Policy Challenges of Cross-Border Cloud Computing

Renee Berry and Matthew Reisman

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Takeaways

- As cloud computing grows, so do the flows of data across borders.

- These flows raise policy concerns…
  - Many of which fall outside "conventional" trade policy.

- Countries are pursuing novel approaches to cooperation…
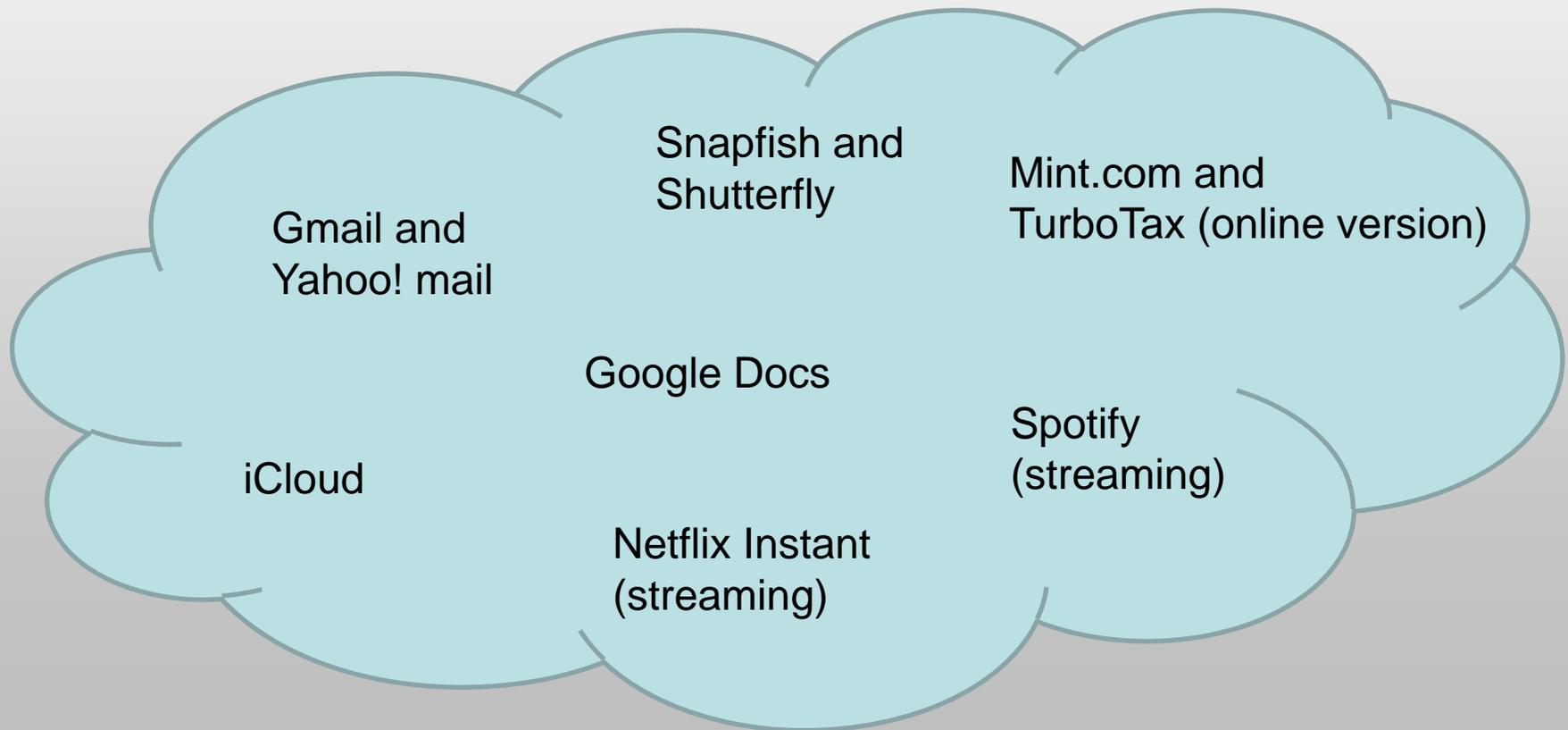 - But the policy environment is in flux.

Agenda

➢ **Definitions and market characteristics**

- Export estimates

- Trade agreements

- Policy issues

- Developing country case studies

Definitions

The Cloud: You're already there.

Snapfish and Shutterfly

Mint.com and TurboTax (online version)

Gmail and Yahoo! mail

Google Docs

iCloud

Spotify (streaming)

Netflix Instant (streaming)

NIST definition: 5 essential characteristics of the Cloud

- On-demand self-service

- Broad network access

- Resource pooling

- Rapid elasticity

- Measured service

Variations on the Cloud

- 3 types of cloud services: Software as a Service (Saas), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS).

- Public cloud, private cloud, and options in between.

Why Cloud?

- Accessibility
- Customization

- Separates data from device
- Potential cost savings

Who provides cloud services?

- Cloud-only/cloud-based companies
- Traditional software companies
- Hardware + service companies
- Internet service companies
- Largely U.S.-based

So how big is the Cloud, anyway?

Table 1 Cloud market estimates and forecasts, 2010 and 2015 ($ billions)[1]

	2010				2015			
	SaaS	PaaS	IaaS	**Total**	SaaS	PaaS	IaaS	**Total**
Gartner	10.0	1.3	2.8	**14.1**	21.3	2.4	19.6	**43.3**
Forrester	13.4	0.3	1.0	**14.7**	78.4	9.8	5.8	**94.1**

Sources: Pring et al., "Forecast: Public Cloud Services, Worldwide and Regions," June 29, 2011; Ried et al., "Sizing the Cloud," April 21, 2011.

[1] Totals do not include Gartner's estimates of public cloud revenues from "business process services" and Forrester's estimates for "business process as a service."
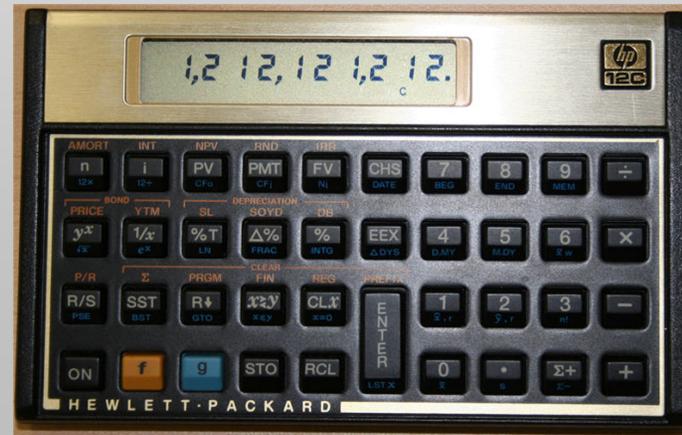
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Export Estimates: Three Steps

1. Find categories in U.S. export data most likely to contain cloud computing.

2. Estimate cloud computing's share of transactions in those categories.

3. Do the arithmetic.

Source: Wikimedia Commons

1. Find the categories

Category	$ millions
U.S. cross-border exports (2010)	
Computer and data processing services	8,771
General use computer software	35,040
Total	*43,811*
Sales of services by U.S. majority-owned foreign affiliates (2009)	
Computer systems design and related services	66,250
Software publishers	24,982
Total	*91,232*

Source: USDOC, BEA

2. Estimate the cloud shares

Category	Global Revenues, 2010 ($ billions)
PaaS	1.3
IaaS	2.8
IT services	793.0
(PaaS + IaaS)/IT services (%)	*0.5*
SaaS	10.0
Enterprise software	244.0
SaaS/Enterprise software (%)	*4.1*
Source: Gartner	

3. Do the arithmetic

Category	Cloud + Non-cloud ($ millions)	Cloud share (%)	Cloud ($ millions)
U.S. cross-border exports (2010)			
Computer and data processing	8,771	0.5 _(IaaS+PaaS share of IT services)_	45
General use computer software	35,040	4.1 _(SaaS share of Enterprise Software)_	1,436
Total	_43,811_		_1,481_
Sales by U.S. majority-owned foreign affiliates (2009)			
Computer systems design and related services	66,250	0.5 _(IaaS+PaaS share of IT services)_	343
Software publishers	24,982	4.1 _(SaaS share of Enterprise Software)_	1,024
Total	_257,824_		_1,366_

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WTO

- No GATS commitments on cloud computing *per se.*

  - 83 on "computer and related services."

  - 60 on "on-line information and/or data processing."

Source: Wikimedia Commons

Free Trade Agreements

- ## Korea—United States
  - Hortatory language: "Parties shall endeavor to refrain from… unnecessary barriers to electronic information flows across borders."

  - Digital products

- ## TPP: ?

Source: Wikimedia Commons

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Data privacy

- Major area of difference internationally
- U.S. and EU have very different approaches, developing countries in flux
- U.S. approach: self-regulatory overall, sector-specific restrictions

EU Data Privacy Directive

- Standards that all member states must follow in their domestic laws

- Applies to all personal data collected on any individual EU citizen

- Seven core standards for data storage and processing related to: fairness, specific purpose, limiting to what's relevant, accuracy, destruction once obsolete, security measures, and restrictions on the use of automated processing

U.S. firms and the EU Directive

- Safe Harbor provision
- Variation in member states' application
- Additional challenges to doing business

OECD Guidelines

- Adopted in 1980
- Attempt to keep governments out of the way and thereby encourage self-regulation
- Basic core principles for governments
- Currently under review

APEC Privacy Framework

- Core principles for providers, not governments
- Data collector accountable for following principles as data move across borders

Security-related policy

- Special sectors

- Contractual obligations

- Security and government access to data
    - PATRIOT Act

    - EU Data Retention Directive

    - Uncertainty in developing countries

- OECD, ISO guidance

Localization requirements

- At odds with the cloud model
- Provider willingness/ability to accommodate varies
- Concrete examples for financial and government data. Concern about proposed/potential broader measures.
- U.S. not immune: recent controversy involving government cloud procurement.

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Cloud Enabling Environment

- Infrastructure
  - Telecommunications
    - Broadband quality, availability, and cost
  - Electricity

- Laws and regulations
  - Data privacy and security
  - Internet filtering (censorship)
  - Intellectual property

Case study: China

- Potential market, not an existing one
- Cloud and the latest 5-Year Plan – indigenous development of the Cloud
- City and company-level investments
- Uncertain policy environment
- Infrastructure challenges
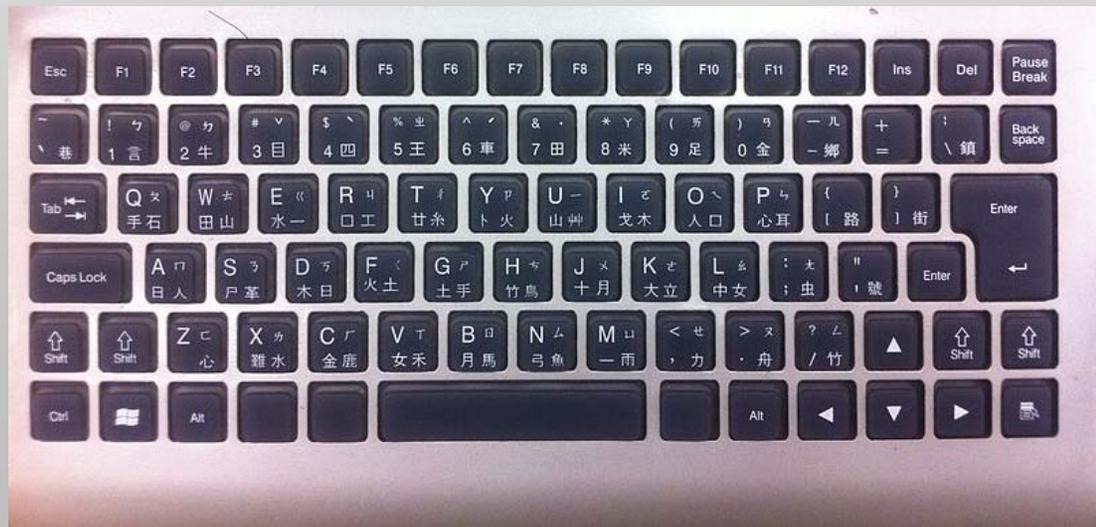
Case study: India

- World's leading exporter of computer and information services…
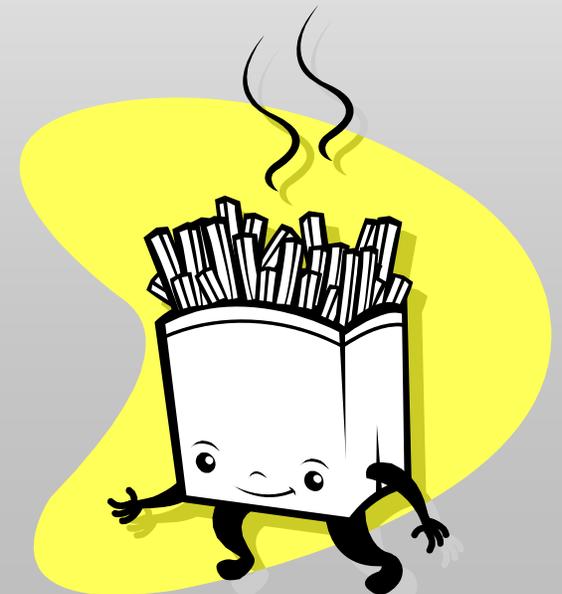
- …but is the cloud a threat to the Indian success story?
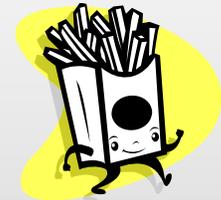

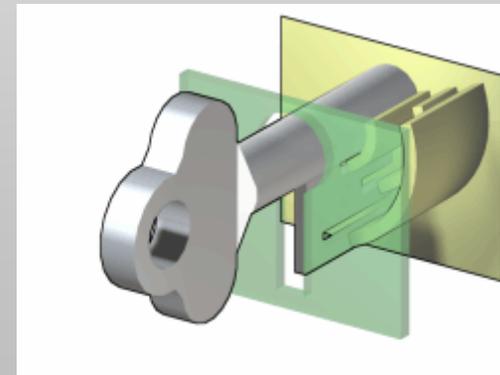*Source:* Wikimedia Commons

Indian cloud suppliers

- Small fries
  - Specialists in specific cloud services
    - Cnergyis, Orangescape, Netmagic

- Big guys
  - Wide range of services
    - Wipro, Infosys, TCS

Challenges

- ## Infrastructure

  - ### Unreliable and expensive electricity

- ## Legal uncertainties

  - ### Information Technology (Amendment) Act

    - #### "Reasonable security practices"

Source: Wikimedia Commons

Conclusions

- Cross-border cloud computing is substantial and growing…

- … but the policy environment is still in flux.

- International cooperation across multiple channels is valuable.

- Cloud development is particularly challenging for developing countries...
  - But those countries are not standing still.