Empirical foundations for the resurrection of Heckscher–Ohlin theory

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A B S T R A C T

We decompose the factor content of trade into Heckscher–Ohlin–Vanek trade and Ricardian trade. We measure factor content using only the United States' technology and also as Leontief advocated, using the local technology. In either case, differences in endowments are quite important in explaining the factor content of trade. If one uses raw estimated coefficients as a means of comparison, differences in endowments are ten times as important as differences in technology.

1. Introduction

The dichotomy between trade because of differences in endowments and trade because of differences in technology is a central aspect of international economics. Our textbooks uniformly have this structure: (1) we teach the concept of comparative advantage and emphasize that Ricardian trade occurs because of differences in technology; (2) we explain that the real source of comparative advantage is differences in factor endowments; and (3) we explain (slight) variants on the Ricardian and Heckscher–Ohlin models as having to do with product differentiation, increasing returns to scale, trade in intermediate goods, and other ancillary concerns. It is fair to say that the Ricardian and Heckscher–Ohlin models are the twin pillars upon which almost all the edifice of trade theory is built.

The last twenty years have not been kind to Heckscher–Ohlin theory. Bowen, Leamer, and Sveikauskas (1987) began the assault in earnest, and Trefler (1995) showed that the predictions of the simplest model of factor content were grossly at odds with the measured factor content of trade. Davis and Weinstein (2001) showed that various adjustments to countries' technologies, home bias in consumption, and the existence of not traded goods seemed to improve the model's fit. But we are dissatisfied with the lack of a theoretical foundation for their analysis.

Fisher and Marshall (2008) define the concept of a virtual endowment. Fix a reference country. Then its own virtual endowment is simply the value of its own factor services, evaluated at its local factor prices. Thus the local virtual endowment is the actual local endowment, as long as one is careful to remember that Heckscher–Ohlin theory describes trade in factor services, not factors themselves. The virtual endowment of any other country is the value of factor services that would be necessary to produce its actual output if it had to use the reference country's technology. Thus a virtual endowment controls for technological and factor price differences. In essence, it uses the prism of the technology of the reference country to look at the factor content of world production.

The predicted factor content of trade is the difference between the local endowment and the local country's share of the world endowment. The former is its supply of factors and the latter is its use of factors. Notice that the predictions of the theory combine ineluctably the supply side and the demand side of the world economy. The empirical researcher needs to take a stand on the measured factor content of trade when testing the model. It has been customary to measure the factor content of trade using the United States' technology matrix, but Leontief (1953) was careful only to measure the factor content of American exports and imports using America's technology matrix.

We divide the predicted factor content of trade into two parts: (1) a pure Heckscher–Ohlin–Vanek component; and (2) a Ricardian one.[2] The former imposes factor price equalization by assumption, and the latter is a proper specification of the difference between the local technology and that of every other country in the world. Then we analyze how important each component is in explaining the total dollar value of exports from each country in our sample.

Our data have an unusual degree of consistency by the standards of the literature. As we have already emphasized, we evaluate factor services properly, using local factor prices. The consistency between the income and product approaches in national accounts ensures that the sum of local factor services is local GDP.

Exploiting the variability of data across thirty-three countries, we estimate two systems of seemingly unrelated regressions. The first system of three equations regresses the factor content of trade in capital, labor, and social capital, measured in the traditional way with the US technology matrix, on a constant, a measure that captures pure Heckscher–Ohlin–Vanek (HOV) trade, and one that is based upon technological differences. In the second system, we use our preferred measure of the local factor content of trade.

Our most important empirical finding is that the HOV trade is *ten times as important* as Ricardian trade in explaining the factor content of trade regardless of the way in which factor content is measured. This result is obtained when using unstandardized regression coefficients of the two components as determinants of the factor content of trade. In a sense, this empirical finding is reassuring because it shows that the large literature in empirical trade emphasizing variants on how best to model technological differences may be misguided. Our contribution is actually a theoretical one, in which we decompose the local measured factor content of trade into a part that is predicted by classical HOV theory and another that captures trade because countries' technologies are different. Since the HOV theory is concerned with factor content, a correct theoretical specification of endowment differences ought to explain the factor content of trade.

The factor content of trade is less than would be predicted by the simplest model. This difference is statistically significant, but the amount of missing trade is much smaller than the norm in the literature. Still, the best way to explain factor trade is to use factor endowments, adjusted correctly for differences in technology.

The rest of this paper is structured as follows. In the next section, we give our fundamental decomposition. The third section is a description of the data, and the fourth shows the data and reports the regression results. The fifth section gives a brief summary and some recommendations for future research.

2. Theory

Let n denote the number of goods, f the number of factors, and A_i be country i's $n \times f$ technology matrix. Using v_i to denote country i's $f \times 1$ endowment vector and y_i to describe its $n \times 1$ vector of actual (observable) output, the full employment condition is $v_i = A_i^T y_i$. By now there is overwhelming evidence that countries' technologies are different. In particular

$$A_i \neq A_j.$$

This simple observation led Fisher and Marshall (2008) to develop the idea of a virtual endowment. Let country j serve as the reference. Then the virtual endowment of country i is:

$$\tilde{v}_i = A_j^T y_i. \tag{1}$$

Notice that a country i's virtual endowment in Eq. (1) is equal to its actual endowment if it has an identical technology to that of the reference (e.g., this is the case if country i is the reference, $i = j$). Also, its virtual endowment will differ only slightly from its actual endowment when $A_i \approx A_j$, namely if the two technologies are quite similar. In essence, the intellectual construct of a virtual endowment allows the trade theorist to impose the assumption of identical technologies and factor price equalization, according to the reference country's technology and factor prices.

Traditional Heckscher–Ohlin theory predicts (and associated tests postulate) that the factor content of trade is:

$$v_i - s_i v, \tag{2}$$

where v_i is the vector of local resources, $v = \sum_i v_i$ is the vector of world resources, and s_i is the local share of world absorption. The first term in Eq. (2) is the local supply of factors and the second is the local demand for all the world's factors.

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[2] Some of the measured technology differences may stem from non-Ricardian sources, such as union activity, but we are unable to distill these from our data.

Adding and subtracting country i's share of the virtual world endowment evaluated at its factor prices, we may write:

$$v_i - s_i v = v_i - s_i \tilde{v} + s_i \tilde{v} - s_i v. \qquad (3)$$

In Eq. (3) the virtual world endowment $\tilde{v} = \sum_j A_i^T y_j$ is the factor content of world output according to the technology of country i. We thus measure the world's virtual endowment from the point of view of each country. The consistency of our data ensures that absorption shares are identical if one uses virtual endowments or real endowments.[3]

Using the definition of virtual endowments, we have:

$$v_i - s_i v = [\tilde{v}_i - s_i \tilde{v}] + s_i \left[\sum_j \left(A_i^T - A_j^T \right) y_j \right]$$

Here we have used the fact that country i's virtual endowment is its actual endowment. The first expression on the right side is the pure endowment effect measured at country i's factor prices, and the second expression is the effect having to do with different technologies across countries. The second term in brackets is a weighted matrix sum, where each country-specific technological difference is weighted by its actual output vector.

Fig. 1 illustrates this decomposition for the case of two countries. The point E is the endowment point, and the local factor prices are w_1 and r_1, where we are using the standard notation. Since technology is not assumed identical, the foreign wage w_2 and the foreign rent r_2 may well be different. The figure shows that the foreign real wage is lower; indeed we have assumed that $w_2 < w_1$ and also that $r_2 > r_1$. The standard model would aggregate home and foreign endowments, and the world endowment would be $K = K_1 + K_2$ and $L = L_1 + L_2$. Of course, this is a fundamental source of confusion, since Heckscher–Ohlin theory describes trade in factor services, not units of endowment.[4] Once one assumes that local and foreign factor prices are not identical, then a unit of the services of home labor is quite different from its foreign analog.

Fig. 1 shows that we have shrunk the labor axis since each effective foreign worker is equivalent to $\pi_L = w_2/w_1 < 1$ home workers. We have stretched the capital axis because each effective unit of foreign capital is $\pi_K = r_2/r_1 > 1$ units of home capital. Fisher (2010) shows that factor-specific technical differences are a special case of more general ones.

Here we are implicitly assuming that

$$A_1 = A_2 \begin{bmatrix} \pi_K & 0 \\ 0 & \pi_L \end{bmatrix}$$

where we use the same notation as in Fig. 1, namely, $\pi_K = (r_2/r_1)$ and $\pi_L = (w_2/w_1)$. In this special case, capital–labor ratios are identical in each industry, once we have made the proper adjustments to factor productivity. Because of these simple differences, the world's virtual endowment is:

$$\tilde{v} = \begin{bmatrix} K_1 + \pi_K K_2 \\ L_1 + \pi_L L_2 \end{bmatrix}$$

In the more general case, it is not possible to use these simple adjustments. In that case, the proper adjustment would show that the dimensions of the Edgeworth box would be $v_1 + A_1^T (A_2^T)^{-1} v_2$, measured in units of country i's factors.[5]

This virtual endowment is the upper right point of the blue Edgeworth box in Fig. 1. The volume of factor trade, when we have imposed that A_1 is the reference technology, is just the distance from E to C'. The naive predicted factor content of trade, when we have not made the proper adjustment for technology differences, is the distance from E to C. In the case we have drawn, there will be some missing trade because the naive theory has made the wrong prediction. In reality, the volume of the factor content of trade will depend upon many other factors such as trade costs, the exact specification of preferences, and whether some goods are not traded. Fisher and Marshall (2008) show convincingly that the demand side of the model is actually very accurate when one controls for technology differences.

3. Description of the data

The data are the recent OECD input–output tables for 33 countries: Australia, Austria, Belgium, Brazil, Canada, China, the Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Indonesia, Ireland, Israel, Italy, Japan, Korea, the Netherlands, New Zealand, Norway, Poland, Portugal, Russia, Slovakia, Spain, Sweden, Switzerland, Turkey, Taiwan, and the United

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[3] We measure each element of the output vector in real dollars. Every country's technology matrix is a row stochastic matrix. Since any virtual endowment is based upon the dollar value of local output, local national income does not depend upon the reference country.

[4] Apparently, this confusion becomes obvious only when considering technology differences at the same time as endowment differences.

[5] This is a key distinction between our approach and that of Trefler (1993) who derives factor-specific productivity differences in technology. Our general specification, captured by $A_1^T(A_2^T)^{-1}$, allows technology to differ between industries and factors.
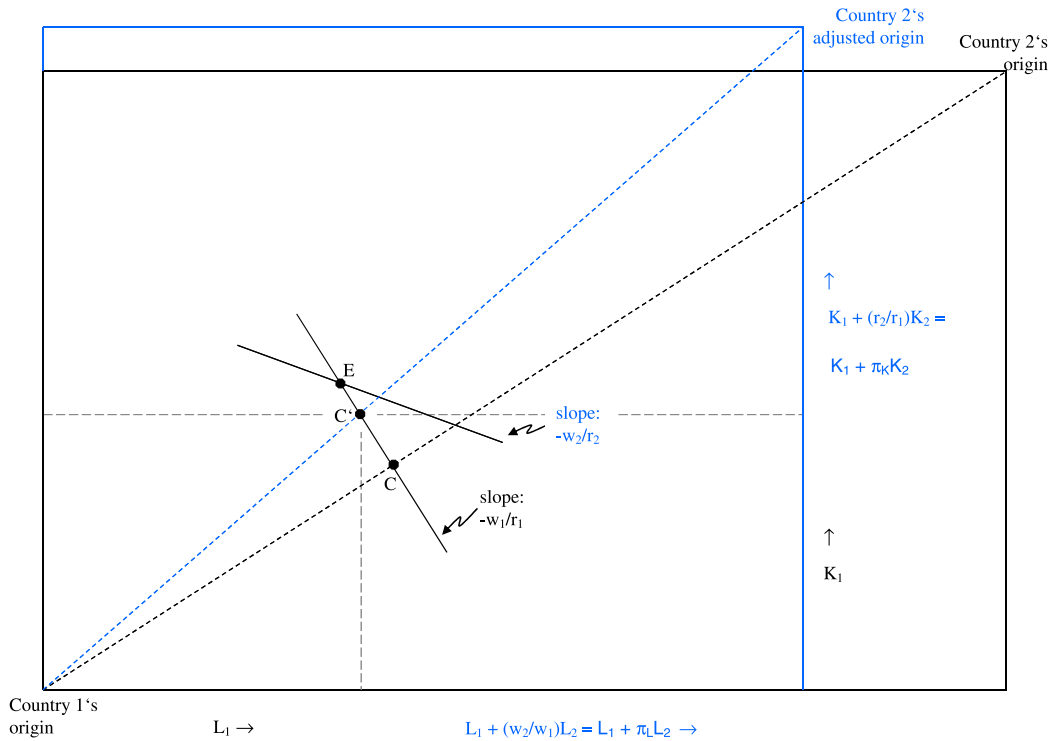
Fig. 1. Fundamental decomposition.

States. These countries represent 75% of world GDP and 67% of world trade. Each input–output table describes the local economies near the year 2000. Appendix Table 1 gives a list of the sectors and shows the level of aggregation that we are using in this analysis.

These tables are consistent in two ways. First, they are designed to be comparable across countries. Second, the factor shares for each industry are consistent with endowments; for example, the weighted average of capital's shares across all local industries is equal to its share in macroeconomic accounts by construction. The 48 sectors correspond to two-digit ISIC Rev. 3 industry categories. The technology matrices themselves are factor shares, so they do not depend upon the local exchange rate.

Still, outputs by sector y_i, exports by sector x_i, and imports by sector m_i are reported in local currencies. We converted these values into real dollars using purchasing power parity exchange rates in the Penn World Table 6.2. These exchange rates correspond to the benchmark year for each input–output table. Then all PPP dollar values are converted to the year 2000 using the United States' GDP deflator.

We compute s_i as the fraction of country i's absorption relative to the total absorption in the sample. We correct for trade with the rest of the world by measuring world output as the sum of the in-sample output and an exogenously given net export vector from the rest of the world. Since preferences are identical across countries and are represented by a homothetic utility function, we can divide the exogenously given net trade vector from the rest of the world among the 33 countries in our sample. This net trade vector is observable, since it is the total net imports from the rest of the world.

In contrast with much of the literature, we measure local endowments completely and consistently with national income accounts. In particular, $v_i = A_i^T y_i$, and both the technology matrix A_i and the local net output vector y_i are observable. Let A_0 be the United States' technology matrix and $x_{row} - m_{row}$ be net exports from the rest of the world into the sample countries. Then the world endowment $v = \sum_i v_i + A_0^T(x_{row} - m_{row})$. In essence, we are looking at the empirical properties of just the equilibrium that Kemp and Wan (1976) described.

We measure our three factors of production by three corresponding categories of value-added payments to these factors. Each country's endowments are measured by the services of capital (gross operating surplus), those of labor (compensation of employees), and payments for social capital (indirect taxes on production). Hence the vector of output is a list of payments for the services of each factor, rather than a list of physical stocks or flows. We rely exclusively on the *consistent* OECD input–output tables to construct each technology matrix. A column of the technology matrix lists the direct and indirect payments to each factor needed to produce one dollar's worth for each sector. Each row of the matrix is the direct and indirect cost share of capital, labor, and social capital in producing a dollar's worth of output.

These data are unusually consistent for this literature, since the net trade vector $x_i - m_i$ and the vector of national output y_i come directly from the same national accounts. We show elsewhere (Fisher & Marshall, 2008) that they replicate many of the features of other standard data sets; in particular they seem to show missing trade as in Trefler (1995).

4. Empirical implementation

This section is divided into two subsections. In the first, we present the data, and in the second, we report our regression results.

4.1. The data in tabular and graphical form

Appendix Table 2 gives the endowments that we measure for each country. The units are millions of US$ in the year 2000. By construction, any row sum gives that country's GDP. For example, the GDP of the United States was roughly US$ 10×10^{12} and that of Australia is about US$ 0.4×10^{12} in that year. This table shows how diverse our sample of countries is.

There is an important theoretical and practical debate on how best to measure the factor content of trade. Leontief himself was careful to measure the factor content of imports and exports into and from the United States using the United States' own *local* technology matrix, but many authors have followed Leamer (1984) and measured the factor trade of trade using the United States' technology matrix globally. The profession now has technology matrices for a wide array of countries, and following Leamer's practice, while once expedient, may now be dubious.[6]

We computed the factor content of trade in two ways. First, we followed the older literature and calculated the factor content of trade according to the United States' technology matrix. Again, let A_0 be the technology matrix of the United States. We use $z_j^0 = A_0^T(x_j - m_j)$ as the left hand variable in our first system of regressions. In our second system, we use what Leontief would have advocated, namely $z_j = A_j^T(x_j - m_j)$. It is worth emphasizing again that this is *the local factor content of trade*, the opportunity cost of world trade at local factor prices.

These two measures of factor content are highly correlated but the local factor content shows greater trade in factor services than it does for the traditional measure using the United States as a reference country. Fig. 2 shows a scatter plot of the two measures for our three factors. Looking at trade in services of labor, the point in the lower left shows that the Unites States is measured as a net importer of labor; by construction that point is on the 45° line. The degrees of correlation measures for the other two factors are similar, but the two measures of trade in social capital are more loosely correlated.[7]

Fig. 3 shows the factor content of trade for the three factors measured according to the United States' technology on the vertical axis, and the first term in Eq. (3) on the horizontal axis. The two seem positively correlated, but we cannot yet draw any conclusions about the partial correlation until one controls for the second term in Eq. (3). The analogous scatter plot between factor content of trade in labor measured according to the United States' technology and the second term in Eq.(3) is shown in Fig. 4. Now there seems to be a weak negative correlation between the predictions and the measured factor content. We should emphasize that we feel the measures of factor trade themselves are contaminated, and we are showing the case that works worst for our theory. We firmly believe that one ought to use the local factor content of trade in a world where technology differences matter.

For the sake of brevity, we do not show the data for the other two factors. They generally support the idea that the predictions using virtual endowments are much better than those based upon differences in technology. This claim will become quite apparent once we turn our attention to the regressions reported in the next subsection.

4.2. Two systems of seemingly unrelated regressions

Recall again that the literature often measures the factor content of trade according to the United States' technology matrix: $z_i^0 = A_0^T(x_i - m_i)$. Let $z_i^{0,f}$ be the component of the factor content of trade that relates to factor f. We begin this subsection by estimating the following system of three seemingly unrelated regressions:

$$z_i^{0,f} = \beta_0^f + \beta_1^f \left(v_i^f - s_i \tilde{v}^f \right) + \beta_2^f s_i \sum_j \left(A_i(f)^T - A_j(f)^T \right) v_j + u_i^{0,f} \qquad (4)$$

where $f \in \{K, L, G\}$ and $j \in \{AUS, ..., USA\}$. The notation $A_i(f)^T$ refers to the f-th row of the transposed technology matrix A_i^T. The error term $u_i^{0,f}$ captures effects such as trade costs, home bias in consumption, and aggregation bias in the data. These effects are assumed to be uncorrelated with endowments and technologies. Four comments are in order. First, each country's virtual endowment is its actual endowment; hence $\tilde{v}_i^f = v_i^f$. Second, the world's virtual endowment $\tilde{v}$ is the total supply of factors in the world evaluated according to the local country's technology and factor prices. Third, if countries had identical technologies, then all the terms in the summation on the right side of Eq. (4) would be zero, and this equation would collapse to a simple regression of the factor content of trade on the HOV predictions. Fourth, if countries have very different technologies, then β_2^f in Eq. (4) would be

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[6] Trefler (1995) measures the factor content of trade using the technology matrix of the United States and Davis and Weinstein (2001) measure the factor content of trade in several different ways, including using the United States as a reference technology. They do not measure it using an unaltered local technology matrix, even though they emphasize that countries have different technologies that they can observe.

[7] The exports of both China and Russia are dominated by single sectors (textiles in China and wholesale and retail trade in Russia). This tends to amplify the difference in factor content in the two measures to the extent that factor shares in these sectors differ in the United States, so both China and Russia appear as outliers in Fig. 2.
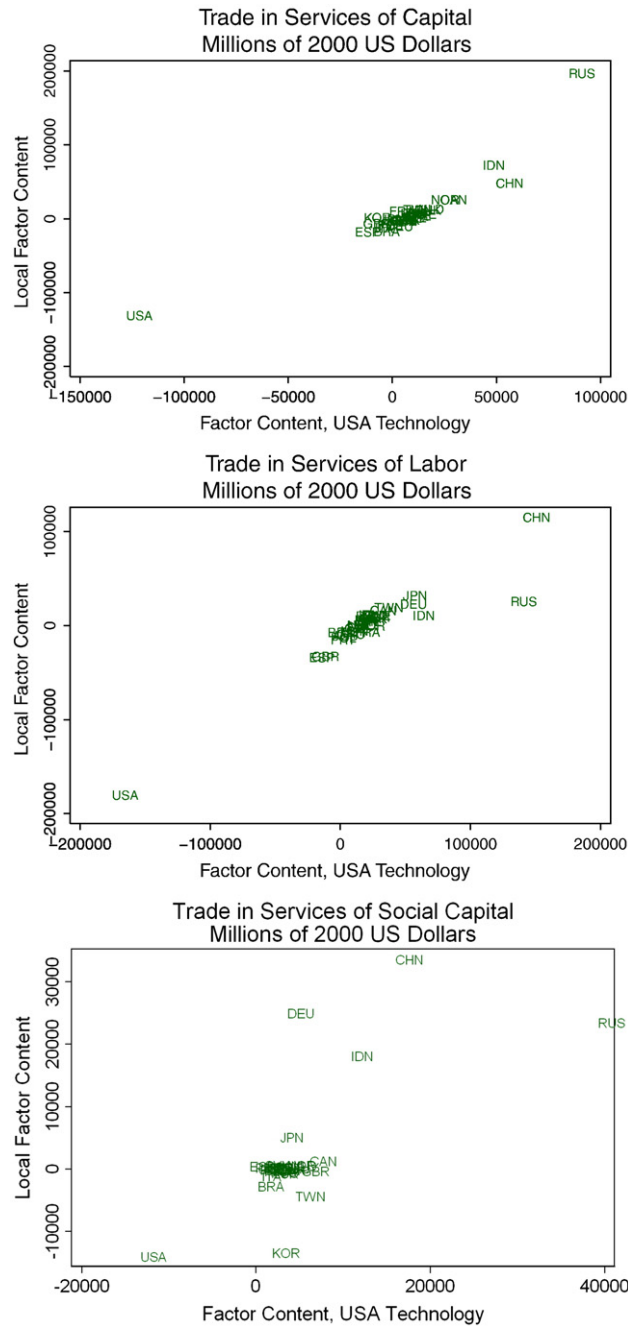
Trade in Services of Capital
Millions of 2000 US Dollars

Trade in Services of Labor
Millions of 2000 US Dollars

Trade in Services of Social Capital
Millions of 2000 US Dollars

Fig. 2. Three measures of factor content.

estimated precisely because the term in parentheses varies a lot. Hence, if technology differences did indeed explain factor content, then $\hat{\beta}_2^f$ would be a sharp estimate of this effect.

Four comments are in order. First, the estimates of β_0^f are not statistically different from zero. In fact these coefficients are estimated imprecisely for all factors. Pure HOV theory would predict that $\hat{\beta}_0^f = 0$, and one cannot reject that null hypothesis here. Second, the estimates of β_1^f are all positive and precisely estimated. Pure HOV theory would predict that each should be unity, and one can reject that null hypothesis here. But they are surely different from zero. Third, the effect of technology differences – the estimate of β_2^f – may be weakly positive, but they are not estimated very precisely. It does seem that technology difference helps explain the factor content of trade in capital. Fourth, the decomposition inherent in Eq. (4) shows that the HOV effect, when properly measured, is as much as ten times as strong as the one having to do with different technologies. Thus the levels of these coefficients have an important bearing on the debate about how important technology differences are in the literature on
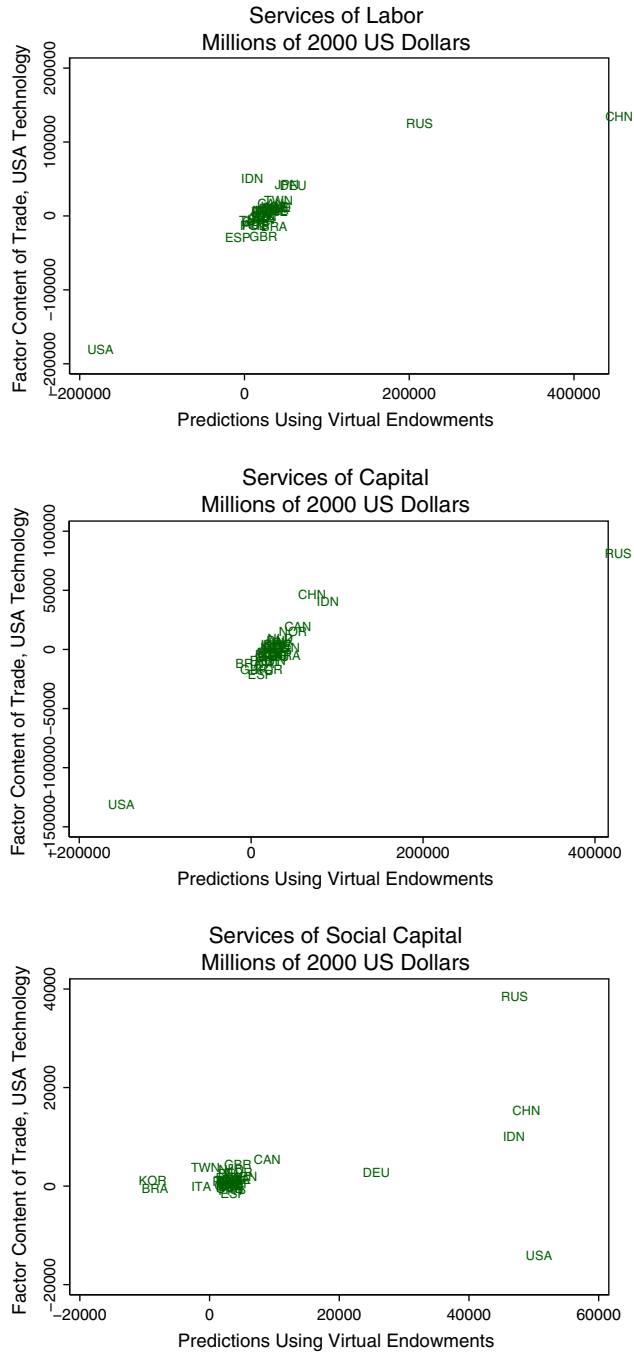
Fig. 3. Heckscher–Ohlin–Vanek trade.

empirical tests of the HOV theory. Our tentative conclusion is that technology differences are of second order, once one uses the construct of a virtual endowment.

The second system uses our preferred measure $z_j = A_j^T(x_j - m_j)$, the local factor content of trade. We estimate:

$$z_i^f = \beta_0^f + \beta_1^f \left(\tilde{v}_i^f - s_i \tilde{v}^f \right) + \beta_2^f s_i \sum_j \left(A_i(f)^T - A_j(f)^T \right) y_j + u_i^f. \tag{5}$$
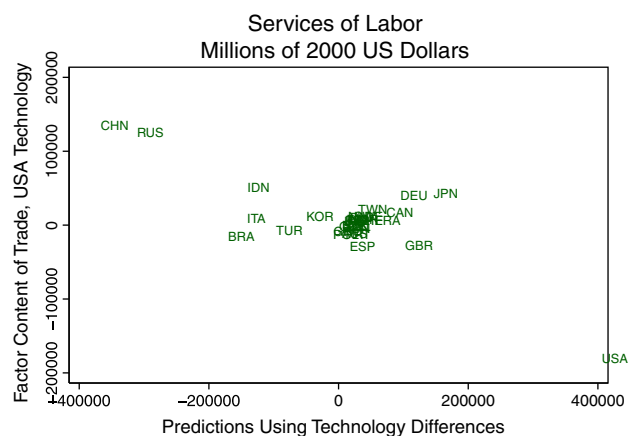
Fig. 4. Ricardian trade.

Our regression results are reported in Table 2.[8] They are even sharper than before. We will again make four observations. First, the constant term is again imprecisely estimated. Second, the HOV effects are all strong and quite well estimated, although each one differs significantly from the hypothesized value of unity. A simple estimate of missing trade is $1-\hat{\beta}_1^f$, and we now have a better record of predicting trade than is the norm in this literature. In brief, there is missing trade, but there is not so much. The greatest degree of missing trade is in the services of labor. Third, technology no longer matters for trade in capital; whether its significance in Table 1 is an artifact of using the United States as a reference may be worth investigating. Our last observation is simply to reiterate the main point of this paper: the HOV effect is as much as ten times as strong as that of different technologies.

5. Conclusion

Our main contribution is the decomposition inherent in Eq (3), and the estimates we reported in the systems in Eqs. (4) and (5). Our message is simple: if one measures the factor content of trade the way Leontief advocated and if one makes the right theoretical predictions, then the HOV theory does very well indeed in explaining trade in factor services. It is not perfect, and there is missing factor trade. But the theory is in much better shape than the profession has been led to believe.

In particular, we illustrate that distinguishing actual from virtual endowments is important if countries differ not only with regard to relative factor endowments but also with regard to technologies. A virtual endowment already incorporates productivity differences because it computes foreign production using all the information inherent in a reference country's technology matrix. It allows for much more accurate productivity adjustments than forcing factor-specific or Hicks-neutral differences on the data. So, our decomposition in Eq. (3) is slightly disingenuous. *Technological differences are already in our predictions, but they are consistent with measuring the local factor content of trade in the natural way, as Leontief advocated.*

In fact, in a simple Ricardian model with only one factor, the first part of our decomposition $v_i-s_i\tilde{v}$ gives the labor savings inherent in trading according to comparative advantage. A naive adherent of the HOV theory would assert that the factor content of trade must be identically zero if trade is balanced because the (productivity-adjusted) services of domestic labor exported exactly equal those of foreign labor imported. But Leontief (and we) would argue that the measured local factor content of trade is negative, since the domestic economy is saving local labor by importing goods for which foreigners have comparative advantage. In this simple and canonical case, our predictions using virtual endowments explain all the factor content of trade.

The naive adherent to the HOV theory would argue that the correct factor content of trade measures domestic exports according to the domestic technology and foreign exports according to the foreign one. If trade were balanced, the predicted factor content of trade would be zero, and the measured factor content of trade would also be zero. In this case, our decomposition would attribute part of factor trade to differences in virtual endowments and part to differences in technologies. The naive HOV theorist would be at a loss to explain trade at all because there is only one factor in each country.

We are passionate in our defense of virtual endowments. They are theoretically cogent, and they explain the data well. One might assert that a test of the HOV theory based on virtual endowments is just an examination of the demand side assumptions of the model. But this objection is disingenuous for at least two reasons. First, nothing in any economic model guarantees that there is any trade in the real world at all; sufficiently high trade frictions shut down all goods trade, and then the measured factor content of trade is trivially zero, no matter how one approaches the concept. Second, advocates of the naive HOV theory have routinely noted that factor price equalization obviously does not hold in the data. They concur that technologies are different across countries and then routinely ignore the theoretical implications of their obviously correct empirical observations.

So the foundations of the empirical resurrection of the HOV theory lie in bringing the data and theory together. Virtual endowments are a big step in the right direction.

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[8] Using the same data and virtual endowment productivity adjustments, Marshall (2011) re-allocates social capital to labor and physical capital and presents several additional statistical tests of the HOV predictions similar to those in Davis and Weinstein (2001) that corroborate the results presented here.

Table 1
SUR based on USA factor content.

	Capital (K)		Labor (L)		Social capital (G)	
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
$\hat{\beta}_0^f$	−3992	2860	612	4073	1483	1263
$\hat{\beta}_1^f$	0.2730	0.0363	0.3247	0.0671	0.2026	0.0720
$\hat{\beta}_2^f$	0.0450	0.0220	−0.0595	0.0450	0.0159	0.0158

Table 2
SUR based on local factor content.

	Capital (K)		Labor (L)		Social capital (G)	
	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
$\hat{\beta}_0^f$	−95	1990	−4859	3931	−362	1315
$\hat{\beta}_1^f$	0.533	0.024	0.236	0.062	0.458	0.073
$\hat{\beta}_2^f$	0.009	0.015	−0.037	0.042	0.015	0.016

Acknowledgments

Appendix

Table 1
Sectors.

Number	Description
1	Agriculture, hunting, forestry and fishing
2	Mining and quarrying (energy)
3	Mining and quarrying (non-energy)
4	Food products, beverages and tobacco
5	Textiles, textile products, leather and footwear
6	Wood and products of wood and cork
7	Pulp, paper, paper products, printing and publishing
8	Coke, refined petroleum products and nuclear fuel
9	Chemicals excluding pharmaceuticals
10	Pharmaceuticals
11	Rubber & plastics products
12	Other non-metallic mineral products
13	Iron & steel
14	Non-ferrous metals
15	Fabricated metal products, except machinery & equipment
16	Machinery & equipment, nec
17	Office, accounting & computing machinery
18	Electrical machinery & apparatus, nec
19	Radio, television & communication equipment
20	Medical, precision & optical instruments
21	Motor vehicles, trailers & semi-trailers
22	Building & repairing of ships & boats
23	Aircraft & spacecraft
24	Railroad equipment & transport equip nec.
25	Manufacturing nec; recycling (including Furniture)
26	Production, collection and distribution of electricity
27	Manufacture of gas; distribution of gaseous fuels through mains
28	Steam and hot water supply
29	Collection, purification and distribution of water
30	Construction
31	Wholesale & retail trade; repairs
32	Hotels & restaurants
33	Land transport; transport via pipelines
34	Water transport

Table 1 (*continued*)

Number	Description
35	Air transport
36	Supporting and auxiliary transport activities; activities of travel agencies
37	Post & telecommunications
38	Finance & insurance
39	Real estate activities
40	Renting of machinery & equipment
41	Computer & related activities
42	Research & development
43	Other business activities
44	Public admin. & defense; compulsory social security
45	Education
46	Health & social work
47	Other community, social & personal services
48	Private households with employed persons & extra-territorial organisations & bodies

Table 2
Endowments.

Country	Capital	Labor	Social Capital
AUS	182,080	221,723	16,099
AUT	78,199	113,710	3197
BEL	97,428	134,903	3145
BRA	617,155	505,164	73,108
CAN	270,637	488,086	40,995
CHE	65,683	133,941	0
CHN	1,510,530	2,583,493	698,630
CZE	70,061	62,832	−1320
DEU	731,264	1,129,320	9989
DNK	57,196	85,243	−135
ESP	309,572	393,530	4608
FIN	48,446	58,020	−1319
FRA	518,596	800,157	53,150
GBR	462,516	849,245	25,839
GRC	79,671	49,821	676
HUN	49,334	52,927	20
IDN	604,461	280,272	20,780
IRL	47,442	41,998	318
ISR	36,856	65,259	3669
ITA	651,462	545,387	26,294
JPN	1,023,347	1,736,108	129,671
KOR	365,107	346,921	1616
NLD	155,397	210,544	1219
NOR	68,096	69,942	−1099
NZL	31,941	29,861	2003
POL	150,559	147,798	5601
PRT	69,399	87,296	−1496
RUS	744,598	413,172	79,935
SVK	26,397	22,802	−528
SWE	68,816	130,412	6407
TUR	287,343	94,078	−1586
TWN	162,252	252,589	6058
USA	3,421,133	5,842,522	664,880

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