter-regional Shocks (Region in which shock occurs named first)											
	Scotland	Wales	NI	England	Scot/Wales	Scot/NI	Scot/Eng	Wales/Scot	Wales/NI	Wales/Eng	NI/Scot	NI/Wales	NI/Eng	Eng/Scot	Eng/Wales	Eng/NI
MANUFACTURING	1.888	1.868	1.977	2.549	0.071	0.035	1.263	0.099	0.031	1.120	0.079	0.049	0.915	0.067	0.049	0.017
NON-MANUFACTURING TRADED	1.884	1.638	2.214	2.702	0.035	0.018	0.668	0.071	0.019	0.751	0.094	0.050	1.057	0.066	0.039	0.014
NON-MFR NON-TRADED	1.923	1.677	1.645	2.200	0.034	0.017	0.618	0.061	0.019	0.664	0.038	0.021	0.423	0.038	0.026	0.009

	Total IO/SAM Type I Employment Mults			
	Scotland	Wales	NI	England
MANUFACTURING	3.257	3.117	3.020	2.681
NON-MANUFACTURING TRADED	2.604	2.479	3.415	2.821
NON-MFR NON-TRADED	2.592	2.420	2.126	2.272

Table 21: Attribution of Employment to Final Demand categories

			IO/SAM Type I Supported Employment				
			Scotland	**Wales**	**NI**	**England**	**TOTAL**
Final Demand Sector	**Scot**	Households	516.33	15.18	7.92	269.34	808.78
		General Govt.	455.69	3.32	1.81	60.10	520.91
		Investment (GFCF + Change in Inventories)	160.85	4.60	2.34	74.87	242.66
		ROW Exports	345.81	6.10	3.19	108.55	463.66
	Wales	Households	14.95	288.72	4.68	162.25	470.61
		General Govt.	4.42	255.84	1.49	45.92	307.66
		Investment (GFCF + Change in Inventories)	3.10	55.33	1.16	36.52	96.10
		ROW Exports	3.36	121.59	1.04	35.90	161.89
	NI	Households	5.89	3.41	154.85	64.85	229.00
		General Govt.	2.27	1.22	205.33	24.27	233.09
		Investment (GFCF + Change in Inventories)	1.42	0.98	47.06	16.63	66.09
		ROW Exports	1.65	0.98	73.04	18.31	93.97
	England	Households	236.61	140.74	47.11	8225.76	8650.23
		General Govt.	34.10	32.81	12.01	3956.24	4035.17
		Investment (GFCF + Change in Inventories)	46.89	43.80	15.19	2481.64	2587.52
		ROW Exports	57.05	43.38	14.60	3987.88	4102.91
		TOTAL	1890.40	1018.00	592.83	19569.02	**23070.24**

			IO Type II Supported Employment				
			Scotland	**Wales**	**NI**	**England**	**TOTAL**
Final Demand Sector	**Scot**	General Govt.	642.69	15.16	7.63	283.42	948.90
		Investment (GFCF + Change in Inventories)	227.23	11.21	5.46	197.87	441.76
		ROW Exports	478.60	17.18	8.56	319.98	824.32
	Wales	General Govt.	16.58	361.12	5.17	188.46	571.32
		Investment (GFCF + Change in Inventories)	7.38	78.25	2.49	89.67	177.79
		ROW Exports	9.95	170.71	3.05	115.30	299.01
	NI	General Govt.	7.98	4.65	268.85	92.45	373.93
		Investment (GFCF + Change in Inventories)	3.52	2.33	62.72	42.67	111.24
		ROW Exports	4.83	2.93	103.71	57.27	168.74
	Eng	General Govt.	152.05	110.62	39.55	6654.22	6956.44
		Investment (GFCF + Change in Inventories)	135.54	105.38	37.11	4301.52	4579.55
		ROW Exports	204.06	138.46	48.53	7226.18	7617.22
		TOTAL	1890.40	1018.00	592.83	19569.02	**23070.24**

			SAM Type II Supported Employment				
			Scotland	**Wales**	**NI**	**England**	**TOTAL**
Final Demand Sector	**Scot**	General Govt.	682.66	14.99	7.57	273.45	978.67
		Investment (Capital + Stocks)	203.43	8.60	4.20	146.59	362.82
		ROW Exports	469.89	14.67	7.33	266.55	758.44
	Wales	General Govt.	17.58	394.31	5.40	194.79	612.08
		Investment (Capital + Stocks)	5.83	69.94	1.97	68.28	146.01
		ROW Exports	8.83	167.86	2.65	99.05	278.40
	NI	General Govt.	8.58	4.88	288.84	97.46	399.75
		Investment (Capital + Stocks)	2.75	1.81	56.60	32.26	93.42
		ROW Exports	4.20	2.48	99.32	48.65	154.65
	Eng	General Govt.	182.61	124.67	44.40	7510.05	7861.73
		Investment (Capital + Stocks)	102.70	81.49	28.43	3572.87	3785.49
		ROW Exports	201.35	132.30	46.11	7259.01	7638.77
		TOTAL	1890.40	1018.00	592.83	19569.02	**23070.24**

Table 22: IO Type 1, Type II and SAM Type 2 Inter-Regional Value Added Multipliers for Scotland, Wales, Northern Ireland and England, £million value added per £million value added, 1999

Type I IO/SAM

	Own multiplier				Inter-regional Shocks (Region in which shock occurs named first)											
	Scotland	Wales	NI	England	Scot/Wales	Scot/NI	Scot/Eng	Wales/Scot	Wales/NI	Wales/Eng	NI/Scot	NI/Wales	NI/Eng	Eng/Scot	Eng/Wales	Eng/NI
MANUFACTURING	1.429	1.468	1.844	1.832	0.027	0.015	0.578	0.054	0.016	0.603	0.052	0.027	0.595	0.030	0.021	0.007
NON-MANUFACTURING TRADED	1.475	1.275	1.525	1.701	0.009	0.006	0.237	0.032	0.008	0.334	0.029	0.012	0.335	0.019	0.009	0.004
NON-MFR NON-TRADED	1.627	1.386	1.667	1.750	0.012	0.007	0.264	0.031	0.009	0.326	0.032	0.014	0.337	0.016	0.011	0.004

	Total IO/SAM Type I VA Mults			
	Scotland	Wales	NI	England
MANUFACTURING	2.050	2.141	2.518	1.890
NON-MANUFACTURING TRADED	1.728	1.649	1.902	1.733
NON-MFR NON-TRADED	1.910	1.751	2.050	1.780

Type II IO

	Own multiplier				Inter-regional Shocks (Region in which shock occurs named first)											
	Scotland	Wales	NI	England	Scot/Wales	Scot/NI	Scot/Eng	Wales/Scot	Wales/NI	Wales/Eng	NI/Scot	NI/Wales	NI/Eng	Eng/Scot	Eng/Wales	Eng/NI
MANUFACTURING	1.971	2.123	2.854	3.518	0.071	0.040	1.611	0.158	0.049	1.950	0.148	0.078	1.867	0.102	0.062	0.025
NON-MANUFACTURING TRADED	1.971	1.690	2.163	2.960	0.038	0.023	0.928	0.095	0.027	1.123	0.087	0.041	1.081	0.071	0.037	0.015
NON-MFR NON-TRADED	2.428	2.076	2.701	3.438	0.056	0.032	1.297	0.124	0.037	1.483	0.115	0.057	1.405	0.082	0.047	0.019

	Total IO/SAM Type I VA Mults			
	Scotland	Wales	NI	England
MANUFACTURING	3.693	4.280	4.947	3.705
NON-MANUFACTURING TRADED	2.960	2.935	3.372	3.083
NON-MFR NON-TRADED	3.813	3.721	4.279	3.587

Type II SAM

	Own multiplier				Inter-regional Shocks (Region in which shock occurs named first)											
	Scotland	Wales	NI	England	Scot/Wales	Scot/NI	Scot/Eng	Wales/Scot	Wales/NI	Wales/Eng	NI/Scot	NI/Wales	NI/Eng	Eng/Scot	Eng/Wales	Eng/NI
MANUFACTURING	1.822	1.899	2.476	2.836	0.056	0.031	1.228	0.121	0.036	1.426	0.113	0.059	1.377	0.074	0.045	0.018
NON-MANUFACTURING TRADED	1.857	1.617	1.997	2.550	0.029	0.018	0.698	0.080	0.022	0.915	0.071	0.033	0.866	0.055	0.028	0.011
NON-MFR NON-TRADED	2.124	1.806	2.268	2.726	0.037	0.021	0.836	0.086	0.025	0.982	0.081	0.039	0.948	0.055	0.031	0.013

	Total IO/SAM Type I VA Mults			
	Scotland	Wales	NI	England
MANUFACTURING	3.136	3.482	4.024	2.974
NON-MANUFACTURING TRADED	2.602	2.635	2.967	2.645
NON-MFR NON-TRADED	3.018	2.899	3.336	2.825

Table 23: Attribution of Value Added to Final Demand Categories

			IO/SAM Type I Supported VA (£m)				
			Scotland	**Wales**	**NI**	**England**	**TOTAL**
Final Demand Sector	**Scot**	Households	17681.61	446.46	256.53	9729.99	28114.59
		General Govt.	13116.35	96.96	56.57	2131.85	15401.74
		Investment (GFCF + Change in Inventories)	4798.02	134.34	70.80	2606.07	7609.23
		ROW Exports	12472.55	179.37	103.24	3917.52	16672.67
	Wales	Households	531.16	8649.79	154.59	5922.40	15257.93
		General Govt.	144.29	6400.47	40.37	1508.51	8093.65
		Investment (GFCF + Change in Inventories)	110.25	1444.14	34.08	1253.09	2841.56
		ROW Exports	119.42	3586.50	34.19	1306.15	5046.27
	NI	Households	208.53	100.46	5997.05	2393.66	8699.70
		General Govt.	76.18	34.33	4017.97	815.60	4944.09
		Investment (GFCF + Change in Inventories)	50.53	28.46	1054.16	574.78	1707.94
		ROW Exports	58.53	28.84	2374.39	672.91	3134.68
	England	Households	8375.92	4159.35	1582.90	310631.99	324750.17
		General Govt.	1171.84	907.56	317.68	106256.11	108653.18
		Investment (GFCF + Change in Inventories)	1668.13	1260.94	444.19	74973.44	78346.71
		ROW Exports	2040.62	1276.06	464.28	145076.94	148857.90
		TOTAL	62623.93	28734.04	17003.00	669771.02	**778132.00**

			IO Type II Supported VA (£m)				
			Scotland	**Wales**	**NI**	**England**	**TOTAL**
Final Demand Sector	**Scot**	General Govt.	19524.75	447.89	259.99	10404.81	30637.45
		Investment (GFCF + Change in Inventories)	7074.18	330.67	182.42	7193.95	14781.21
		ROW Exports	17024.76	508.26	293.78	11788.00	29614.80
	Wales	General Govt.	570.40	9553.88	170.52	6813.55	17108.34
		Investment (GFCF + Change in Inventories)	259.67	2130.76	82.28	3242.42	5715.13
		ROW Exports	350.17	5057.66	105.67	4268.04	9781.55
	NI	General Govt.	276.12	135.98	6476.51	3365.06	10253.67
		Investment (GFCF + Change in Inventories)	123.66	68.57	1660.15	1551.37	3403.75
		ROW Exports	169.82	86.73	3561.17	2131.82	5949.54
	Eng	General Govt.	5301.44	3219.36	1299.59	208081.03	217901.43
		Investment (GFCF + Change in Inventories)	4765.30	3092.86	1234.73	143642.97	152735.86
		ROW Exports	7183.67	4101.42	1676.17	267288.01	280249.28
		TOTAL	62623.93	28734.04	17003.00	669771.03	**778132.00**

			SAM Type II Supported VA (£m)				
			Scotland	**Wales**	**NI**	**England**	**TOTAL**
Final Demand Sector	**Scot**	General Govt.	20892.37	442.42	254.90	9994.16	31583.85
		Investment (Capital + Stocks)	6257.86	253.16	137.33	5277.92	11926.28
		ROW Exports	16724.70	433.32	248.77	9777.70	27184.48
	Wales	General Govt.	606.57	10548.41	176.80	7029.27	18361.05
		Investment (Capital + Stocks)	205.27	1881.65	63.28	2441.26	4591.45
		ROW Exports	311.23	4972.41	90.89	3656.78	9031.31
	NI	General Govt.	297.14	142.75	7250.64	3547.36	11237.89
		Investment (Capital + Stocks)	96.82	52.99	1423.31	1160.96	2734.08
		ROW Exports	147.94	73.53	3391.46	1808.01	5420.94
	Eng	General Govt.	6376.24	3634.35	1461.72	240395.19	251867.50
		Investment (Capital + Stocks)	3616.03	2382.38	921.53	116146.03	123065.96
		ROW Exports	7091.77	3916.67	1582.37	268536.40	281127.22
		TOTAL	62623.93	28734.06	17003.00	669771.04	**778132.03**

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