The Factor Content of Trade: Time-series Evidence[1]

NOTE: THE RESULTS ARE PRELIMINARY AND SHOULD NOT BE QUOTED

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Abstract

This paper provides time-series evidence of the Heckscher-Ohlin-Vanek (HOV) theorem during an era of emerging global production networks. We use world input-output tables, which consist of national input-output tables of forty major economies (including Brazil, Russia, India, and China) linked through international trade statistics for the period 1995 to 2006. These tables are combined with data on employment by industry and detailed labor-skill categories to test predictions by the HOV theorem. Our results suggest the fit between the measured and predicted factor content of trade is good but worsens over time. During the past decades, the traditional HOV theorem may break down due to the changing nature of international trade.

Keywords: Factor content; Globalization; Heckscher-Ohlin-Vanek

JEL classification: F1; F11; D57

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1. Introduction

Much research in international trade has focused on testing the Heckscher-Ohlin-Vanek (HOV) theorem because of the sharp predictions this theory has for the links between trade, technology, and endowments. The HOV theorem yields a simple prediction: The net export of factor services will be the difference between a country's endowment and the endowment typical in the world for a country of that size (Davis and Weinstein 2001).

Early tests demonstrated that the HOV theorem failed to predict trade in the services of factors better than a coin toss (Maskus 1985). More recent studies find that relaxing the assumption of identical technologies across countries is important for aligning actual trade patterns with the predicted pattern by HOV (Trefler 1993). In addition, current models incorporate trade in intermediate inputs. Incorporating these improvements in the empirical model, the predictions by the HOV theorem appear broadly aligned with the measured factor content of trade (Reimer 2006; Trefler and Zhu 2010).

This paper is first to provide time-series evidence on the factor content of trade. Following Reimer (2006) and Trefler and Zhu (2010), we measure the factor content of trade by country and compare it to the predicted factor content for the period from 1995 to 2006. We use world input-output tables, which consists of national input-output tables of forty economies (including Brazil, Russia, India, and China) linked through international trade statistics for the period 1995 to 2006. These tables are combined with data on employment by industry and detailed labor-skill categories to test predictions by the HOV theorem. In line with Trefler and Zhu (2010), the results suggest a good fit of the HOV theorem. However, the HOV theorem provides an increasingly poor fit between the predicted and measured factor services over time.

The increasingly poor fit of the HOV theorem might be related to the changing nature of trade. Largely due to the advancement of information and communication technologies, particular tasks within firms are being outsourced. For example, whereas IBM in the past manufactured a computer in-house, today the production of their computer hardware is spread across a global network. The offshoring of production by firms is like 'shadow migration' (Baldwin and Robert-Nicoud, 2010). That is, it is as if foreign factors migrated to the offshoring nation (hence using the offshoring nation's technology) but were paid foreign wages. Baldwin and Robert-Nicoud (2010) show that the traditional HOV theorem breaks down as a result and suggest a modified HOV theorem where 'shadow migration' endowments are used instead of actual endowments.

This paper proceeds as follows. The methodology for measuring the factor content of trade is presented in section 2. Next, section 3 describes the data required for testing HOV over time. Section 4 presents results on the factor content of trade over time, and parametric and non-parametric tests of the HOV theorem. Finally, section 5 concludes.

2. Trade in the services of factors: Methodology

This section outlines the traditional methodology for measuring the factor content of trade. Next it outlines a modified HOV theorem that takes account of the changing nature of trade, with an increasingly large part of tasks being outsourced.

2.1 The traditional HOV theorem

The HOV prediction states that each country is a net exporter of its abundant production factor(s). A country's factor content of trade (**f**) is predicted by the endowment (**v**) of country *c* and its share in world consumption (*s*): [2]

$$\mathbf{f}^{C} = \mathbf{v}^{C} - s\mathbf{v}^{W}, \quad (1)$$

where $\mathbf{v}^{W}$ is the world endowment of production factors.

To measure the factor content of trade, we follow recent models of international trade (Reimer 2006; Trefler and Zhu 2010) and trace the amount of factor inputs needed to produce a certain amount of final output.[3] The key element in this approach is that not only direct, but also indirect contributions of factor inputs are taken into account. This is achieved by focusing on the flow of goods and services from producing sectors to final users in a world input-output framework.

Let n=1,…,N index goods, and c=1,…,C index countries. Define the vector of net output ($\mathbf{y}^{C}$) as:

$$\mathbf{y}^{C} = \mathbf{x}^{C} - \mathbf{A}\,\mathbf{x}^{C}, \quad (2)$$

where $\mathbf{y}^{C}$ is a net output vector of dimension NC x 1, $\mathbf{x}^{C}$ is a (NC x 1) gross output vector, and **A** is the world input-output matrix with intermediate input shares of dimension (NC x NC). The vector $\mathbf{x}^{C}$ has positive elements for domestic gross output and zeros everywhere else. The matrix **A** describes how a given final product in a country is produced with different combinations of intermediate products, both domestically produced and imported from other countries.

Let $\mathbf{t}^{C}$ be a (NC x 1) vector representing the exports and imports of goods by a country for intermediate or final use. Let the (NC x 1) vector $\mathbf{d}^{C}$ refer to demand for final use. Trade is the difference between production and final demand, measured by:

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[2] We follow conventional input-output notation. This notation is used consistently throughout the paper. Matrices are indicated by boldfaced capital letters (e.g. **A**), vectors are columns by definition and are indicated by boldfaced lowercase letters (e.g. **x**), and scalars are indicated by italicized lowercase letters (e.g. *a*). A prime indicates transposition (e.g. **x**').

[3] Miller and Blair (2009) provide a thorough introduction to input-output analysis. For other applications in the literature on trade in value added see e.g. Deardorff (1982), Davis and Weinstein (2001), Reimer (2006), and Trefler and Zhu (2010).

$$\mathbf{t}^{\mathbf{C}} = \mathbf{y}^{\mathbf{C}} - \mathbf{d}^{\mathbf{C}}. \tag{3}$$

Next, consider **V**, which is a (F x NC) direct factor input matrix with F factor inputs. The matrix **V** considers country-specific direct factor inputs. An element in this matrix indicates the share in gross output of a production factor used directly by the country to produce a good or service. The elements are direct factor inputs, because they do not account for production factors embodied in imported intermediate inputs. To satisfy final demand, inputs are required. These inputs, however, need to be produced and require extra inputs. The extra inputs, however, also need to be produced, and so forth. Summing all inputs yields the total production that is – directly and indirectly – required to meet final demand. In matrix notation, the Leontief inverse is $(\mathbf{I} - \mathbf{A})^{-1}$ where **I** is an identity matrix. Using the Leontief inverse, a total factor input matrix $\mathbf{V}^*$ is imputed:

$$\mathbf{V}^* = \mathbf{V}\,(\mathbf{I} - \mathbf{A})^{-1}. \tag{4}$$

A typical element in $\mathbf{V}^*$ indicates the amount of the world production factor *f*, embodied in a country's version of good *n*. The factor content of trade ($\mathbf{f}^{\mathbf{C}}$) for a country (of dimension F x 1) is therefore measured by:

$$\mathbf{f}^{\mathbf{C}} = \mathbf{V}^*\mathbf{t}^{\mathbf{C}}. \tag{5}$$

Hence, the measured trade in the services of factors, the left-hand side of equation (1), is given by equation (5). The predicted factor content of trade by the Heckscher-Ohlin-Vanek theorem is given by the right-hand side of equation (1):

$$\mathbf{v}^{\mathbf{C}} - s\mathbf{v}^{\mathbf{W}}, \tag{6}$$

where the predicted value is the endowment vector $\mathbf{v}^{\mathbf{C}}$ of a country (with dimension F x 1), and $\mathbf{v}^{\mathbf{W}}$ is the world endowment vector, which is the sum of the individual country's endowment vectors adjusted for differences in productivity. The scalar *s*, denotes the country's share in world consumption. Following Trefler and Zhu (2010), the consumption share is measured as a country's gross domestic product less the value of the trade surplus, divided by world gross domestic product.

2.2 The modified HOV theorem

Largely due to the advancement of information and communication technologies, particular tasks within firms are increasingly outsourced (Helpman, 2011). Baldwin and Robert-Nicoud (2010) consider this offshoring of production by firms like a form of 'shadow migration'. That is, it is as if foreign factors migrated to the offshoring nation but were paid foreign wages. The key assumption is therefore that a firm can offshore a task using their own nation's technology.

Baldwin and Robert-Nicoud (2010) suggest a modified HOV theorem where 'shadow migration' endowments are used instead of actual endowments. Consider the shadow migration vector Δv, which measures foreign factors employed in performing the offshored tasks. The modified HOV theorem can then be written as:

$$(s\mathbf{v}^{W} - \mathbf{v}^{C}) - \mathbf{f}^{C} = [1 - s(1-\gamma^{-1})]\,\Delta v, \qquad (7)$$

where γ measures the productivity level of factors across countries. The left-hand side of equation (7) is the familiar HOV theorem. According to HOV, the left-hand side should equal zero. However, with trade in tasks, the difference between the measured and predicted factor content of trade is proportional to but smaller than the shadow migration vector Δv. As global production networks have expanded during the past decades, the difference between measured and predicted services of factors widens. Hence, we expect the fit of the HOV theorem to worsen over time.

3. Trade in the services of factors: Data

Testing the HOV predictions over time requires data on factor inputs, and annual World Input-Output Tables (WIOTs). This section is divided into two parts. The first part describes the measurement of factor inputs at the industry level. The second part sketches the construction of annual world input-output tables for the period from 1995 to 2006. The world input-output table and the factor inputs database distinguish 35 industries for 40 countries and the rest of the world. The list of industries distinguishes is provided in appendix table 1, and the list of countries is given in appendix table 2.

3.1 Factor inputs: Labor skill categories

For each industry, we obtain data on employment by three labor types (low-, medium- and high-skilled labor) by country for the period from 1995 to 2006. The EU KLEMS database provides this data for a large set of OECD countries. O'Mahony and Timmer (2009) provide a more detailed description of the methods used in constructing the EU KLEMS dataset. For non-OECD countries, including Brazil, Russia, India, and China, additional data has been collected and prepared following the same harmonization and construction procedures used in construction the EU KLEMS dataset.

Labor input is based on series of employment by various types of labor. Employment in our data set is defined as 'all persons employed', including all paid employees, but also self-employed and family workers. These series are not part of the core set of national accounts statistics reported by national statistical offices. Typically only total employment by industry are available from the

National Accounts. For these series additional material has been collected from employment and labor force statistics. For each country covered, a choice was made of the best statistical source for employment data at the industry level. In most countries this was the labor force survey (LFS). In other instances, an establishment survey, or social-security database was used. Care has been taken to arrive at series which are time consistent, as most employment surveys are not designed to track developments over time, and breaks in methodology or coverage frequently occur. Erumban et al. (2011a) provide additional detail on the data construction for the BRICs and other non-OECD countries.

3.2 World input-output tables

We outline the basic concepts and main data sources of the annual world input-output tables (WIOT) for the period 1995 to 2006. An in-depth discussion of the construction of the WIOTs is presented in Erumban et al. (2011b). A major bottleneck to study the factor content of trade while accounting for trade in intermediate inputs is the lack of information on cross-country inter-industry linkages. What is needed is information not only on the flow of products between countries, but on the flows of products between industries within and across countries. This type of information is contained in so-called international, or world, input-output tables.

Basically, world input-output tables (WIOTs) are a combination of national input-output tables (IOTs) in which the use of products is broken down according to their origin using trade statistics. Each product is produced either by a domestic industry or by a foreign industry. In contrast to the national IOT, this information is made explicit in the WIOT. For country A, flows of products both for intermediate and final use are split into domestically produced or imported. In addition, the WIOT shows for imports in which foreign industry the product was produced. This is illustrated by the schematic outline for a WIOT in Figure 1.

[Figure 1 about here]

Figure 1 illustrates the simple case of three regions: countries A and B, and the rest of the world. The WIOTs we construct distinguish 40 countries and the rest of the World, but the basic outline remains the same. For each country the use rows are split into two separate rows, one for domestic origin and one for foreign origin. In contrast to the national IOT for country A, it is now clear from which foreign industry the imports originate, and how the exports of country A are being used by the rest of the world, that is, by which industry or final end user. While national IO tables are routinely produced by NSIs, WIOTs are not as they require a high level of harmonization of statistical practices across countries.

The construction of WIOTs has two distinct characteristics when compared to e.g. the methods used by GTAP, OECD and IDE-JETRO. First, we rely on national supply and use tables (SUTs) rather than input-output tables as our basic building blocks. Second, to ensure meaningful analysis over time, we start from output and final consumption series given in the national accounts and benchmark national SUTs to these time-consistent series. SUTs are a more natural starting point for this type of analysis as they provide information on both products and (using and producing) industries. A supply table provides information on products produced by each domestic industry and a use table indicates the use of each product by an industry or final user. The linking with international trade data, that is product based, and the factor inputs dataset that is industry-based can be naturally made in a SUT framework. In contrast, an input-output table is exclusively of the product or industry type. Often it is constructed on the basis of an underlying SUT, requiring additional assumptions.

As discussed above, national SUTs are only infrequently available and are often not harmonized over time. Therefore, they are benchmarked on consistent time-series from the national accounts series. From the national accounts, time series on gross output and value added by industry, total imports and total exports and final use by use category are taken. This data is used to generate time series of SUTs using the so-called SUT-RAS method (Temurshoev and Timmer 2009). This method is akin to the well-known bi-proportional updating method for input-output tables known as the RAS-technique. The technique has been adapted for updating SUTs.

The next step is a breakdown of the use table into domestic and imported origin. As margins are only generated by domestic industries, a breakdown of the use table at basic price is made. Ideally one would like to have additional information based on firm surveys that inventory the origin of products used, but this type of information is hard to elicit and only rarely available. We use a non-survey imputation method that relies on a classification of detailed products in the international trade statistics into three use categories. Our basic data is import flows of all countries covered from all partners in the world at the HS6-digit product level taken from the UN COMTRADE database. Based on the detailed product description at the HS 6-digit level products are allocated to three use categories: intermediates, final consumption, and investment.[4] This resembles the well-known correspondence between the about 5,000 products listed in HS 6 and the Broad Economic Categories (BEC) as made available from the United Nations Statistics Division. These Broad Economic Categories can then be aggregated to the broader use categories mentioned above.

For services trade no standardized database on bilateral flows exists. These have been collected from various sources (including OECD, Eurostat, IMF and WTO), checked for consistence and integrated into a bilateral service trade database. As services trade is taken from the balance of

[4] A mixed category for products which are likely to have multiple uses was used as well; this category was allocated over the other use categories when splitting up the use tables.

payments statistics it is originally reported at BoP codes. For building the shares, a mapping to WIOD products has been applied. For these service categories there does not exist a breakdown into the use categories mentioned above. Thus, we either use available information from existing import use or symmetric import IO tables (see Stehrer et al., 2010, for details)

As a final step, international SUTs are transformed into industry-by-industry world input-output tables based on additional assumptions concerning technology. We use the so-called "fixed product-sales structure" assumption stating that each product has its own specific sales structure irrespective of the industry where it is produced. Here, sales structure refers to the proportions of the output of the product in which it is sold to the respective intermediate and final users. This assumption is most widely used, not only because it is more realistic than its alternatives, but also because it requires a relative simple mechanical procedure. Furthermore, it does not generate any negatives in the IOTs that would require manual rebalancing (Miller and Blair, 2009).

In short, we derive time series of national SUTs and link these across countries through detailed international trade statistics to create so-called international SUTs. These international SUTs are used to construct the symmetric world input-output table which is industry based.

4. Testing the traditional HOV theorem: 1995 -2006

In this section, we examine the fit between the measured and predicted factor content of trade. First, we provide a graphical analysis of trade patterns for the United States, next we apply non-parametric tests, and finally we use a parametric test.

The results suggest a good but worsening fit of the traditional HOV theorem. Currently, an open question is whether these results are due to the particular methodology of embodying factor inputs (as Trefler and Zhu (2010) account for trade in intermediate inputs), or because the increase in international outsourcing using the home nation's technology is calling for the application of a modified HOV theorem.

In addition, it should be stressed that these results are provisional and subject to change as they are based on a preliminary version of the database. Both the world input-output matrix **A** and the **F** matrix will be revised in the upcoming months to include more detailed information.

4.1 Trade patterns

Applying equation (1), we obtain estimates of predicted and measured factor content of labor services. In figure 2 we plot the difference between measured and predicted labor services for the United States over the period 1995 to 2006. The figure suggests that predicted use of labor services is larger as compared to measured labor services in the United States. In addition, the figure suggests this difference is growing over time.

[Figure 2 about here]

4.2 Testing HOV: Non-parametric tests

Sign and rank tests are common approaches in the literature that studies HOV predictions. In term of equation (1), the sign test compares the sign of the actual factor content of trade with the sign of the predicted factor content of trade.

[Table 1 about here]

Table 1 shows sign tests for total employment and by detailed labor-skill types from applying the traditional HOV theorem. We find a good match of signs between the predicted and measured services of factors. On average, about 90 percent of the signs of the measured factor content of trade are what is predicted. However, the match worsens over time. This is notable for total employment, and by labor-skill types. For total employment, the fit is perfect in 1995 but drops to 87.5 percent in 2006. In particular, the fit of HOV for medium-skilled workers appears to deteriorate over time, dropping from 95 percent of correct predictions to 85 percent by the end of the period observed.

A rank test compares the relative measured factor content with the relative predicted factor content. For the rank test, we use Spearman correlations, reported in table 2. The rank correlation tests are significant and high, again suggesting a good fit of the HOV theorem. However, again we observe a decline in the fit of the HOV predictions. The drop in correlation is most notable for total employment shown in figure 3 (data underlying this figure are in table 2). A similar declining trend is observed for the various labor-skills distinguished.

[Figure 3 about here]

[Table 2 about here]

4.3 Testing HOV: Econometric analysis

A final test of the HOV theorem is to run a regression of the measured factor content of trade on the predicted one:

$$\mathbf{f}^{\mathbf{C}} = \boldsymbol{\alpha} + \boldsymbol{\beta}\left(s\mathbf{v}^{\mathbf{W}} - \mathbf{v}^{\mathbf{C}}\right) + \mathbf{t}^{\mathbf{y}} + \boldsymbol{\varepsilon}^{\mathbf{C}}, \tag{8}$$

where t^y is a time trend variable that may capture a growing gap of the predicted services of factors. We predict a positive slope for β. Our dataset allows us to make use of the panel dimension and we run a fixed-effects regression controlling for fixed country characteristics.

Results are shown in table 3. The beta-coefficients are positive and significant as expected, although the slope coefficient is somewhat small. The fit of the regressions are high. Interestingly, the time trend variable picks up and increasing gap between the measured and the predicted factor content of trade.

[Table 3 about here]

5. Concluding remarks

Much research in international trade has focused on testing the Heckscher-Ohlin-Vanek (HOV) theorem because of the sharp predictions this theory has for the links between trade, technology, and endowments.

This paper is first to provide time-series evidence on the factor content of trade. Following Reimer (2006) and Trefler and Zhu (2010), we measure the factor content of trade by country and compare it to the predicted factor content for the period from 1995 to 2006. We use world input-output tables, which consists of national input-output tables of forty economies (including Brazil, Russia, India, and China) linked through international trade statistics for the period 1995 to 2006. These tables are combined with data on employment by industry and detailed labor-skill categories to test predictions by the HOV theorem. In line with Trefler and Zhu (2010), the results suggest a good fit of the HOV theorem. However, the HOV theorem provides an increasingly poor fit between the predicted and measured factor services over time.

The increasingly poor fit of the HOV theorem might be related to the changing nature of trade. Largely due to the advancement of information and communication technologies, particular tasks within firms are being outsourced. For example, whereas IBM in the past manufactured a computer in-house, today the production of their computer hardware is spread across a global network. The offshoring of production by firms is like 'shadow migration' (Baldwin and Robert-Nicoud, 2010). That is, it is as if foreign factors migrated to the offshoring nation (hence using the offshoring nation's technology) but were paid foreign wages. Baldwin and Robert-Nicoud (2010) show that the traditional HOV theorem breaks down as a result and suggest a modified HOV theorem where 'shadow migration' endowments are used instead of actual endowments.

In the near future, we would like to ascertain whether the results are due to the particular methodology of embodying factor inputs (as Trefler and Zhu (2010) account for trade in intermediate inputs but Trefler (1993) does not), or because the increase in international outsourcing using the home nation's technology is calling for the application of a modified HOV theorem.

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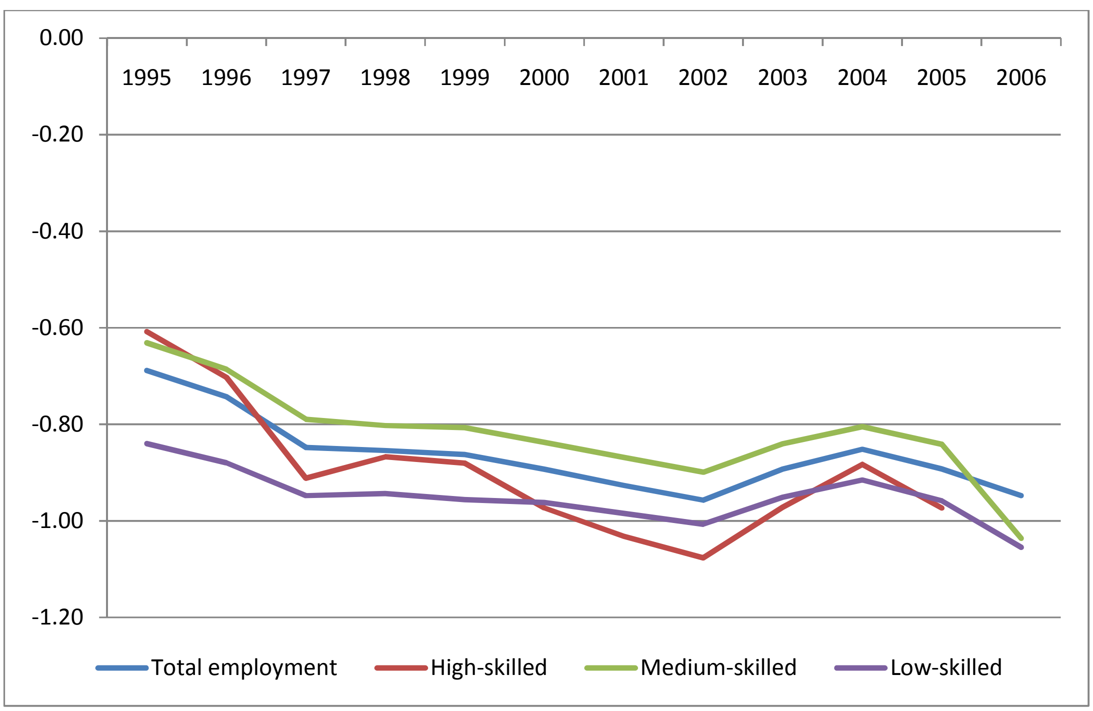
Figure 1. Three-country example of the World Input-Output table

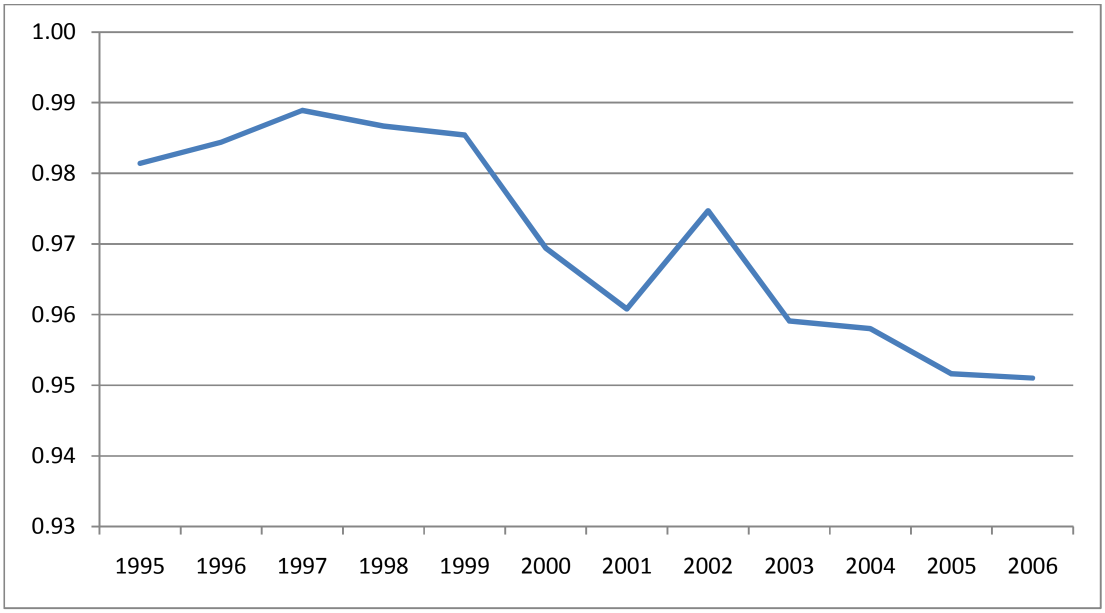
		Country A Intermediate *Industry*	Country B Intermediate *Industry*	Rest of World Intermediate *Industry*	Country A Final domestic	Country B Final domestic	Rest of World Final domestic	Total
Country A	*Industry*	Intermediate use of domestic output	Intermediate use by B of exports from A	Intermediate use by RoW of exports from A	Final use of domestic output	Final use by B of exports from A	Final use by RoW of exports from A	Output in A
Country B	*Industry*	Intermediate use by A of exports from B	Intermediate use of domestic output	Intermediate use by RoW of exports from B	Final use by A of exports from B	Final use of domestic output	Final use by RoW of exports from B	Output in B
Rest of World (RoW)	*Industry*	Intermediate use by A of exports from RoW	Intermediate use by B of exports from RoW	Intermediate use of domestic output	Final use by A of exports from RoW	Final use by B of exports from RoW	Final use of domestic output	Output in RoW
		Value added	Value added	Value added				
		Output in A	Output in B	Output in RoW				

Figure 2. Difference between measured and predicted factor content of trade, United States



Note: preliminary results

Figure 3. Spearman rank correlations total employment, United States



Note: see table 2 for data underlying this figure.

Table 1. Sign tests HOV theorem

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total employment	100.0	100.0	100.0	95.0	92.5	87.5	87.5	90.0	87.5	87.5	87.5	87.5
High-skilled	90.0	85.0	95.0	95.0	90.0	90.0	80.0	87.5	75.0	87.5	87.5	77.5
Medium-skilled	95.0	95.0	97.5	95.0	95.0	92.5	92.5	90.0	87.5	85.0	87.5	85.0
Low-skilled	85.0	87.5	87.5	87.5	82.5	85.0	87.5	82.5	90.0	85.0	82.5	82.5

Note: preliminary results.

Table 2. Spearman rank correlations HOV theorem

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total employment	0.98	0.98	0.99	0.99	0.99	0.97	0.96	0.97	0.96	0.96	0.95	0.95
High-skilled	0.94	0.94	0.95	0.98	0.98	0.93	0.91	0.91	0.89	0.93	0.93	0.79
Medium-skilled	0.98	0.97	0.99	0.99	0.98	0.97	0.96	0.96	0.95	0.95	0.96	0.97
Low-skilled	0.89	0.88	0.89	0.89	0.89	0.89	0.88	0.86	0.91	0.89	0.84	0.87

Note: preliminary results. All correlations are significant at the 1 percentage level.

Table 3. Fixed-effects regressions HOV theorem

	Predicted factor content		Time trend		R^2
Total employment	**0.183**	***	**-141**	***	0.84
	0.007		*28*		
High-skilled	**0.177**	***	**-30**	***	0.83
	0.006		*5*		
Medium-skilled	**0.209**	***	**-105**	***	0.84
	0.008		*20*		
Low-skilled	**0.123**	***	**-10**	***	0.89
	0.004		*4*		

Note: preliminary results. Coefficients are reported in bold, standard errors in parentheses. *** indicates significance at the 1 percentage level.

Appendix tables

Appendix table 1. Industries distinguished

Code	NACE	Description
1	AtB	Agriculture, Hunting, Forestry and Fishing
2	C	Mining and Quarrying
3	15t16	Food, Beverages and Tobacco
4	17t18	Textiles and Textile Products
5	19	Leather, Leather and Footwear
6	20	Wood and Products of Wood and Cork
7	21t22	Pulp, Paper, Paper , Printing and Publishing
8	23	Coke, Refined Petroleum and Nuclear Fuel
9	24	Chemicals and Chemical Products
10	25	Rubber and Plastics
11	26	Other Non-Metallic Mineral
12	27t28	Basic Metals and Fabricated Metal
13	29	Machinery, not elsewhere classified
14	30t33	Electrical and Optical Equipment
15	34t35	Transport Equipment
16	36t37	Manufacturing, not elsewhere classified; Recycling
17	E	Electricity, Gas and Water Supply
18	F	Construction
19	50	Sale, Maintenance and Repair of Motor Vehicles and Motorcycles; Retail Sale of Fuel
20	51	Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles
21	52	Retail Trade, Except of Motor Vehicles and Motorcycles; Repair of Household Goods
22	H	Hotels and Restaurants
23	60	Inland Transport
24	61	Water Transport
25	62	Air Transport
26	63	Other Supporting and Auxiliary Transport Activities; Activities of Travel Agencies
27	64	Post and Telecommunications
28	J	Financial Intermediation
29	70	Real Estate Activities
30	71t74	Renting of Machinery & Equipment, and Other Business Activities
31	L	Public Admin and Defense; Compulsory Social Security
32	M	Education
33	N	Health and Social Work
34	O	Other Community, Social and Personal Services
35	P	Private Households with Employed Persons

Appendix table 2. Countries included in the World Input-Output tables

1	Austria	**11**	Greece	**21**	Portugal	**31**	Canada
2	Bulgaria	**12**	Hungary	**22**	Romania	**32**	United States
3	Belgium	**13**	Ireland	**23**	Slovak Republic	**33**	Japan
4	Cyprus	**14**	Italy	**24**	Slovenia	**34**	South Korea
5	Czech Republic	**15**	Latvia	**25**	Spain	**35**	Australia
6	Denmark	**16**	Lithuania	**26**	Sweden	**36**	Taiwan
7	Estonia	**17**	Luxembourg	**27**	United Kingdom	**37**	Turkey
8	Finland	**18**	Malta	**28**	Brazil	**38**	China
9	France	**19**	Netherlands	**29**	Mexico	**39**	India
10	Germany	**20**	Poland	**30**	Indonesia	**40**	Russia