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# ECONOMIC *Perspective*

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## IMPORT SUBSTITUTION AND THE DEMAND FOR SKILLED LABOUR IN SCOTLAND

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### INTRODUCTION

It is, of course, well-known that Scotland is highly 'open' with respect to external trade, with, for example, exports and imports representing 80% and 87% of 1994 GDP respectively.<sup>1</sup> However, it is probably fair to say, that, in terms of policy discussion and formulation, considerably more attention is paid to Scotland's performance in export markets than to the impact of import penetration in Scottish markets. This is perhaps unfortunate since, at least at the most general level, 'export promotion' and 'import substitution' can be seen as substitute (or, better still, complementary) policies for enhancing Scottish economic activity.<sup>2</sup>

In order to inform discussion of the merits or otherwise of import substitution policies for Scotland, the present paper provides quantitative estimates of the effects on the Scottish economy of a marginal change in imports, separately from the Rest of the UK (RUK) and from the Rest of the World (ROW). As part of the 'Scotland's Trade in Skills' project<sup>3</sup> the results presented emphasise the impact of changing imports on Scotland's requirements for skilled labour. Formally, this is an embodied factor content analysis, with 'skilled labour' being the sole identified production factor.

This paper can be read in conjunction with earlier published reports on economic implications of Scotland's net trade balance and Scottish exports.<sup>4</sup>

### METHODOLOGY

The 'core' data and methodological framework is the 1989 Scottish Input-Output Tables,<sup>5</sup> from which required domestic and import

industry/commodity coefficient matrices can be derived. For the 'Trade in Skills' project, these are supplemented by compatible skilled physical labour coefficients matrices compiled from the 1991 Census of Population. The COP allows 'skilled' labour to be classified in either of two ways (neither of which, unfortunately, is generic in terms of skill content):

- occupation, in terms of 2-digit Standard Occupational Classification (SOC) job descriptions.
- qualification, in terms of post-school qualifications achieved in 11 broad subject areas at three different levels of attainment.

To assess the 'impact' of import substitution, essentially the following procedures were adopted:

- a) a 'shock' was imparted to the Scottish system by changing all RUK or ROW import penetration ratios by a constant marginal amount (ie all multiplied by a single scalar with a value very close to unity). For each industry-commodity, the base import penetration ratio is defined as:

#### Scottish base imports of commodity

Scottish base domestic absorption of commodity

It may be noted that the numerical values of the scalars chosen to adjust RUK (ROW) import penetration ratios, were specified to be equivalent to a '£1 million' change in aggregate RUK(ROW) imports from base year values.<sup>6</sup> Thus, for shorthand purposes only, the initial shocks may be described as 'a £1 million change in RUK/ROW aggregate imports'.

- b) Separately for RUK and ROW, the altered import penetration ratios were incorporated into the Input-Output system and the entire model re-run. Differences between scenario and base results were the impacts of a '£1 million equivalent' change in import penetration ratios.

It can be noted that, although the initial shock may be specified in terms of a '£1 million equivalent' change in (say) UK imports, this will have the following outcomes:

- \* a change in aggregate Scottish domestic economic activity (always of opposite sign to the initial change in RUK imports)
- \* a change in aggregate UK imports (always of the same sign as the initial shock, but not necessarily equal to £1 million)

- \* a change in aggregate ROW imports (always less in value than the initial RUK shock value, but always of the opposite sign)

The above methodological notes are necessarily brief and do not cover all the technical issues involved. Further details, and a mathematical specification, are available from the authors on request. Here, we turn immediately to the presentation and discussion of the import-substitution simulation results.

#### Impact of Import Substitution on Scotland's Demands for Skilled Labour

The scenario results considered here are the outcomes of i) a '£1 million equivalent' increase in RUK import penetration ratios, *ceteris paribus*; and ii) a '£1 million equivalent' increase in ROW import penetration ratios. The outcome impacts of these shocks on occupational employment in Scotland are summarised at 1-digit SOC level in Table 1.

As expected from earlier discussion, all the entries in Table 1 are negative i.e. an increase in import penetration ratios reduces (or, more accurately, displaces) Scottish employment across-the-board.<sup>7</sup> Aggregate employment displacement is similar for an initial RUK or ROW shock. Relatively, there are greater differences at the 1-digit SOC level, but the rankings of occupational displacements were also similar.<sup>8</sup> In terms of occupational 'skills', the highest absolute levels of displacements were in manual skills of varying degrees, primarily utilised in manufacturing (SOC's 5 and 8).

Interestingly, the next highest displacement was in skilled management occupations (SOC1). Table 2 presents the equivalent results of the above simulations in terms of displacement of Scottish qualified labour. In this context, identified qualifications refer to post-school educational achievement levels from sub-degree to PhD.

Perhaps the most immediately noteworthy feature of Table 2 is that the large majority of jobs displaced did not have any of the identified qualifications. In fact, this is a reflection of the way in which the 'embodied labour content' of imports is quantified in terms of displacement of Scottish employment in the pre-existing Scottish pattern. Thus, the analysis does not reveal that RUK imports actually embodied 0.74 Science/Maths graduates, rather it indicates that a marginal increase in RUK imports at the expense of equivalent domestic production would have displaced 0.74 Scottish Science/Maths graduates.

With this in mind, the high non post-school qualification content is readily attributable to a) the fact that, in aggregate, only 18.8% of the Scottish workforce (in 1991) had post-school qualifications; and b) the largest numbers of jobs displaced in absolute terms tended to be in occupations in which post-school qualified persons were not concentrated (notably SOC's 5, 8, 9).

Considering the qualified labour results by subject, Table 2 shows that, for both RUK and ROW imports, the highest displacements were in Technology/Engineering, Science/Maths, and Social/Business/Administration.

The results for Engineering and Science may seem initially puzzling, since the 'natural' occupational homes for these persons (SOC's 20 and 21) were not among the highest displaced in absolute terms. Again however, this is readily explicable as follows: although the occupations in which Scientists and Engineers specialised were not highly displaced, this was offset by the high concentration of qualified scientists and engineers in these occupations. For example, every 100 jobs displaced in SOC 20/21 'contained' 44.9 qualified technologists/engineers and 27.3 qualified scientists/mathematicians.

Finally, Table 3 compares the impact on the demand for skilled labour in Scotland of a '£1 million equivalent' decrease in RUK/ROW imports with a £1 million increase in RUK/ROW exports.<sup>9</sup> The results indicate that, with respect to both RUK and (especially) ROW trade, a unit of Scottish imports embodied a higher aggregate labour content than Scottish exports i.e. imports were more labour-intensive than exports.

At least at the level of aggregation in Table 3, the relative embodied skilled labour content (whether in terms of occupations or qualifications) of Scotland's imports from RUK was similar to that of her exports to RUK. However, for ROW trade, there is some indication that the embodied skilled labour content displaced by imports was higher than that of exports, particularly in terms of qualifications. This conclusion is, in fact, reinforced by the more disaggregate analysis underlying Table 3, and if persistent over time, would not be encouraging for Scotland's future international competitiveness in an increasingly 'skill-driven world'.<sup>10</sup>

#### CONCLUSIONS

The major conclusion of this paper is that across-the-board changes in Scotland's propensity to import have significant effects on her domestic labour requirements, both in aggregate terms and in terms of particular skills. Indeed, the results

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suggest that a change in imports has greater impact on Scotland's demands for labour than an equivalent change in exports.

It would be wrong to infer from this that a major re-orientation of Scottish economic policy should take place in favour of import substitution rather than export promotion: particularly at the sectoral

level, in many cases this will prove to be neither financially viable nor economically desirable. However, the results do suggest that perhaps more attention should be paid to the import side of Scotland's external trade than appears to be the case at present.

**Table 1: Impact on Scottish Employment of Marginal Increases in Import Penetration Ratios\***

SOC	RUK Imports		ROW Imports	
	FTEs		FTEs	
1	-4.67	(4)	-4.86	(3)
2	-1.82	(8)	-2.02	(8)
3	-2.58	(6)	-2.94	(6=)
4	-5.03	(3)	-4.69	(4)
5	-6.48	(1)	-6.49	(1)
6	-2.40	(7)	-2.94	(6=)
7	-1.66	(9)	-1.44	(9)
8	-5.70	(2)	-5.77	(2)
9	-2.89	(5)	-3.49	(5)
0	-0.17	(10)	-0.18	(10)
<b>Totals</b>	<b>-33.40</b>		<b>-34.83</b>	

\* Designed to be equivalent to an increase in base year values of RUK or ROW imports of £1 million.

Figures in brackets are rankings 1 = highest.

Key to SOC: 1 = Managers/Administrators, 2 = Professional, 3 = Associate Professional, 4 = Clerical/Secretarial, 5 = Craft and Related, 6 = Personal and Protective, 7 = Sales, 8 = Plant/Machine Operatives, 9 = Other Occupations, 0 = Unclassified.

**Table 2 Qualified Scottish Labour Displaced by Marginal Increases in Import Penetration Ratios (£1 million Equivalent)**

Subject*	FTEs	
	RUK Imports	ROW Imports
Education	-0.16	-0.17
Health/Medicine/Dentistry	-0.55	-0.66
Technical/Engineering	-1.43	-1.51
Agricultural/Vet	-0.10	-0.12
Science/Maths	-0.74	-0.80
Social/Admin/Business	-1.43	-1.38
Vocational/Architecture	-0.30	-0.31
Languages	-0.13	-0.13
Arts	-0.13	-0.13
Music	-0.12	-0.13
Other	-0.01	-0.01
Not any of above	-28.30	-29.45
<b>Totals</b>	<b>-33.40</b>	<b>-34.80</b>

\*Summary of 3 separate attainment levels in each subject - sub-degree, first degree, higher degree.

**Table 3: Employment Impacts of 'Equivalent' Reductions in Imports and Increases in Exports (FTEs/£1 million)**

a) Occupations

b)

SOC	RUK				ROW			
	Import	%	Export	%	Import	%	Export	%
1	4.67	(14.0)	4.07	(13.2)	4.86	(14.0)	3.58	(15.3)
2	1.82	(5.4)	1.77	(5.7)	2.02	(5.8)	1.12	(4.8)
3	2.58	(7.7)	2.43	(7.9)	2.94	(8.4)	1.45	(6.2)
4	5.03	(15.1)	5.11	(16.6)	4.69	(13.5)	3.28	(14.0)
5	6.48	(19.4)	6.53	(21.2)	6.49	(18.6)	4.01	(17.2)
6	2.40	(7.2)	1.46	(4.7)	2.94	(8.4)	1.86	(8.0)
7	1.66	(5.0)	1.60	(5.2)	1.44	(4.1)	1.44	(6.2)
8	5.70	(17.1)	5.19	(16.9)	5.77	(16.6)	4.34	(18.6)
9	2.89	(8.7)	2.31	(7.5)	3.49	(10.0)	2.04	(8.7)
0	0.17	(0.5)	0.33	(1.1)	0.18	(0.5)	0.23	(1.0)
<b>Totals</b>	<b>33.40</b>	<b>(100)</b>	<b>30.80</b>	<b>(100)</b>	<b>34.83</b>	<b>(100)</b>	<b>23.35</b>	<b>(100)</b>

c) Qualifications

d)

Subject	Import	%	Export	%	Import	%	Export	%
Education	0.16	(0.5)	0.13	(0.4)	0.17	(0.5)	0.10	(0.4)
Health	0.55	(1.6)	0.40	(1.3)	0.66	(1.9)	0.29	(1.2)
Technol/ Engineering	1.43	(4.3)	1.39	(4.5)	1.51	(4.3)	0.96	(4.1)
Agriculture/Vet	0.10	(0.3)	0.09	(0.3)	0.12	(0.3)	0.07	(0.3)
Science/Maths	0.74	(2.2)	0.72	(2.3)	0.80	(2.3)	0.50	(2.1)
Social/Admin/ Business	1.43	(4.3)	1.42	(4.6)	1.38	(4.0)	0.91	(3.9)
Vocation/ Architect	0.30	(0.9)	0.28	(0.9)	0.31	(0.9)	0.19	(0.8)
Language	0.13	(0.4)	0.12	(0.4)	0.13	(0.4)	0.08	(0.3)
Arts	0.13	(0.4)	0.13	(0.4)	0.13	(0.4)	0.08	(0.3)
Music/Drama	0.12	(0.4)	0.11	(0.4)	0.13	(0.4)	0.07	(0.3)
Other	0.01	(0.1)	0.01	(0.1)	0.01	(0.1)	0.01	(0.1)
None of above	28.30	(84.7)	26.00	(84.4)	29.45	(84.6)	20.09	(86.0)
<b>Totals</b>	<b>33.40</b>	<b>(100)</b>	<b>30.80</b>	<b>(100)</b>	<b>34.80</b>	<b>(100)</b>	<b>23.35</b>	<b>(100)</b>

Note: Figures in brackets are percentages of column totals.

ENDNOTES

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<sup>1</sup> Ref: Input-Output Tables and Multipliers for Scotland 1994 HMSO, Edinburgh 1997. This is the latest publication from the Scottish Input-Output Programme which produces annual Scottish Input-Output balances and five yearly derived tables and multipliers.

<sup>2</sup> It could be argued that inward investment policies are relevant to import substitution; but in fact, most Scottish inward investment programmes seem orientated towards establishing a domestic base for exporting.

<sup>3</sup> The 'Trade in Skills' project is undertaken as an element of the ongoing Scottish Input-Output Programme (SIOP). However, the analysis and discussion of the present paper are the responsibility of the named authors.

<sup>4</sup> Refs: McNicoll I, Alexander J and Foley M: 'Scotland's Trade in Occupational Skills' Fraser of Allander QEC, Dec 1996. Alexander J and McNicoll I 'The Skills Content of Scottish Trade' Scottish Economic Bulletin March 1997.

<sup>5</sup> Ref: Scottish Input-Output Tables for 1989 (2 Vols) HMSO, Edinburgh, 1994.

<sup>6</sup> Specifically, all RUK and ROW import penetration ratios were changed by 0.005% and 0.008% respectively.

<sup>7</sup> Given the marginal nature of the analysis, the results presented (with signs reversed) can also be interpreted as the outcomes of a '£1 million equivalent' decrease in import penetration ratios.

<sup>8</sup> This latter point is also true at the 2-digit SOC level.

<sup>9</sup> For technical reasons, the import and export impacts in Table 3 are not exactly comparable though they are very close to being so. Wholly consistent results for a 'balanced change in trade' scenario have been calculated, but are not yet published.

<sup>10</sup> Ref: Wood A. North-South Trade: Changing Fortunes in a Skill-Driven World OUP 1994.