Simplest case:

One good, X
Two factors of production, L and K
Two countries, h and f.

Figure 15.1

World Edgeworth Box.

Total dimensions are the total world endowments of labor and capital.

Any point in the box is a division of the world endowment between country h and country f.
Figure 15.1  Equivalence of alternative types of trade
Country h is measured from the Southwest corner and country f from the Northeast corner.

E is the endowment point (h is capital abundant and f is labor abundant).

Trade is to a final equilibrium at point A, the consumption point.

Consider the trade from E to A. Three ways to do this.

1. h exports capital, imports labor (E directly to A)
2. h exports capital (E to B), imports X (B to A).
3. h imports labor (E to C), exports X (C to A).
All three are equivalent in welfare terms. Wage rate and return to capital are the same. Stolper-Samuelson theorem valid.

Implications for the trade account.

Merchandise account: balance of trade in X only.
Current account: balance of trade in X and in factor services.

Option 1: No trade in goods, merchandise account balances

Option 2: Deficit in the merchandise account. Home exports services, imports goods.

Option 3: Surplus in the merchandise account. Home imports labor services, exports goods. The latter is “emigrants remittances from foreign’s point of view.”
Complications:

Exports of capital (option 2):

home-country critics don’t like the fact that firms are exporting jobs.

home-country worries about loss of tax revenue

host countries worry about the loss of sovereignty to foreign firms.

Imports of labor (option 3)

Congestion effects. In fact there is at least one additional factor, land. Importing people creates effects not present with the other two.

Immigrants also demand public services, etc. Low wage / low skill immigrants cost more in public services than they contribute in taxes.
This latter effects sets up a fiscal externality. Firms want low wage immigrants, but local and state governments want to keep them out.

Gains from trade theorem

Let \( X_i \) denote production of good \( i \) and \( D_i \) denote consumption of good \( i \). \( V_j \) will denote the use of factor \( j \) in production.

\( \bar{V}_j \) will denote the endowment of factor \( j \). \( V_j \) and \( \bar{V}_j \) can now differ due to imports or exports of factor \( i \).

\( V_j > \bar{V}_j \), for example, means that the country is an importer of factor \( j \). \( p_i \) denote goods prices and \( w_j \) is the price of factor \( j \).

Superscript * denotes free trade while superscript ‘\( a \)’ denotes autarky.
Profit maximization condition, and then sum over all industries

\[
\sum_i p_i^* X_i^* - \sum_i \sum_j w_j^* V_{ij}^* \geq \sum_i p_i^* X_i^a - \sum_i \sum_j w_j^* V_{ij}^a \tag{15.1}
\]

The sum of factor use on the left-hand side gives the total value of factor payments for factors used in the free-trade equilibrium.

\[
\sum_i \sum_j w_j^* V_{ij}^* = \sum_j w_j^* V_j^* \tag{15.2}
\]

The sum of factor use on the right-hand side is the value of the country’s factor endowment (since no factors are trade) at free-trade prices.

\[
\sum_i \sum_j w_j^* V_{ij}^a = \sum_j w_j^* \bar{V}_j \tag{15.3}
\]

Substituting (15.2) and (15.3) into (15.1), the latter can be written as
\[
\sum_i p_i^* X_i^* - \sum_j w_j^* V_j^* \geq \sum_i p_i^* X_i^a - \sum_j w_j^* \bar{V}_j
\] (15.4)

This can be re-arranged to yield

\[
\sum_i p_i^* X_i^* + \sum_j \left[ w_j^* \bar{V}_j - w_j^* V_j^* \right] \geq \sum_i p_i^* X_i^a
\] (15.5)

The trade balance condition: the sum of the value of exports over all goods $i$ plus the sum of the value of factor exports (the difference between each factor’s endowment and use) over all factors $j$ must equal zero

\[
\sum_i \left[ p_i^* X_i^* - p_i^* D_i^* \right] + \sum_j \left[ w_j^* \bar{V}_j - w_j^* V_j^* \right] = 0
\] (15.6)

This can be rearranged to yield
Autarky market clearing condition is that the supply and demand of each
good are equal.

\[
\sum_i p_i^* X_i^* + \sum_j \left[ w_j^* \bar{V}_j - w_j^* V_j^* \right] = \sum_i p_i^* D_i^*
\] (15.7)

Substitute (15.7) for the left-hand side of (15.5) and substitute (15.8) for the
right-hand side of (15.5). The latter then becomes

\[
X_i^a = D_i^a
\] (15.8)

Substitute (15.7) for the left-hand side of (15.5) and substitute (15.8) for the
right-hand side of (15.5). The latter then becomes

\[
\sum_i p_i^* D_i^* \geq \sum_i p_i^* D_i^a
\] (15.9)

Free trade consumption is revealed preferred to autarky consumption, which
was to be proved. Free trade in goods and factors in a competitive,
undistorted economy must be better than autarky.
Heckscher-Ohlin Model

1. Factor prices are equalized by trade and there is no reason to add factor trade to commodity trade.

2. Countries are sufficiently different such that they are specialized in trade: then each country has a relatively high price for its scarce factor, the factor used intensively in its import competing industry.

   Figure 15.2     Figure 15.3

Allowing factors to move implies that relative factor endowment differences will be reduced and in general trade will be reduced.
Figure 15.2: Specialization and Relative Factor Prices

Figure 15.3: Factor trade outside the FPE set

World Capital Endowment

FPE Set

World Labor Endowment

h spec in $X_2$ an/or $f$ in $X_1$

$h$ spec in $X_1$ and/or $f$ in $X_2$
Trade in goods and factors are *substitutes*

3. Trade barriers prevent commodity prices from being equalized, and so factor prices are not equalized.

Each country has a relatively high price for its own import good, and thus a relatively high price for its scarce factor (Stolper-Samuelson theorem).

Factor trade tends to equalize relative endowments and thereby reduce or even eliminate trade. Trade in goods and factors are *substitutes*.

Figure 15.4  Figure 15.5
Figure 15.4: Trade Costs and Factor Prices

Unit value isoquants: e.g., $1 of $X_1$ or $X_2$

Figure 15.5: Factor trade with trade costs
Factor Trade and Commodity Trade as Complements

1. Differences in technology: add Ricardo to Heckscher-Ohlin.

Suppose that country $h$ has a superior technology in $X_1$, the labor intensive sector.

But suppose that countries have equal relative endowments of both labor and capital.

Country $h$ will produce relatively more $X_1$ in free-trade (in goods) equilibrium. But this will bid up the price of labor in country $h$.

Then labor should flow to country $h$ until all $X_1$ is produced in country $h$. Trade in goods will increase.

Figure 15.6 Figure 15.7
Figure 15.6: Country h has technical advantage in $X_1$

Figure 15.7: Factor prices with technology differences
If Silicon Valley has a higher productivity in computer hardware and software, then engineers will move there.

They may move from where they are scarce to where they are abundant.

This is commonly referred to as “brain drain”.

2. Distortions: e.g, a production subsidy to $X_1$

Suppose that we have two absolutely identical countries except country $h$ subsidizes $X_1$ production.

Country $h$ has a higher price for $L$ (used intensively in $X_1$) and a lower price for $K$. (Stolper - Samuelson theorem)
If labor is allowed to move, it will flow into h and h will become even more specialized in $X_1$, f will become more specialized in $X_2$ (Rybczynski theorem).

The volume of trade will increase: trade in goods and factors are *complements*.

3. Increasing returns to scale

Suppose that two identical economies specialize. Figure 15.8

They the economy that specializes in the capital-intensive good will have a relatively high price for capital and vice versa for the country specializing in the labor-intensive good.
Then capital will flow to the country specializing in the capital intensive good, expanding that sector further.

Factor trade can make the initially-identical country different in relative endowments.

This is also the key insight of the so-called “new economic geography”, in which an initial equilibrium with countries having identical factor endowments is unstable.

Differences in factor endowments arises endogenously if factors can move. Ex post, countries will be relatively well endowed with factors used intensively in their export industry. Mimics Heckscher-Ohlin!
Figure 15.10: Factor trade and goods trade
Summary

1. There are many possible types of trades, some of which may be equivalent in welfare and factor-price (income distribution) outcomes, but which look very different statistically.

Goods can be traded for goods, or factor service trade can substitute for goods trade. E.g., a country can export capital instead of capital intensive good.

2. In some cases, trade in goods exhaust all possible gains from trade; in particular, this occurs if trade in goods results in factor-price equalization.

3. In the case of the Heckscher-Ohlin model, trade in goods may not equalize factor prices do to specialization and/or trade costs. There are additional gains to be achieved by trading factors.
While trade in goods and factors are welfare complements, they are substitutes in terms of trade volumes in the HO model.

4. For many other underlying causes of trade, trade in goods and factors are both welfare and trade-volume complements.

When countries have identical factor endowments but

ricardian differences in technology
production distortions that differ across countries
strong increasing returns to scale

allowing factors to move increases the volume of goods trade and leads countries to be relatively well endowed with factors used intensively in their export industries.

the HO observation becomes a result of trade, not a cause.
FIGURE 2.1
Leading 20 Remittance-Receiving Countries in the World
(percentage of GDP in 2004)

Source: IMF Balance of Payment Statistics; World Bank.

Note: Received remittances = received compensation of employee + received worker’s remittances + received migrants’ transfer. Lighter bars in the graph are ECA countries.

As before, the problems of data quality are pervasive because of the difficulties of measuring remittances sent outside of the formal financial sector are very difficult to quantity. Further complicating these data problems are that large year-on-year increases in remittances may reflect improvements in central banks’ remittance recording systems rather than changes in migrants’ behaviors.

Data

While remittances have increased dramatically in a number of countries, they have slowed for others. A review of remittance flows over the past nine years demonstrates this pattern (figure 2.3). Interestingly, while remittances from migrants who have lived out of their...
Migrants’ Remittances

home countries for more than one year represent the largest share of inflows, remittances from migrants who have lived abroad for less than a year represent an increasingly large share.

Not all migrants, however, send remittances, particularly in those cases where the stay in destination countries is short. Surveys conducted for this report found that in Bulgaria, 80 percent did not; in Bosnia and Herzegovina, 37 percent; and in Romania, 62 percent.

Generally remittance flows in ECA follow the same two-bloc pattern as migration (table 2.1). The EU and the middle-income Commonwealth of Independent States (CIS) countries are the main sources of


Note: Received remittances = received compensation of employee + received worker’s remittances + received migrants’ transfers. Albania and Slovak Republic are 2003 data, other countries are 2004 data. GDP is $ converted current price.
to 216% of exports from the West Bank and Gaza, 90% of exports from Cap Verde, over 75% of exports from Albania and Uganda, and over 50% of exports from Bosnia and Herzegovina, Sudan and Jordan. Remittances were also equivalent to more then 40% of the GDP in Tonga, more then 35% of the GDP in the West Bank and Gaza, more then 25% of the GDP in Lesotho, and more then 20% of the GDP in Cap Verde, Jordan and Moldova (Table III.1).

**Table III.1. Top 30 developing countries with the highest remittances received as a percentage of GDP, 2002**

<table>
<thead>
<tr>
<th>Remittances as % of GDP</th>
<th>Remittances as % of GDP</th>
<th>Remittances as % of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonga 41.9</td>
<td>Albania 15.6</td>
<td>Uganda 9.2</td>
</tr>
<tr>
<td>West Bank and Gaza 36.7</td>
<td>FYROM 15.2</td>
<td>Guatemala 8.9</td>
</tr>
<tr>
<td>Lesotho 25.8</td>
<td>Nicaragua 14.6</td>
<td>Pakistan 8.9</td>
</tr>
<tr>
<td>Jordan 24.0</td>
<td>El Salvador 14.5</td>
<td>Morocco 8.8</td>
</tr>
<tr>
<td>Cape Verde 23.3</td>
<td>Republic of Yemen 12.5</td>
<td>Georgia 8.3</td>
</tr>
<tr>
<td>Moldova 22.8</td>
<td>Dominican Republic 11.7</td>
<td>Sri Lanka 7.9</td>
</tr>
<tr>
<td>Vanuatu 18.4</td>
<td>Ghana 11.3</td>
<td>Latvia 7.5</td>
</tr>
<tr>
<td>Bosnia and Herzegovina 18.4</td>
<td>Armenia 11.2</td>
<td>Sudan 7.2</td>
</tr>
<tr>
<td>Guyana 18.2</td>
<td>Honduras 11.1</td>
<td>Ethiopia 6.8</td>
</tr>
<tr>
<td>Jamaica 16.7</td>
<td>Philippines 9.9</td>
<td>Bangladesh 6.6</td>
</tr>
</tbody>
</table>

Note: “Remittances” refer to the sum of the “compensation of employees”, “worker’s remittances”, and “other current transfers in other sectors”.


Statlink: [http://dx.doi.org/10.1786/614135851320](http://dx.doi.org/10.1786/614135851320)
Migrant remittance flows are unequally distributed in the world, with Asia receiving the lion’s share. Since 1996, 40 to 46% of the annual remittance flows were received by Asia, followed by Latin America and the Caribbean with 17 to 22%, and Central and Eastern Europe with 15 to 18% (Chart III.2). This is not surprising, since Asia is the most populous region of the world and also has the most numerous diaspora.

It is also not surprising that the top remittance receiving countries are also the most populous, with India and China receiving over USD 14 billion, Mexico over USD 11 billion, the Philippines and Korea over USD 7.5 billion, and Pakistan over USD 5 billion (Table III.2).
to 216% of exports from the West Bank and Gaza, 90% of exports from Cap Verde, over 75% of exports from Albania and Uganda, and over 50% of exports from Bosnia and Herzegovina, Sudan and Jordan. Remittances were also equivalent to more then 40% of the GDP in Tonga, more then 35% of the GDP in the West Bank and Gaza, more then 25% of the GDP in Lesotho, and more then 20% of the GDP in Cap Verde, Jordan and Moldova (Table III.1).

Table III.1. **Top 30 developing countries with the highest remittances received as a percentage of GDP, 2002**

<table>
<thead>
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<th>Country</th>
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<th>Remittances as % of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonga</td>
<td>41.9</td>
<td>Albania</td>
<td>15.6</td>
</tr>
<tr>
<td>West Bank and Gaza</td>
<td>36.7</td>
<td>FYROM</td>
<td>15.2</td>
</tr>
<tr>
<td>Lesotho</td>
<td>25.8</td>
<td>Nicaragua</td>
<td>14.6</td>
</tr>
<tr>
<td>Jordan</td>
<td>24.0</td>
<td>El Salvador</td>
<td>14.5</td>
</tr>
<tr>
<td>Cape Verde</td>
<td>23.3</td>
<td>Republic of Yemen</td>
<td>12.5</td>
</tr>
<tr>
<td>Moldova</td>
<td>22.8</td>
<td>Dominican Republic</td>
<td>11.7</td>
</tr>
<tr>
<td>Vanuatu</td>
<td>18.4</td>
<td>Ghana</td>
<td>11.3</td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>18.4</td>
<td>Armenia</td>
<td>11.2</td>
</tr>
<tr>
<td>Guyana</td>
<td>18.2</td>
<td>Honduras</td>
<td>11.1</td>
</tr>
<tr>
<td>Jamaica</td>
<td>16.7</td>
<td>Philippines</td>
<td>9.9</td>
</tr>
</tbody>
</table>

Another way of comparing capital flows internationally is by looking at the amounts received per capita: the regions that received above-average levels of remittances in 2002 were the Middle East with 305%, Latin America and the Caribbean, 210%, and eastern Europe 165%. Asia and Africa received remittances below the 2002 average of USD 28.53, at proportions of respectively, 72% and 61% (Chart III.3).

Regarding the per capita remittances received by different developing countries, the distribution is even more unequal: Israel, Tonga, Barbados, Jamaica and Jordan received in 2002 the highest amounts of remittances per capita (Table III.3), each exceeding by 1500% the average per capita remittances received by developing countries.

Table III.3. **Top 30 developing countries with the highest remittances per capita received, 2002**

<table>
<thead>
<tr>
<th>Country</th>
<th>Remittances per capita</th>
<th>Country</th>
<th>Remittances per capita</th>
<th>Country</th>
<th>Remittances per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>583</td>
<td>Dominica</td>
<td>289</td>
<td>Korea</td>
<td>159</td>
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<tr>
<td>Tonga</td>
<td>563</td>
<td>Slovenia</td>
<td>288</td>
<td>Belize</td>
<td>154</td>
</tr>
<tr>
<td>Barbados</td>
<td>512</td>
<td>Cyprus</td>
<td>280</td>
<td>Mauritius</td>
<td>Mauritius</td>
</tr>
<tr>
<td>Jamaica</td>
<td>510</td>
<td>FYROM</td>
<td>278</td>
<td>Czech Republic</td>
<td>132</td>
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<tr>
<td>Jordan</td>
<td>431</td>
<td>Latvia</td>
<td>270</td>
<td>Tunisia</td>
<td>114</td>
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<tr>
<td>West Bank and Gaza</td>
<td>344</td>
<td>Bosnia and Herzegovina</td>
<td>234</td>
<td>Mexico</td>
<td>114</td>
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<tr>
<td>Malta</td>
<td>332</td>
<td>Albania</td>
<td>229</td>
<td>Chinese Taipei</td>
<td>113</td>
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<tr>
<td>Cape Verde</td>
<td>321</td>
<td>Vanuatu</td>
<td>209</td>
<td>Ecuador</td>
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<td>Croatia</td>
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<td>Guatemala</td>
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<td>Morocco</td>
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<tr>
<td>El Salvador</td>
<td>317</td>
<td>Guyana</td>
<td>167</td>
<td>Honduras</td>
<td>109</td>
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Statlink: [http://dx.doi.org/10.1786/701528020322](http://dx.doi.org/10.1786/701528020322)