Data, Trade, and Growth

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Note: The statistics and analysis presented here are mainly drawn from my draft paper "Data, Trade, and Growth," first presented on May 1, 2013, at the conference "Measuring the Effects of Globalization," Washington DC. Paper available on request.

Three questions:

How important is trade in data?

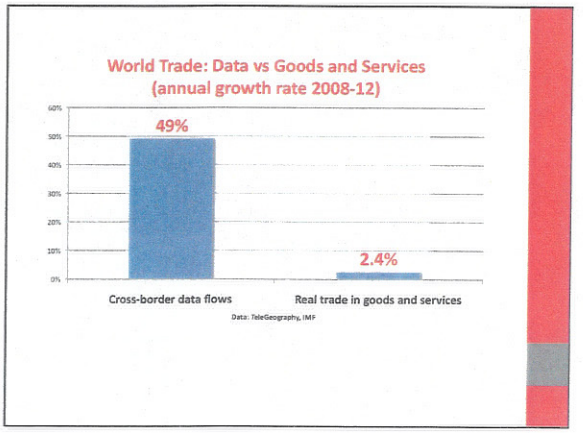
Who benefits from trade in data?

How should trade policy deal with data?

Cross-border flows of data are the fastest-growing component of international trade ...

....global demand for cross-border bandwidth rose at a 49 percent annual rate between 2008 and 2012

Data: TeleGeography



The global economy would not be able to function without cross-border data flows

....Financial data....internal corporate data...links with offshore suppliers...webpages...video...and much more....

Because cross-border flows of data are valuable, they are key for upcoming trade negotiations...

....European data privacy legislation is a major issue for transatlantic free trade agreement

In 2012 U.S. cross-border data flows averaged 6.7 terabits per second....

....or roughly 6000 DVDs per minute.

Data: TeleGeography, PPI

How 'big', in economic terms, is this cross-border data flow?

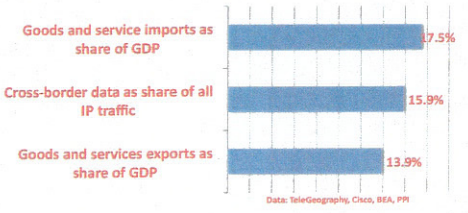
Much of cross-border data does not get counted as exports or imports in the trade statistics (for reasons to be explained later).

Let's compare to domestic data traffic:

Our calculations show that U.S. cross-border data flows were roughly 16% of U.S. total IP traffic in 2012

Data: TeleGeography, Cisco, PPI calculations

Importance of US trade, 2012: Data versus Goods and Services



Note on measurement of cross-border data flows:

1) Large networks (Tier 1) typically have *peering* agreements that let them exchange data with each other without charge (say, AT&T and Tata Communications).
2) Many regional providers also have peering agreements.
3) Based on the example of these arms-length agreements, companies with large private networks can treat their own cross-border traffic the same way—that is, they need not book a charge for traffic between the US and their foreign subsidiaries.
4) Implication: Much or most of cross-border data flows do not leave a monetary footprint.
5)Implication: Much or most of cross-border data flows are not counted in our international trade statistics.
6) Implication: Growth rate of U.S. trade is being underestimated.

Who benefits from cross-border data flows?

Let's suppose that a European student downloads a video of a Stanford University computer science course. Is this an export or an import?

In some ways, it looks like an export, since data leaves the U.S. and the student benefits. But:
--the student doesn't pay Stanford or its Internet providers.
--no marginal jobs or revenues are created in the U.S.
--the data never leaves the U.S.

Indeed, perhaps the concepts of exports and imports don't apply well to cross-border data flows.

Let's try another approach:

It matters where the video is accessed from. If the server is closer, the user experiences less latency, shorter lags, and higher quality.

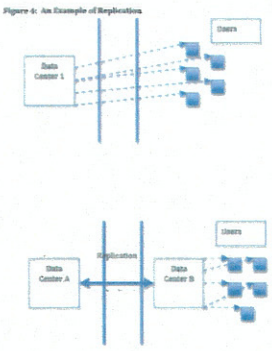
Table 2: Examples of Latency from Europe

	Response time from Germany
European Central Bank (www.ecb.int)	7 ms
Swiss Central Bank (www.snb.ch)	13 ms
Bank of Russia (www.cbr.ru)	57 ms
Federal Reserve (www.federalreserve.gov)	98 ms
Bank of Taiwan (www.cbc.gov.tw)	295 ms

Data: Based on data from ping.eu

How can latency of data be reduced and the quality be improved?

Data can be replicated closer to users by building a data center or a content delivery network.



Building and operating a replication facility such as a data center requires an investment in equipment and communications links .

Google, Amazon, and others operate data centers globally.

Google's Data Centers

Map by Google

Building and operating a replication facility in a region increases the relative utility of data accessed through the data center or other replication facility by decreasing lags and increasing quality.

To put it another way, access to global data is equivalent to intangible capital for a region. By reducing lags by up to 90%, a data center or other replication facility in that region effectively increases intangible capital and output.

Severa observations:

1. Trade in data between two regions may be better characterized by replication rather than exports and imports.

2. Building a data center or other replication facility in a region benefits that region by allowing faster and better access to global data, boosting economic output.

3. Just like consumers in a region benefit from allowing imports of goods, so do data "consumers" benefit from the construction of a data center or other replication facility in their region.

4. Google and others that build replication facilities around the world are using a relatively small amount of local data to fund the replication of a much larger quantity of useful global data in that region.

5. Trade policy should focus on reducing barriers to cross-border data flow **and** to the construction of data centers or other replication facilities. (PPI is in the process of estimating the value of reducing barriers to cross-border data flows).

6. For example, tight European privacy rules will diminish the incentive to build and operate data centers in region. That will reduce quality of global data flowing into the region, and lower economic output.

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