International Economics: Lecture 1
An Introduction to International Trade

Arman Gabrielyan

ATC, February 6, 2017
You and I are about to embark on a journey. A journey of inquiry into the world of International Economics.
In this country per capita GDP was $3,389 in 1960. Comparable figure in the US was $17,036; five times bigger. GDP is in constant 2010 US$. Source: World Bank.
Trade and Outward Orientation played a crucial role in the development of this country.

Trade (exports plus import) of this country is more than 3 times bigger than its GDP.

The same country now, just a half century later.
In 2015 per capita GDP in that country was $51,855.

Comparable figure in the US was $51,638.

Singapore moved from a third world to first in one generation
So one of the crucial questions of the International Economics is:
What is the impact of trade on development?
International Trade applies MICRO economic tools

International Finance applies MACRO economic tools
Fundamental questions of International Trade

- What determines the pattern of international trade?
- What are the effects of trade on welfare and income distribution?
- What are the effects of trade barriers and should trade be regulated?
- What are the effects of economic integration (such as Eurasian Econ. Union) and labor and capital flows?
- Who gains and who loses from the trade?
Our aim will be to develop a coherent tool kit, which will enable us to systematically analyze real world situations and answer to those and related questions.

Our main tool will be MODELS.
What is a MODEL?

A MODEL is a stylized and simplified representation of reality.

Why we “simplify”, instead of describing reality in its richness and multidimensionality?

By simplifying we articulate only fundamental relationships, which have general relevance.

By simplifying we leave out myriad unimportant or accidental relationships.

We simplify, because the real world is extremely complex, and is impossible to describe in finite time.
But which are the important relationships?

Every model-builder may have his/her distinct understanding of which relationships are important.

That is why in economics we have competing models, which try to describe the same phenomenon.

Modeling is ART as much as it is SCIENCE.
But before delving deeper into multiple model’s world, some preliminary concepts....

GNI vs. GDP

Purchasing Power Parity

Trade Openness

Exports – goods and services sold abroad by residents of a country.
Imports – goods and services purchased abroad by residents of a country.
Trade Balance – exports minus imports (surplus/deficit)
GNI vs. GDP

GDP measures the value of all final goods and services produced in an economy in a given period of time.

Total income of everyone = Total expenditure on all goods and services

equivalently GDP measures the total income produced within the borders of economy.

but GNI measures the total income earned by residents.

GNI = GDP + Factor payments from abroad – factor payments to abroad

Factor Payments (Primary Incomes)
- Compensation of employees
- Investment income (direct, portfolio, interest)
GNI = GDP + Net primary income
## GNI and GDP in Armenia in 2015

<table>
<thead>
<tr>
<th></th>
<th>Current US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>10,529,182,498</td>
</tr>
<tr>
<td>Primary income receipts</td>
<td>885,882,034</td>
</tr>
<tr>
<td>Primary income payments</td>
<td>450,507,037</td>
</tr>
<tr>
<td>Net primary income</td>
<td>435,374,997</td>
</tr>
<tr>
<td>GNI (^\text{\text{(GNI = GDP + Net primary income)}})</td>
<td>10,964,557,495</td>
</tr>
</tbody>
</table>

Purchasing Power Parity GDP

How we compare income level in different countries?

Monthly rent in 3 cities

Paris, 13th, 40 sq. m, $1,320
Mumbai, 3 bedr., 2 bath., $1,470
Cairo, 4 bedr., 1 bath., $1,230
Purchasing Power Parity GDP

In Yerevan you will get this 4 bedroom, 3 bathroom 250 sq. m. tasteless apartment for $1500.
Purchasing Power Parity GDP

The value of same basket of goods is drastically different in different countries.

In general, prices are higher in high income (developed) countries.

For example, prices in Armenia in average are about **2.5 times lower** than in the US.

Therefore to make a meaningful comparison of income levels we need to take that difference into account.

Same income how much higher purchasing power has in Armenia compared to the US?
## Per capita PPP GDP in Armenia in 2015

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP in Armenia (current US$)</td>
<td>10,529,182,498</td>
</tr>
<tr>
<td>GDP per capita in Armenia (current US$)</td>
<td>3,489</td>
</tr>
</tbody>
</table>
| PPP GDP per capita in Armenia (current international $) | 8,419  
  (6.7 times lower than US)                  |
| PPP GDP per capita in the US (current international $) | 56,116                 |

Source: World Bank
Why prices are higher in high income (developed) countries?

Note: The main difference is in non-traded good’s prices.

Bella Balassa, Paul Samuelson in 1964 showed price differences are due to different productivities of traded good’s industries.
Why prices are higher in high income (developed) countries?  

**Balassa-Samuelson hypothesis**

**Assumptions**

1. **Productivity in traded goods is higher** in developed country.  
   \[ Q_T^* > Q_T \]

2. **Productivity in non-traded goods is the same** (think of hairdressing).  
   \[ Q_N^* > Q_N \]

3. **Wages are the same in each country.**  
   \[ W_T^* = W_N^*; \quad W_T = W_N \]

   \[
   P_T^* = \frac{W_T^*}{Q_T^*} \quad \quad P_N^* = \frac{W_N^*}{Q_N^*} \\
   P_T = \frac{W_T}{Q_T} \quad \quad P_N = \frac{W_N}{Q_N}
   \]

   \[
   P_N^*/P_T^* = \frac{Q_T^*}{Q_N^*} \quad \quad P_N/P_T = \frac{Q_T}{Q_N}
   \]

   Because \( Q_T^* > Q_T \) then  \( P_N^*/P_T^* > P_N/P_T \)

   Because \( SP_T^* = P_T \) then  \( SP_N^* > P_N \)
Trade Openness

Trade Openness Index = (Exports + Imports) / GDP
## Trade Openness in Armenia in 2015

<table>
<thead>
<tr>
<th></th>
<th>Current US$</th>
<th>% of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>10,529,182,498</td>
<td></td>
</tr>
<tr>
<td>Exports of goods and services</td>
<td>3,137,295,852</td>
<td>30%</td>
</tr>
<tr>
<td>Imports of goods and services</td>
<td>4,418,183,192</td>
<td>42%</td>
</tr>
<tr>
<td>Trade Balance</td>
<td>-1,280,887,340</td>
<td>-12%</td>
</tr>
<tr>
<td>Trade Openness (Exports + Imports)/GDP</td>
<td>72%</td>
<td></td>
</tr>
</tbody>
</table>

Trade Openness in Singapore: Extreme case

\[
\begin{align*}
\text{GDP} & \quad C & \quad I & \quad G & \quad X & \quad M \\
281,439 & = 103,203 + 73,991 + 29,266 + 496,726 - 421,095 \\
\end{align*}
\]

Trade balance \(X - M = 75,631\)

Trade Openness Index \(\frac{(X + M)}{\text{GDP}} = 326\%\)

Trade Openness Index >100% when the economy imports a lot of intermediate goods, turns them into final goods and then exports most of them.

All data in current million US$

World Merchandise Exports

Source: World Bank
2015 decline was mainly due to the drop of world commodity prices. 

World energy prices dropped by 45% in 2015.

Source: World Bank
Prices of primary commodities, January 2014-March 2016
(indices of dollar values, January 2014=100)

Source: WTO World Trade Statistics 2016 Report
World Exports and GDP in real terms (1970=1)

Exports grew in real terms in 2015

Source: World Bank
### World Exports and GDP in constant 2010 US$ (trillion)

<table>
<thead>
<tr>
<th>Year</th>
<th>Exports of Goods &amp; Services</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>2.4</td>
<td>18.9</td>
</tr>
<tr>
<td>2000</td>
<td>12.5</td>
<td>49.6</td>
</tr>
<tr>
<td>2008</td>
<td>18.9</td>
<td>65</td>
</tr>
<tr>
<td>2009</td>
<td>16.9</td>
<td>62.9</td>
</tr>
<tr>
<td>2014</td>
<td>22</td>
<td>73</td>
</tr>
<tr>
<td>2015</td>
<td>22.7</td>
<td>74.9</td>
</tr>
</tbody>
</table>

Source: World Bank
Economies by size of merchandise trade, 2014

Source: WTO World Trade Statistics 2016 Report
World's main exporting countries

Where does the World import from? (2014)

**TOTAL: $17.6T**

- **China**: $2.3T (13%)
- **Japan**: $1.4T (4.1%)
- **Germany**: $1.45T (8.3%)
- **United States**: $1.45T (8.3%)

**South...**

- **South Africa**: 2.0%
- **Russia**: 2.6%
- **China**: 3.3%
- **India**: 1.7%
- **Japan**: 1.4%
- **Singapore**: 1.5%
- **Thailand**: 1.6%
- **Vietnam**: 1.7%
- **Kuwait**: 0.56%
- **PHL**: 0.94%
- **Iraq**: 1.1%
- **United Arab Emirates**: 1.1%
- **Kazakhstan**: 0.75%
- **Israel**: 0.75%
- **Qatar**: 0.73%
- **Turkey**: 0.54%

**Other Asia**

- **Saudi Arabia**: 1.7%
- **Indonesia**: 1.1%
- **Vietnam**: 0.94%
- **Kuwait**: 0.56%
- **Iraq**: 1.1%
- **United Arab Emirates**: 1.1%
- **Kurman**: 0.73%
- **Qatar**: 0.73%
- **Turkey**: 0.54%
- **Kazakhstan**: 0.75%

**Source**: MIT OEC
### World's main export markets

Where does the World export to? (2014)

**TOTAL: $17.6T**

<table>
<thead>
<tr>
<th>Country</th>
<th>Export Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>6.4%</td>
</tr>
<tr>
<td>France</td>
<td>3.7%</td>
</tr>
<tr>
<td>Italy</td>
<td>2.6%</td>
</tr>
<tr>
<td>Russia</td>
<td>1.7%</td>
</tr>
<tr>
<td>Belgium-Luxembourg</td>
<td></td>
</tr>
<tr>
<td>Switzerland</td>
<td>1.6%</td>
</tr>
<tr>
<td>United States</td>
<td>12%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>3.8%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>3.1%</td>
</tr>
<tr>
<td>Spain</td>
<td>1.9%</td>
</tr>
<tr>
<td>Poland</td>
<td></td>
</tr>
<tr>
<td>Austria</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>8.7%</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>3.1%</td>
</tr>
<tr>
<td>Singapore</td>
<td>2.0%</td>
</tr>
<tr>
<td>Vietnam</td>
<td>1.2%</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1.2%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1.0%</td>
</tr>
<tr>
<td>South Korea</td>
<td>2.9%</td>
</tr>
<tr>
<td>South Africa</td>
<td></td>
</tr>
<tr>
<td>Algeria</td>
<td></td>
</tr>
<tr>
<td>Nigeria</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>4.3%</td>
</tr>
<tr>
<td>India</td>
<td>2.4%</td>
</tr>
<tr>
<td>Brazil</td>
<td>1.3%</td>
</tr>
<tr>
<td>Egypt</td>
<td></td>
</tr>
<tr>
<td>Morocco</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>1.2%</td>
</tr>
<tr>
<td>Chile</td>
<td></td>
</tr>
<tr>
<td>Colombia</td>
<td>1.2%</td>
</tr>
</tbody>
</table>

Source: MIT OEC
World's main export markets

- US – 12%, $2.19T
- China – 8.7%, $1.53T
- Germany – 6.4%, 1.13T
- Russia – 1.7%, $295B

So Russia is mere 1.7% of world export market.

Source: MIT OEC
Attention: This lecture is data-heavy. But that is exception, not rule.

Though real life observations are a powerful tool for understanding world, but there is an even more powerful tool.

That tool is model building, which uses pure logic, and thus helps us avoid misconceptions.
We started the lecture with the fascinating case of Singapore. And stressed that trade and outward integration were integral to the success of that country.

But trade in itself doesn’t bring to prosperity, here is another country.
In 1960 GDP per capita was $1,463, Trade Openness was 108%.

In 2015 GDP per capita was $3,163, Trade Openness was 143%.

Growth is modest, and this is one of rare success stories in Africa.
<table>
<thead>
<tr>
<th>Country</th>
<th>Export Value</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>$307M</td>
<td>43%</td>
</tr>
<tr>
<td></td>
<td>Copper Ore</td>
<td>12%</td>
</tr>
<tr>
<td></td>
<td>Fresh fish</td>
<td>5.4%</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>$85.9M</td>
<td>5.3%</td>
</tr>
<tr>
<td></td>
<td>Copper Ore</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>Glass bottle</td>
<td>4.6%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>$75.3M</td>
<td>4.6%</td>
</tr>
<tr>
<td>China</td>
<td>$181M</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td>Copper Ore</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>Precious Metal Ore</td>
<td>11%</td>
</tr>
<tr>
<td>Georgia</td>
<td>$89.7M</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td>Copper ore</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>Glass bottle</td>
<td>5.5%</td>
</tr>
<tr>
<td>Canada</td>
<td>$174M</td>
<td>11%</td>
</tr>
<tr>
<td></td>
<td>Gold</td>
<td>5.5%</td>
</tr>
<tr>
<td>Germany</td>
<td>$161M</td>
<td>9.9%</td>
</tr>
<tr>
<td></td>
<td>Raw copper, Ferroalloys, Molybdenum</td>
<td>2.2%</td>
</tr>
<tr>
<td>United States</td>
<td>$92.5M</td>
<td>5.7%</td>
</tr>
</tbody>
</table>

Source: MIT OEC
Armenia’s Trade Structure

What does Armenia export? (2014)

TOTAL: $1.62B

Copper Ore
- $303M
- 19%

Hard Liquor
- $160M
- 9.9%

Rolled Tobacco
- $115M
- 7.1%

Ferroalloys
- $132M
- 8.1%

Raw Copper
- $71.7M
- 4.4%

Aluminium Foil
- $94.4M
- 5.8%

Gold
- $160M
- 9.9%

Diamonds
- $115M
- 7.1%

Source: MIT OEC
What does Armenia import? (2014)

- Petroleum Gas: $424M, 9.9%
- Refined Petroleum: $294M, 6.9%
- Computers: 1.1%
- Telephone: 1.0%
- Raw Aluminium: 1.2%
- Raw Iode Bars: 0.96%
- Raw Iode Bars: 0.96%
- Gold: $144M, 3.4%
- Diamonds: $143M, 3.4%
- Cars: $195M, 4.6%
- Wheat: 2.1%

Total: $4.28B

Source: MIT OEC
## Share in Total Import

<table>
<thead>
<tr>
<th>Item</th>
<th>World</th>
<th>Armenia</th>
<th>Armenia (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cigarettes</td>
<td>0.13%</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Computers</td>
<td>2.2%</td>
<td>1.1%</td>
<td></td>
</tr>
<tr>
<td>Hard Liquor</td>
<td>0.17%</td>
<td>0.92%</td>
<td></td>
</tr>
<tr>
<td>Cars</td>
<td>4%</td>
<td>4.6%</td>
<td></td>
</tr>
<tr>
<td>Toilet paper</td>
<td>0.15%</td>
<td>0.55%</td>
<td>$23.7M</td>
</tr>
<tr>
<td>Children’s picture books</td>
<td>0.0059%</td>
<td>0.0028%</td>
<td></td>
</tr>
</tbody>
</table>

Source: MIT OEC
Trade data shows, that we love smoking, drinking and driving. For some strange reason we also love using toilet paper.

<table>
<thead>
<tr>
<th>Item</th>
<th>World</th>
<th>Armenia</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Cars</td>
<td>4%</td>
<td>4.6%</td>
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<tr>
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<td>0.55%</td>
</tr>
<tr>
<td>Children’s picture books</td>
<td>0.0059%</td>
<td>0.0028%</td>
</tr>
</tbody>
</table>
What does the World import? (2014) & Export

TOTAL: $17.6T

Crude Petroleum
- 7.8%

Refined Petroleum
- 4.9%

Petroleum Gas
- 2.4%

Integrated Systems
- 2.8%

Computers
- 2.2%

Broadcasting Equipment
- 1.5%

Telephones
- 1.4%

Valves

Cars
- 4.0%

Vehicle Parts
- 2.1%

Packaged Medicaments

Iron Ore
- 2.0%

Coal Briquettes
- 1.6%

Copper Ore

Gold
- 1.8%

Wheat

Source: MIT OEC
Leading Exporters and Importers of **Commercial Services**

<table>
<thead>
<tr>
<th>Exporters</th>
<th>B US$</th>
<th>Importers</th>
<th>B US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>690</td>
<td>US</td>
<td>469</td>
</tr>
<tr>
<td>UK</td>
<td>345</td>
<td>China</td>
<td>466</td>
</tr>
<tr>
<td>China</td>
<td>285</td>
<td>Germany</td>
<td>289</td>
</tr>
<tr>
<td>Germany</td>
<td>247</td>
<td>France</td>
<td>228</td>
</tr>
<tr>
<td>Russia (24)</td>
<td>51</td>
<td>Russia (16)</td>
<td>87</td>
</tr>
<tr>
<td>World</td>
<td>4755</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: WTO World Trade Statistics 2016 Report

Arman Gabrielyan (ATC)  International Economics
## Commercial Services Trade Components

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Goods-related services</td>
<td>Manufacturing services</td>
<td>150 B</td>
</tr>
<tr>
<td></td>
<td>Processing, assembly, labeling, packing, etc. for fee. Example: iphone assembly.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maintenance &amp; repair</td>
<td></td>
</tr>
<tr>
<td>2 Transport</td>
<td></td>
<td>875 B</td>
</tr>
<tr>
<td>3 Travel</td>
<td></td>
<td>1230 B</td>
</tr>
<tr>
<td>4 Other commercial services</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Insurance</td>
<td>2495 B</td>
</tr>
<tr>
<td></td>
<td>Financial services</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Telecommunication</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>4755 B</td>
</tr>
</tbody>
</table>

Source: WTO World Trade Statistics 2016 Report

Arman Gabrielyan (ATC) International Economics 47
Newton’s Law of Universal Gravitation & Trade

Don’t forget to stop the timer when you get to the bottom of the cliff!
Gravity & Trade

\[ F_1 = F_2 = \frac{m_1 \times m_2}{d^2} \times G \]

- \( m \times 2 \Rightarrow F \times 2 \)
- \( d \times 2 \Rightarrow F \times 1/4 \)

\[ G = 6.674 \times 10^{-11} \text{ N} \cdot (\text{m/kg})^2 \]
\[ F_{AR} = \frac{(GDP_A)^\alpha \times (GDP_R)^\beta}{\text{Dist}_{AB}^\delta} \]
What we learned?

What are the fundamental questions of International Trade?

What is a Model?

Basic concepts such as GNI, GDP, Trade Openness, PPP.

World and Armenia Trade Volume and Structure.

Gravity Equation in Economics.
Thank you and enjoy.

But remember

All models are wrong, but some are useful.