Imported Intermediate Inputs and Export Diversification in Low Income Countries

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Motivation

- Should developing countries step away from specializing in commodities and diversify their exports instead?
- Rodrik (2012): Unconditional Convergence in Labor Productivity in Manufacturing. Policies should reallocate resources towards manufacturing.
- Johnson, Ostry, Subramanian (2007): episodes of sustained growth in Sub-Saharan Africa despite weak institutions and lack of macro stability are linked to expanding manufactured exports.
- Hausmann, Hwang, Rodrik (2007): What you export matters.

Motivation

- Imbs and Wacziarg (2003): Positive relationship between diversification and income within countries through time (in range of income relevant to developing countries).

- World Bank's "Can Africa claim the 21st Century" (2000) report.

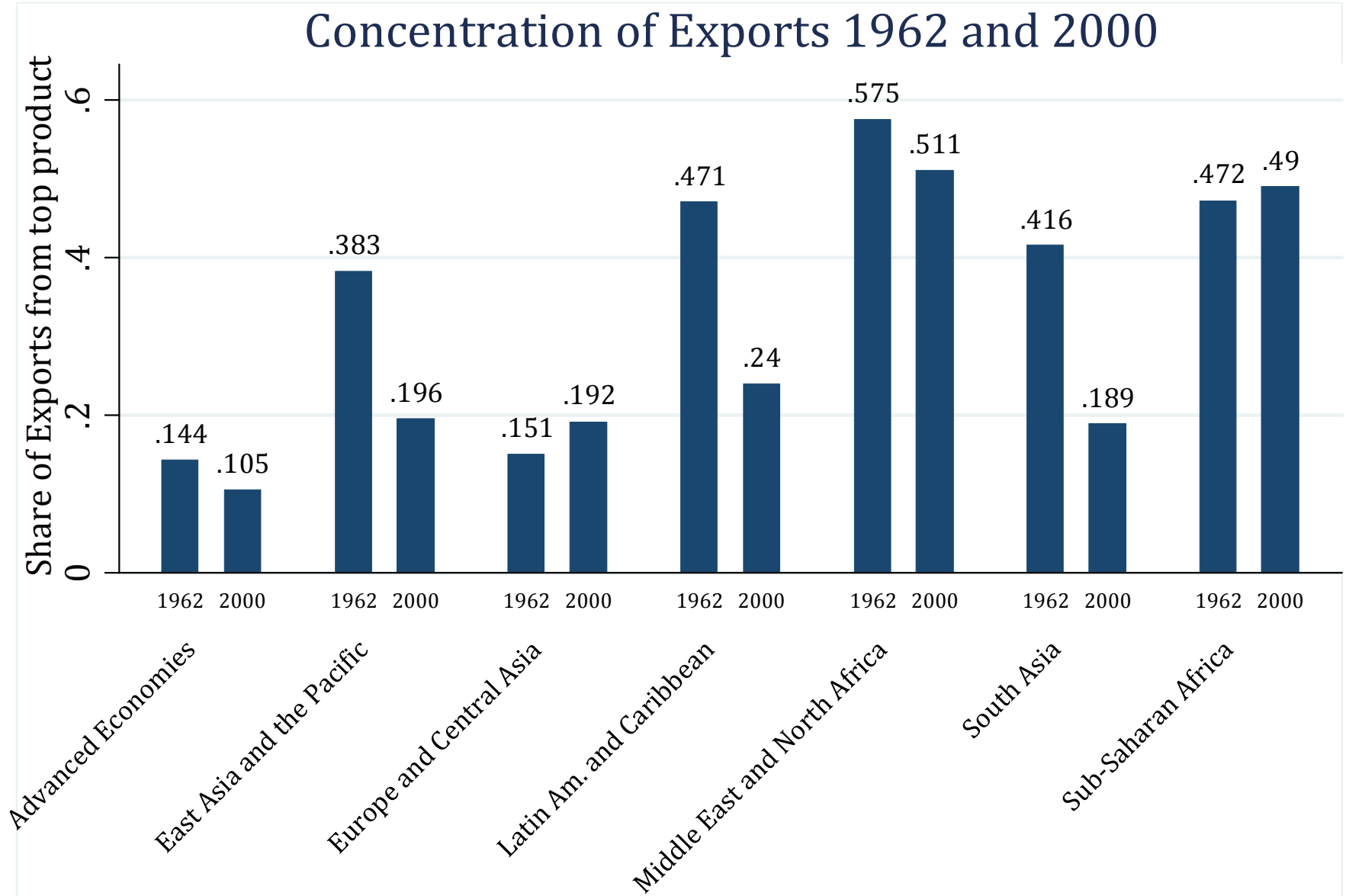
This paper

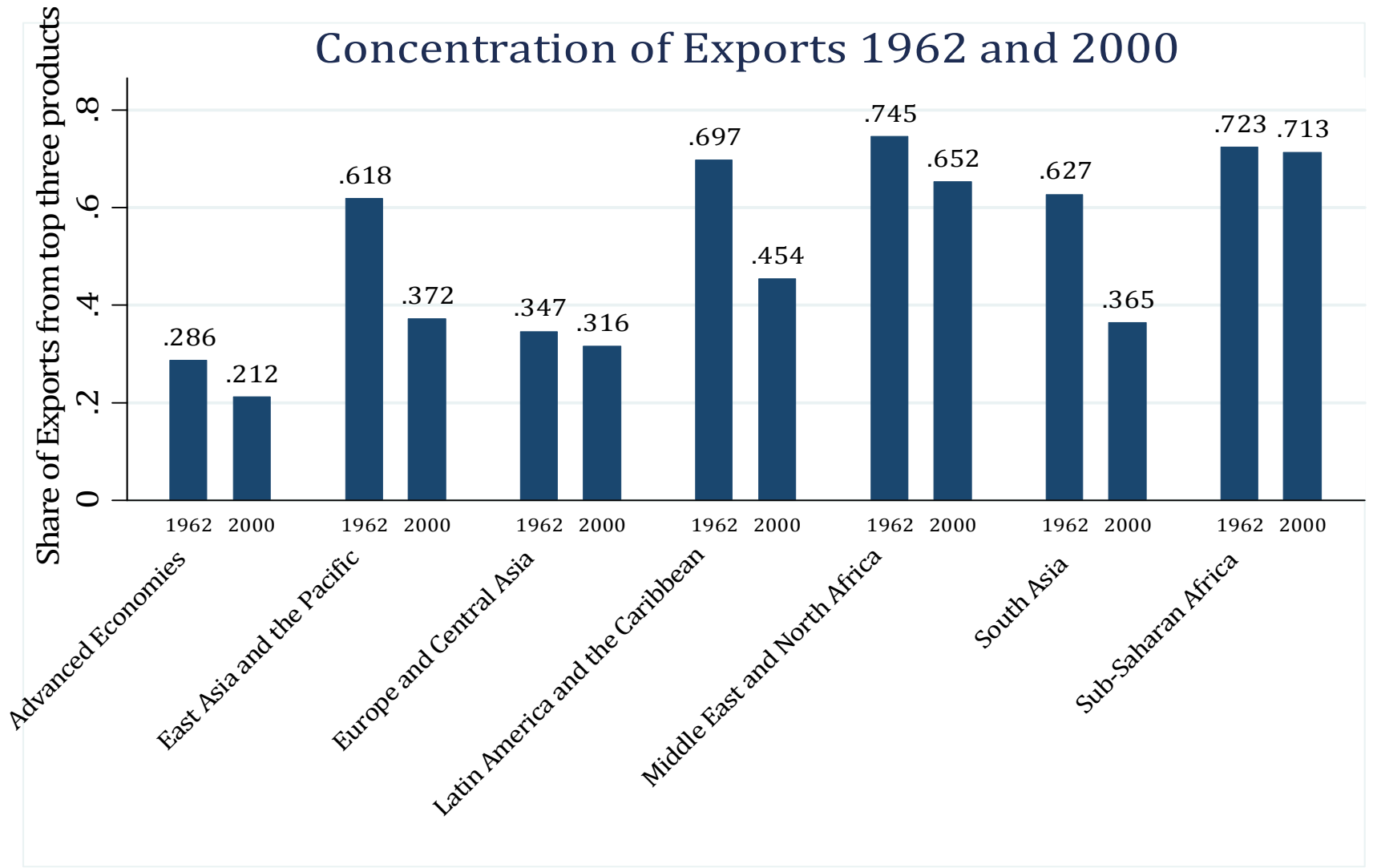
- Study role of vertical linkages in export diversification.
- Use new measure of upstreamness / downstreamness (Antras et al. (2012), Fally (2011)) of exports to characterize countries' position in global value chains.
- Study effect of trade liberalization on export and import diversification and movements along supply chains.
- Is there a link between access to intermediate inputs and export diversification?

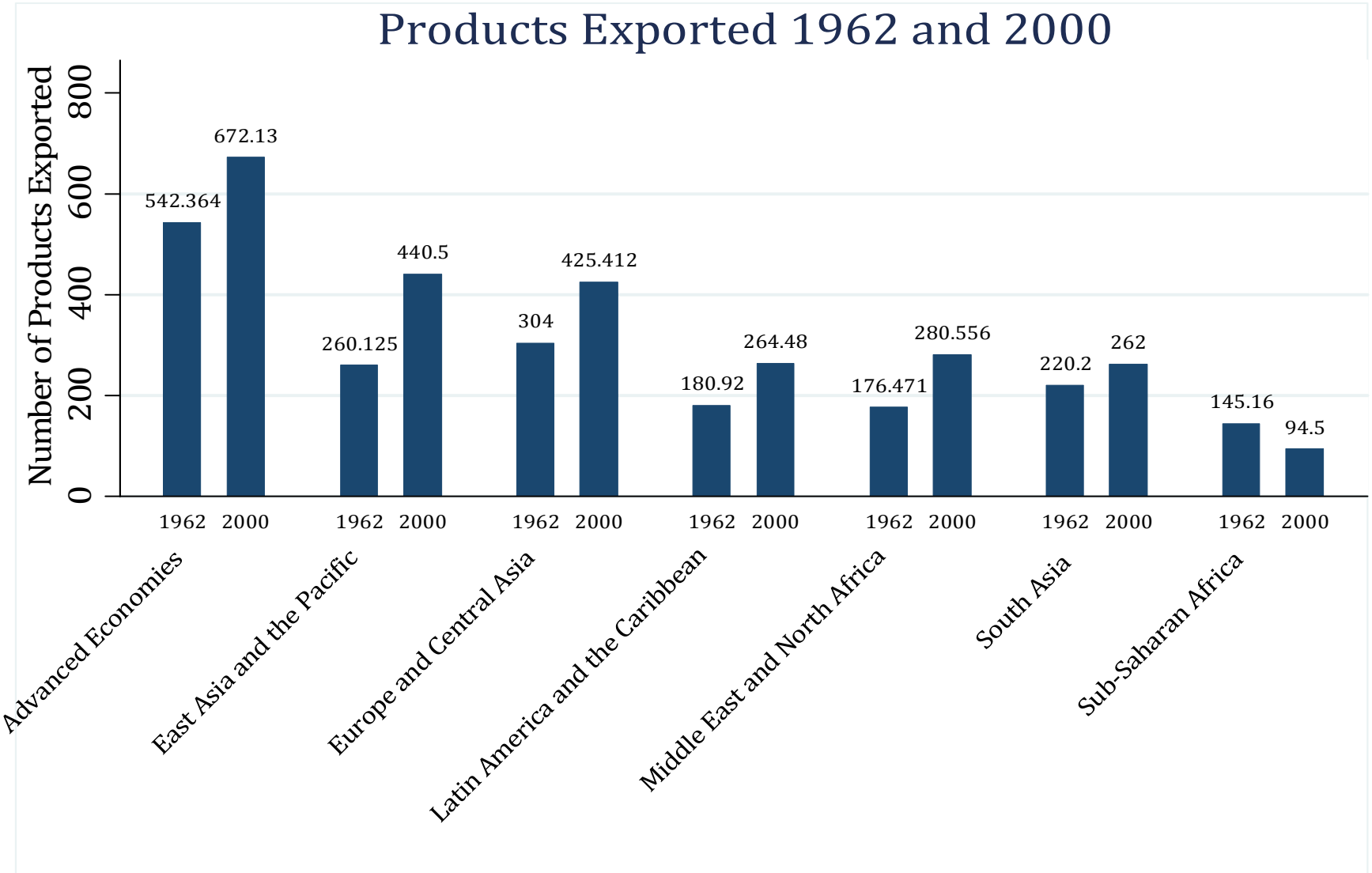
Road Map

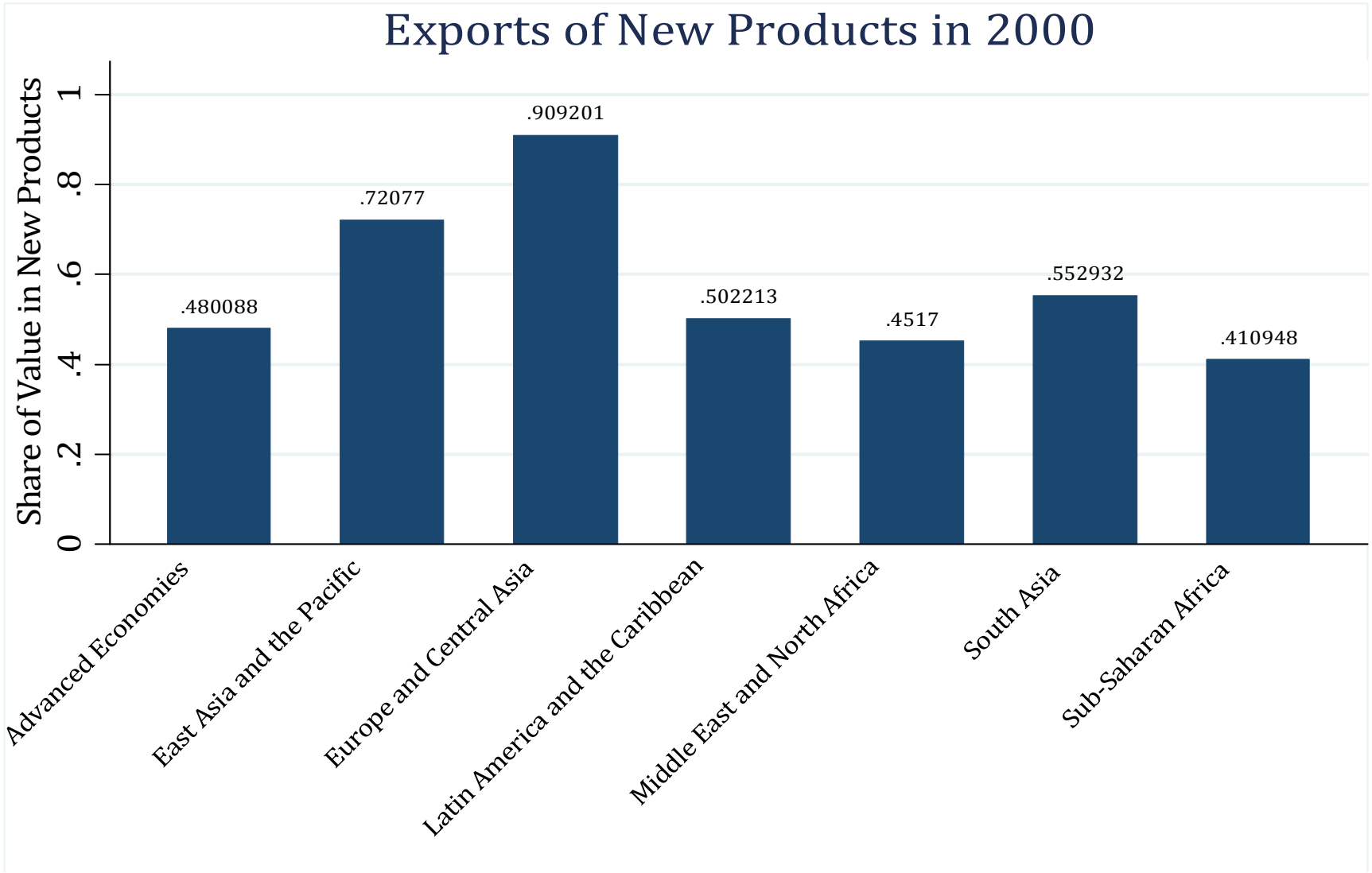
- Trends in Export and Import Diversification, and in Movements along Supply Chains
- Effect of Trade Liberalization on Diversification of Exports and Imports, and in Position along Supply Chains.
- Link between access to Imported Intermediate Inputs and Export Diversification and Position along Supply Chains.

Trends in Export and Import Diversification


Concentration of Exports 1962 and 2000
Share of Exports from top product
0
.2
.4
.6
.144
.105
.383
.196
.151
.192
.471
.24
.575
.511
.416
.189
.472
.49
1962
2000
Advanced Economies
East Asia and the Pacific
Europe and Central Asia
Latin Am. and Caribbean
Middle East and North Africa
South Asia
Sub-Saharan Africa


Concentration of Exports 1962 and 2000
Share of Exports from top three products
0
.2
.4
.6
.8
.286
.212
.618
.372
.347
.316
.697
.454
.745
.652
.627
.365
.723
.713
1962
2000
Advanced Economies
East Asia and the Pacific
Europe and Central Asia
Latin America and the Caribbean
Middle East and North Africa
South Asia
Sub-Saharan Africa

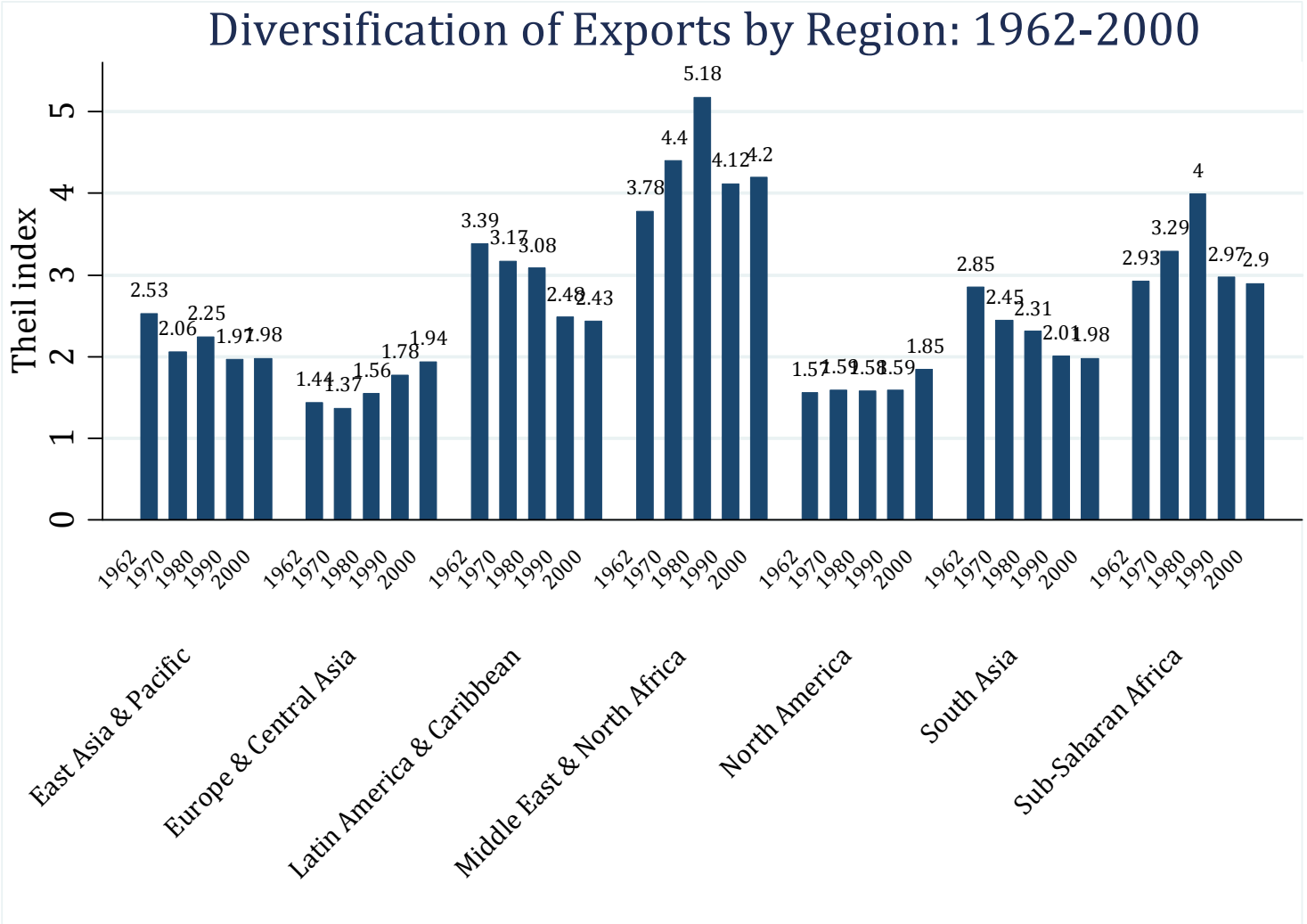

Products Exported 1962 and 2000
Number of Products Exported
0
200
400
600
800
542.364
672.13
260.125
440.5
304
425.412
180.92
264.48
176.471
280.556
220.2
262
145.16
94.5
1962
2000
Advanced Economies
East Asia and the Pacific
Europe and Central Asia
Latin America and the Caribbean
Middle East and North Africa
South Asia
Sub-Saharan Africa


Exports of New Products in 2000
Share of Value in New Products
0
.2
.4
.6
.8
1
.480088
.72077
.909201
.502213
.4517
.552932
.410948
Advanced Economies
East Asia and the Pacific
Europe and Central Asia
Latin America and the Caribbean
Middle East and North Africa
South Asia
Sub-Saharan Africa

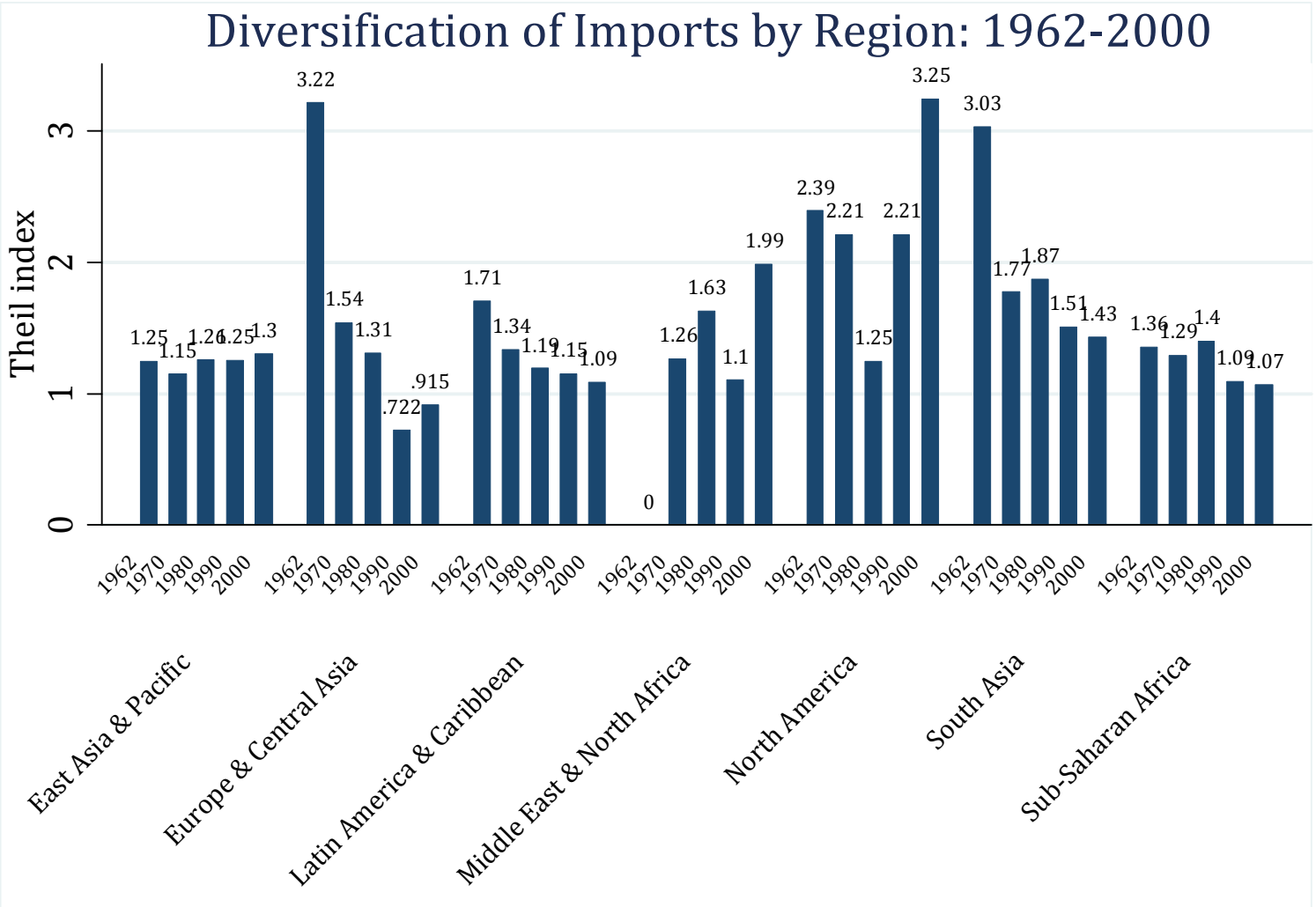
Theil Index

$$T = \frac{1}{N} \sum_{i=1}^{N} \frac{x_i}{\mu} \ln\left(\frac{x_i}{\mu}\right) \quad \text{with} \quad \mu = \frac{\sum_{i=1}^{N} x_i}{N}$$

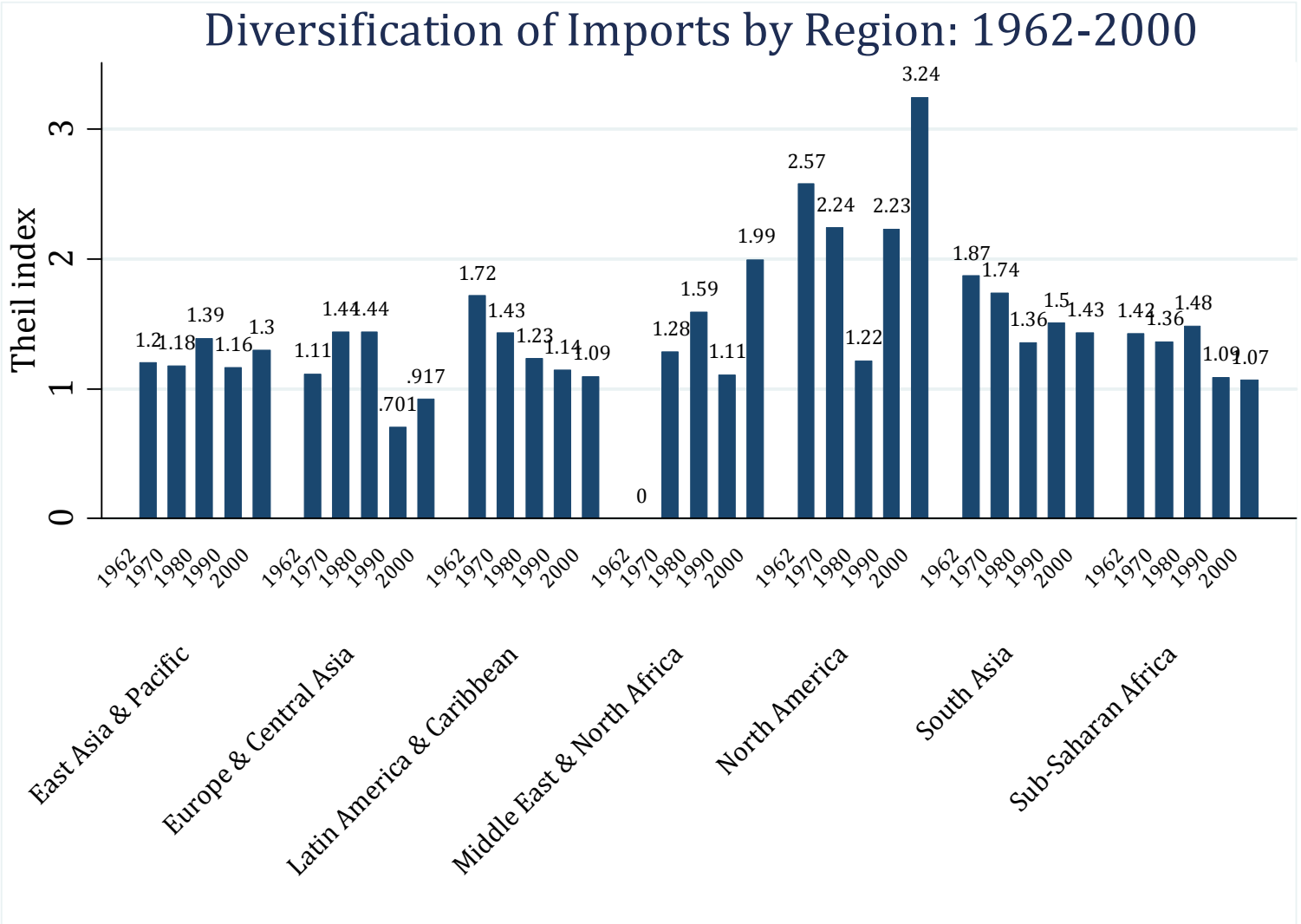
Diversification of Exports by Regions, 1962 – 2000



Diversification of Imports by Regions, 1962 – 2000



Diversification of Imports by Regions, 1962 – 2000. Only Intermediate Inputs



Trends in Export Upstreamness/Downstreamness

Measuring the Position of Countries Exports along Supply Chains

- Antras et al. (2012) and Fally (2011) develop measure of upstreamness/downstreamness that can be used to determine position of countries in global value chains.

- Measure based on input-output tables. Recursive definition: upstream industries are those that sell a large share of their output to other upstream industries.

$$U_i = 1 + \sum_{j=1}^{N} share_{i \to j} \cdot U_j$$

I use their measure based on the U.S. 2002 IO table.

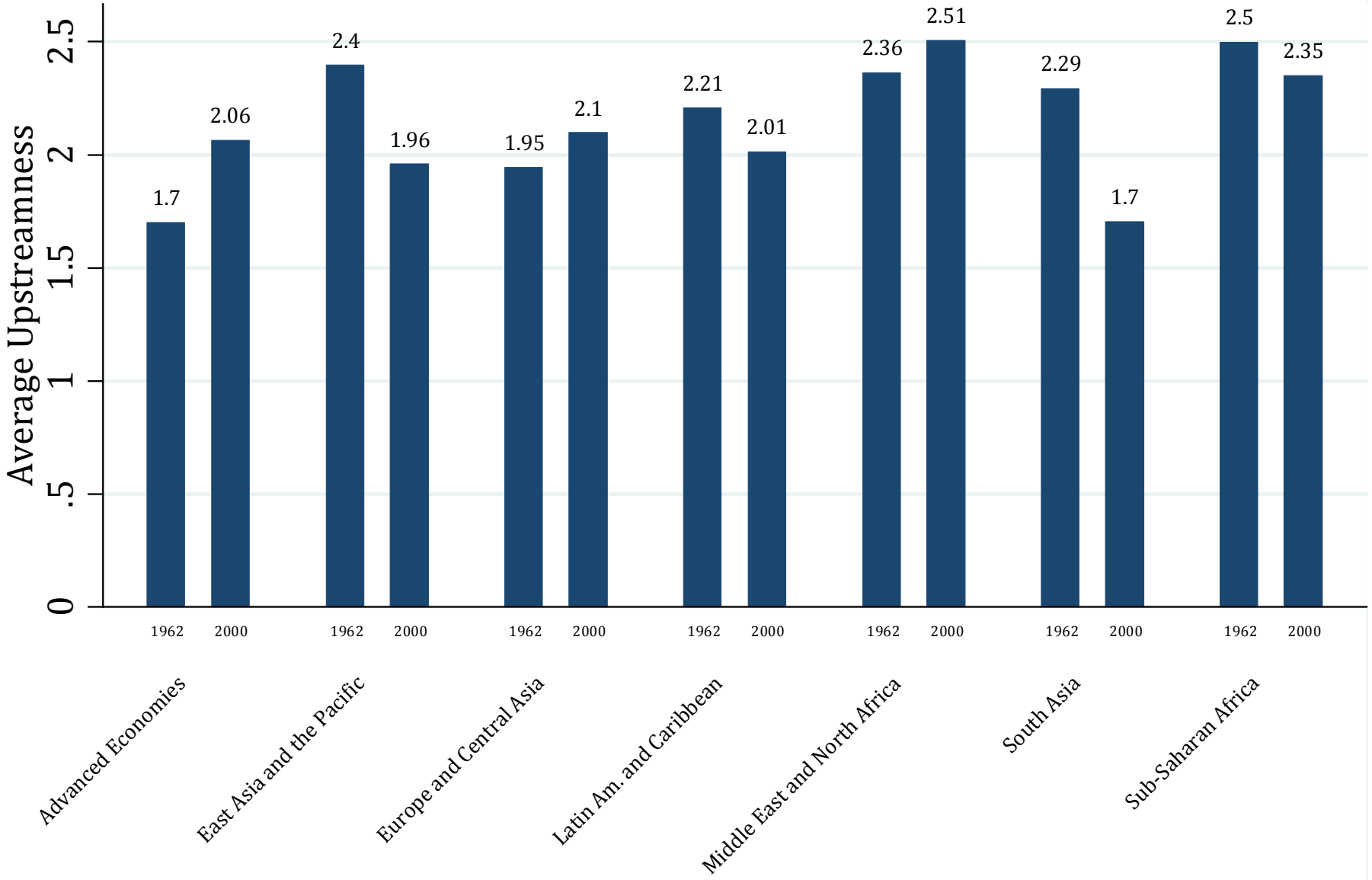
Good representation of other countries and/or periods?
No alternatives ...

Some examples ...

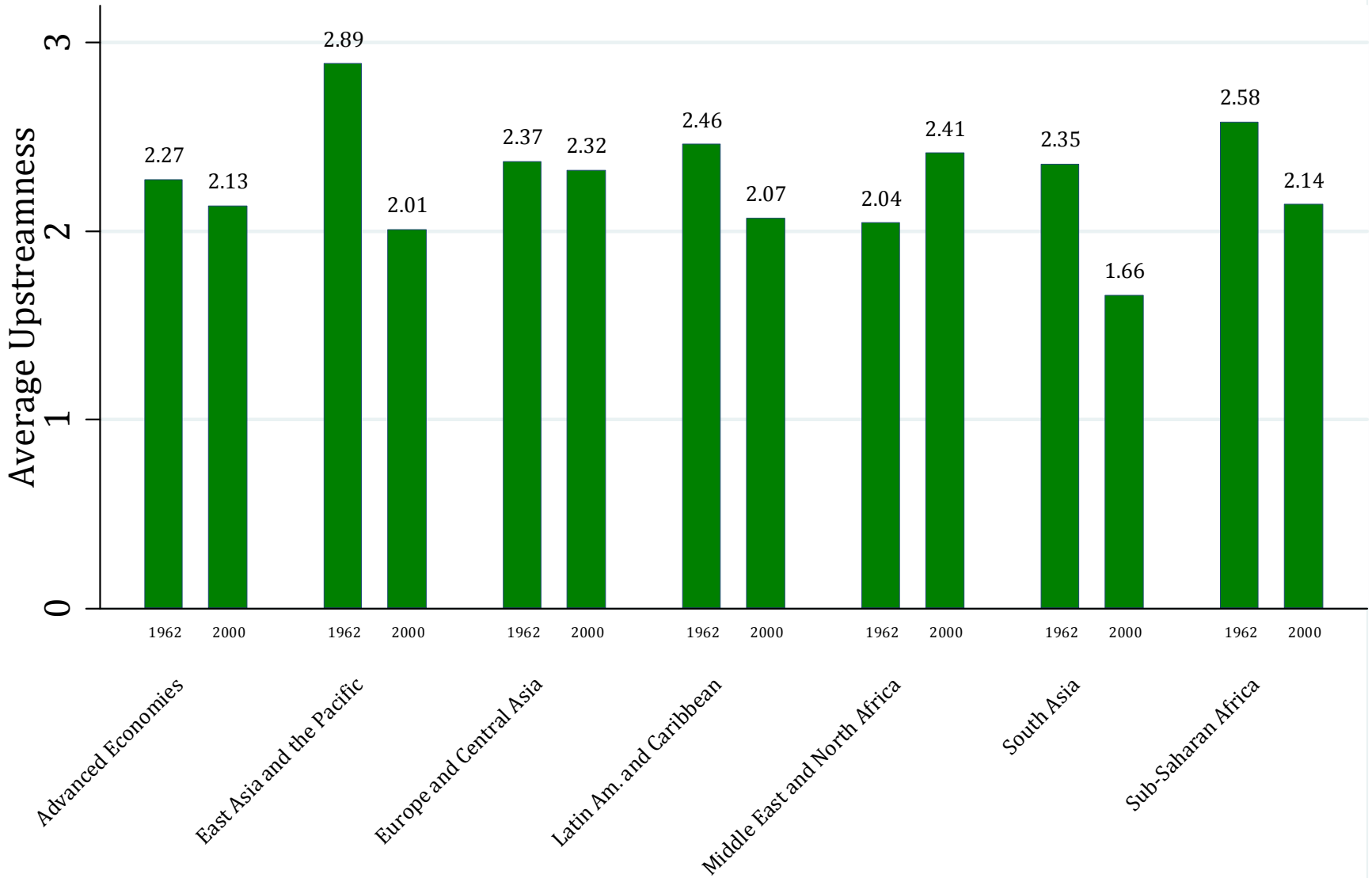
Upstreamness/Downstreamness Index. List of Most Upstream and Most Downstream Products:

STC4	Product	Upstreamness Index	
7810	Passenger motor cars, for transport of pass.& goods	1.00	Most downstream
8452	Dresses, skirts, suits etc, knitted or crocheted	1.02	
8465	Corsets, brassieres, suspendres and the like	1.02	
8952	Pens, pencils and fountain pens	1.03	
7932	Ships, boats and other vessels	1.03	
7931	Warships of all kinds	1.03	
7523	Complete digital central processing units	1.04	
7522	Complete digital data processing machines	1.04	
7521	Analogue & hybrid data processing machines	1.04	
7414	Refrigerators & refr.equipment, ex.household, parts	1.05	
2816	Iron ore agglomerates (sinters, pellets, briquettes)	4.35	
6821	Copper and copper alloys, refined or not, unwrought	4.35	
6822	Copper and copper alloys, worked	4.35	
2922	Shellac, seed lac,stick lac, resins, gum resins, etc.	4.60	
2924	Plants,seeds, fruit used in perfumery, pharmacy	4.60	
2320	Natural rubber latex; nat. rubber & sim. nat. gums	4.60	
2120	Furskins, raw (includ. astrakhan, caracul, etc.)	4.60	
6210	Materials of rubber(e.g.,pastes, plates, sheets,etc)	4.60	
2923	Veget.mater.of a kind used primar. for plaiting	4.60	
5112	Cyclic hydrocarbons	4.65	Most Upstream

Upstreamness in All Sectors between 1962 and 2000



Upstreamness in Manufacturing between 1962 and 2000

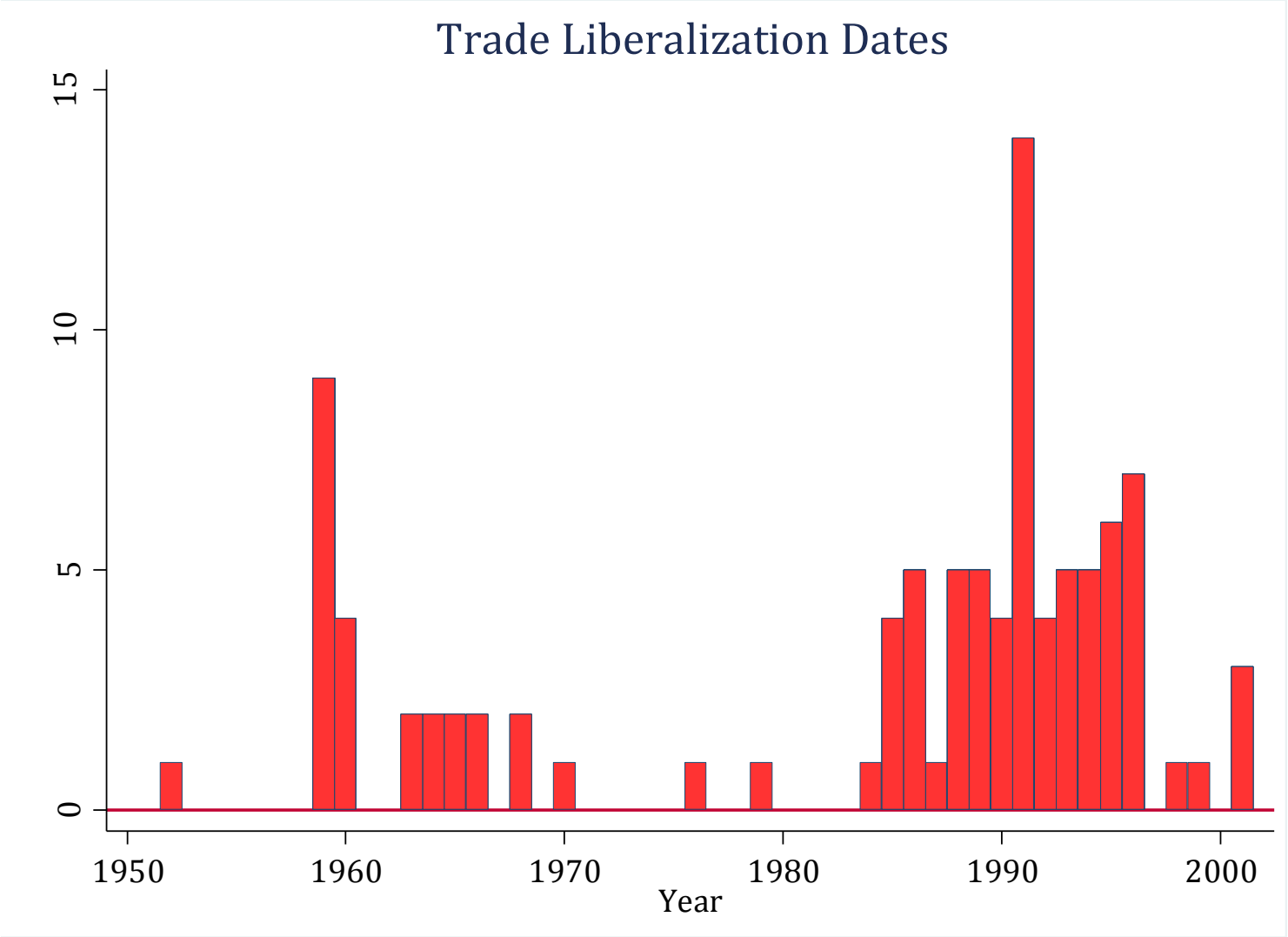


Trade Liberalization and Diversification.

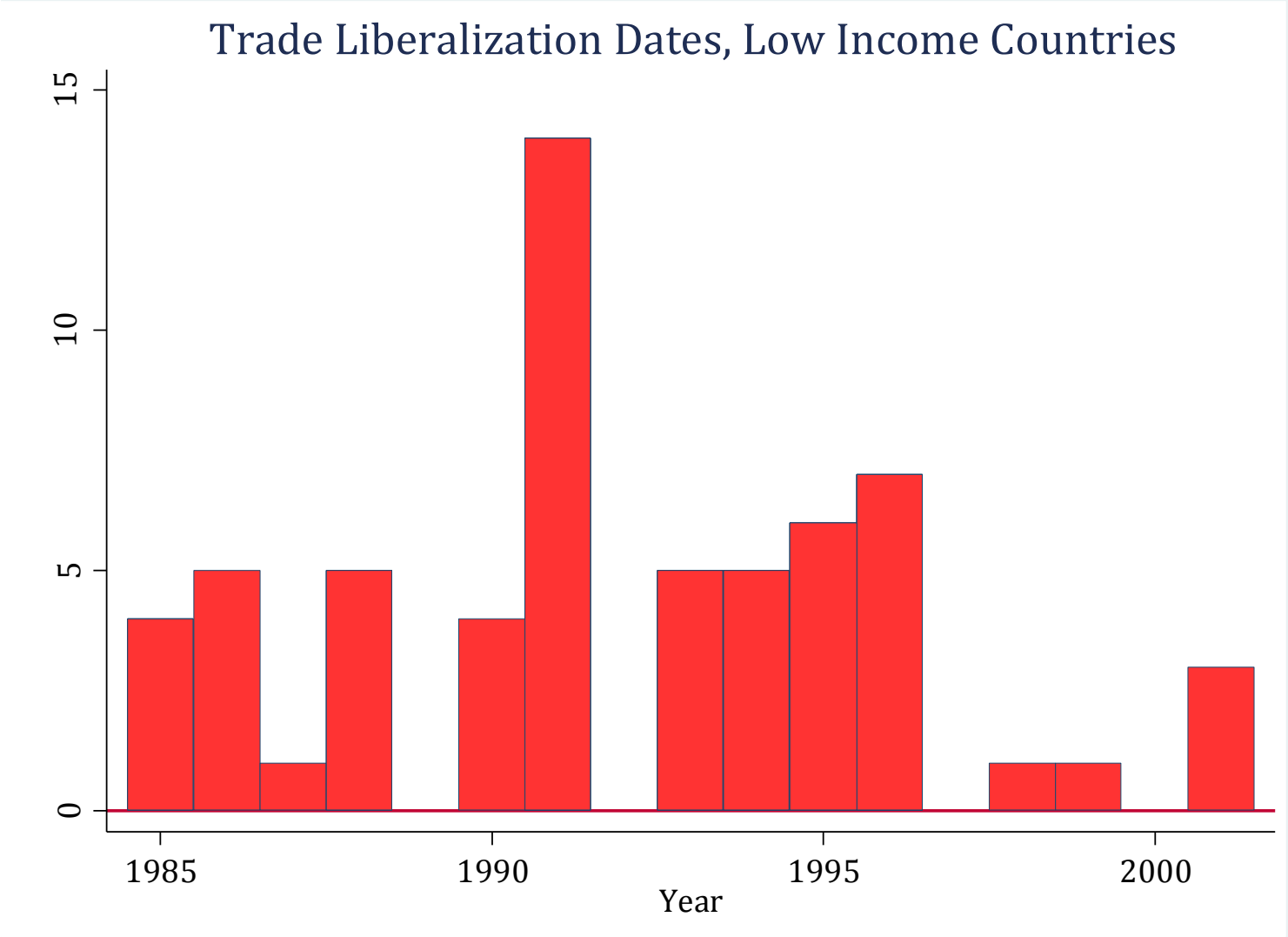
Does trade liberalization lead to an increase in the variety of exported and imported products?

Country-level regressions using Wacziarg and Welch's (2008) liberalization dates.

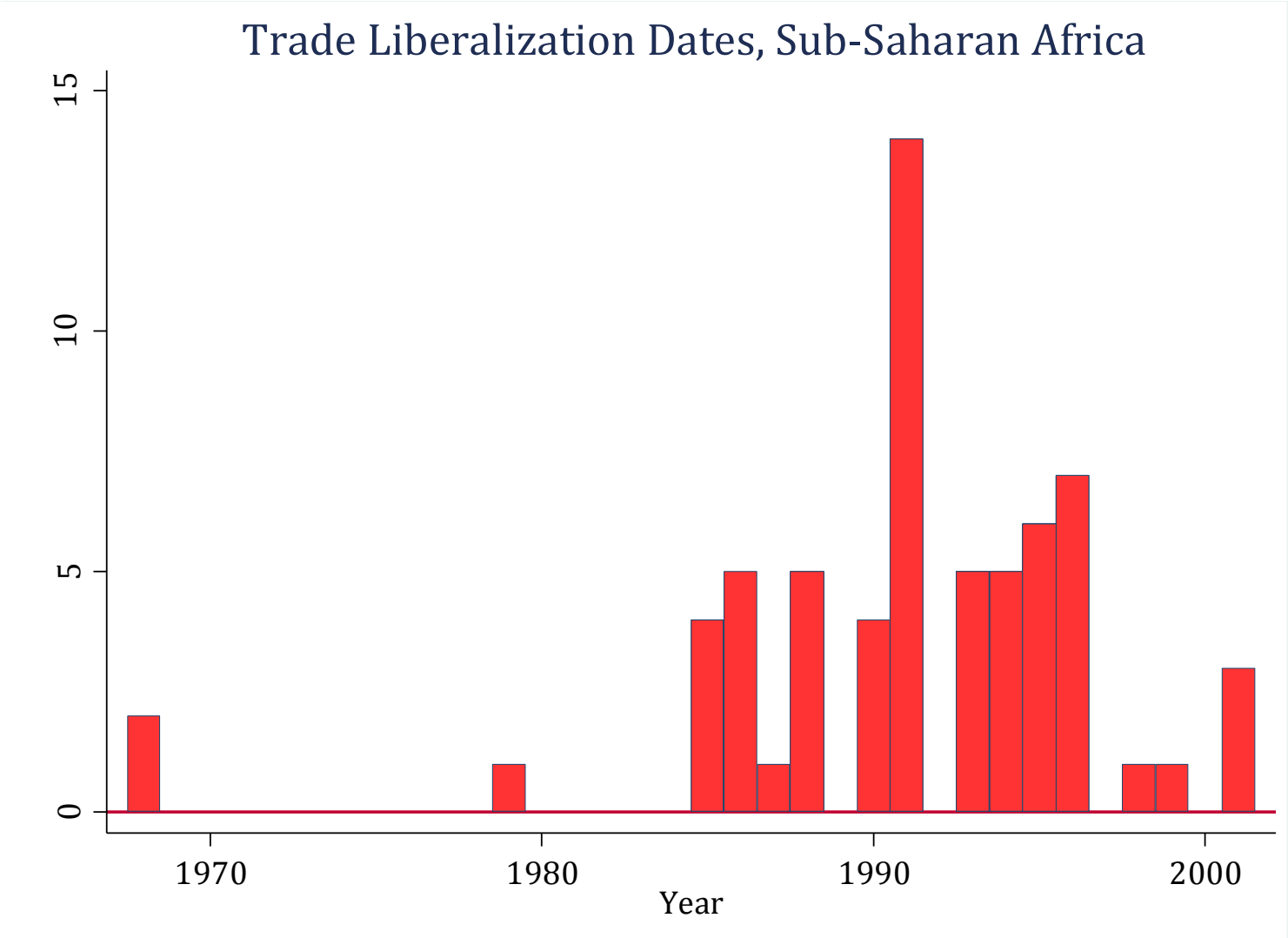
Liberalization Dates: All Countries



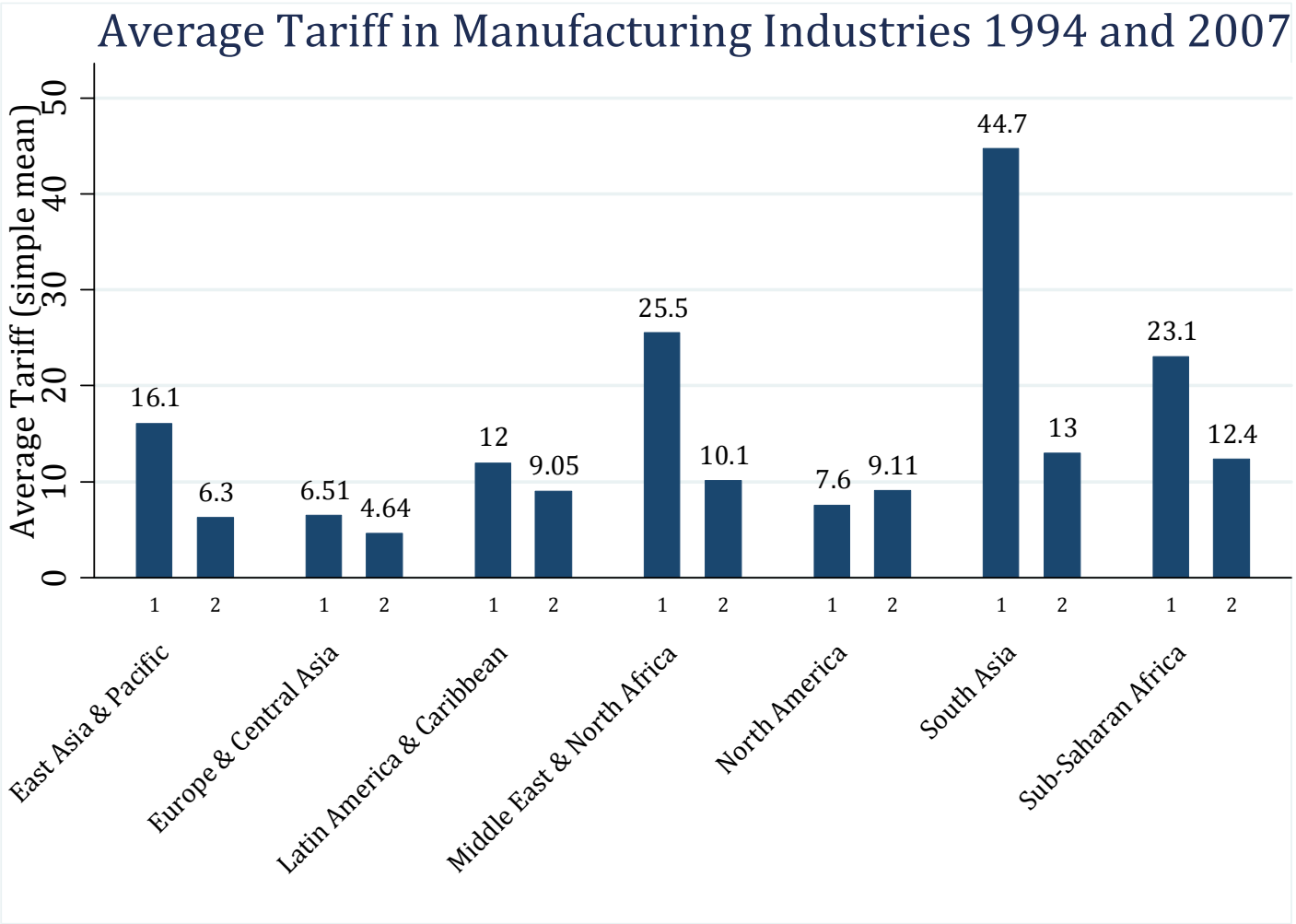
Liberalization Dates: Low Income Countries



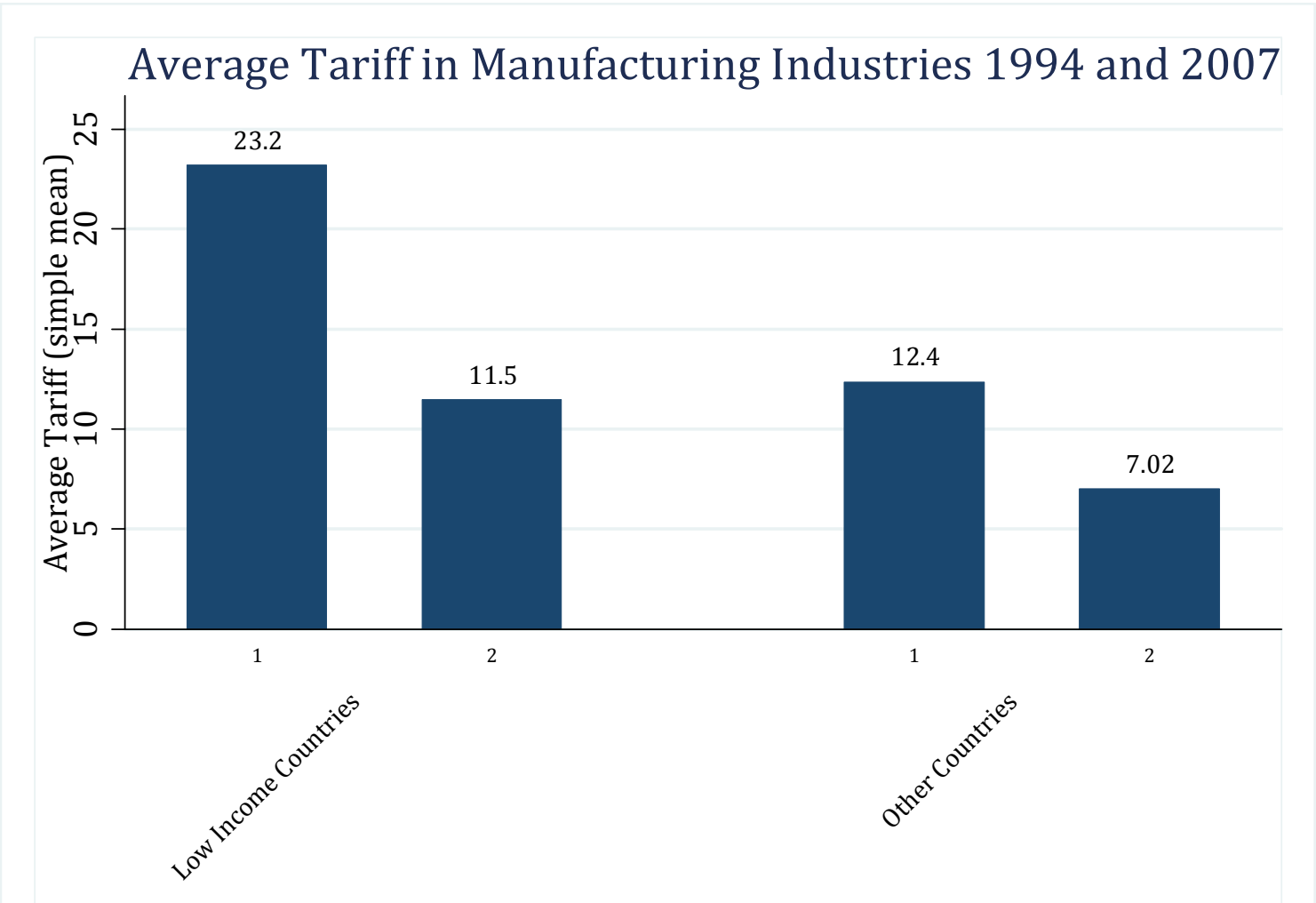
Liberalization Dates: Sub-Saharan Africa



Liberalization: Trends in Average Tariffs in Manufacturing.



Liberalization: Trends in Average Tariffs in Manufacturing



Effect of Liberalization on the Diversification of Exports and Imports: Country-level Estimation.

$$\text{Diversification}_{ct} = \text{Liberalized}_{ct} + \mu_t + \delta_c + \epsilon_{ct}$$

Effect of Trade Liberalization on Export Diversification

Table VIA.1 Dependent Variable: (Log) Number of Exported Products

Sample:	All Countries	Low Income Countries	SSA
Liberalized	0.005	0.123***	0.145***
	0.029	0.034	0.038
Liberalized	0.002	0.059	0.06
(Standardized Coefficients)			
Year fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Number of Observations	4351	1439	1286
R squared	0.815	0.842	0.868

Effect of Trade Liberalization on Export Diversification

Table VIA.2 Dependent Variable: Theil Index of Export Diversification

Sample:	All Countries		Low Income Countries	SSA
Liberalized	- 0.208	***	- 0.022	0
	0.025		0.04	0.045
Liberalized	- 0.121		- 0.011	0
(Standardized Coefficients)				
Year fixed effects	Yes		Yes	Yes
Country fixed effects	Yes		Yes	Yes
Number of Observations	4351		1439	1286
R squared	0.738		0.781	0.761

Effect of Trade Liberalization on Import Diversification: All Imports

Table VIB.1 Dependent Variable: (Log) Number of Imported Products

Sample:	All Countries	Low Income Countries	SSA
Liberalized	0.118 ***	0.186 ***	0.157 ***
	0.016	0.028	0.03
Liberalized (Standardized Coefficients)	0.129	0.169	0.134
Year fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Number of Observations	4335	1438	1285
R squared	0.632	0.622	0.64

Effect of Trade Liberalization on Import Diversification: All Imports

Table VIB.2 Dependent Variable: Theil Index of Import Diversification

Sample:	All Countries	Low Income Countries	SSA
Liberalized	-0.091 ***	-0.101 ***	-0.125 ***
	0.018	0.033	0.034
Liberalized (Standardized Coefficientes)	-0.094	-0.07	-0.084
Year fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Number of Observations	4335	1438	1285
R squared	0.594	0.703	0.723

Effect of Trade Liberalization on Import Diversification: Intermediate Inputs

Table VIC.1
Dependent Variable: (Log) Number of Imported Products (Intermediate Inputs)

Sample:	All Countries	Low Income Countries	SSA
Liberalized	0.117***	0.177***	0.159***
	0.017	0.031	0.033
Liberalized	0.109	0.141	0.12
(Standardized Coefficients)			
Year fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Number of Observations	4335	1438	1285
R squared	0.691	0.647	0.679

Effect of Trade Liberalization on Import Diversification: Intermediate Inputs

Table VIC.2

Dependent Variable: Theil Index of Import Diversification (Intermediate Inputs)

Sample:	All Countries	Low Income Countries	SSA
Liberalized	-0.097***	-0.11***	-0.145***
	0.0179	0.034	0.036
Liberalized	-0.097	-0.072	-0.091
(Standardized Coefficients)			
Year fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Number of Observations	4335	1438	1285
R squared	0.622	0.699	0.716

Trade Liberalization and Movements along Supply Chains.

Effect of Liberalization on Export Upstreamness/Downstreamness: Country-level Estimation.

$$\text{Upstreamness/Downstreamness}_{ct} = \text{Liberalized}_{ct} + \mu_t + \delta_c + \epsilon_{ct}$$

Effect of Trade Liberalization on Upstreamness/Downstreamness

Table VI.D
Dependent Variable: Upstreamness/Downstreamness Index

Sample:	All Countries	Low Income Countries	SSA
Liberalized	-0.109 ***	-0.084 **	0.015
	0.016	0.035	0.036
Liberalized	-0.088	-0.044	0.008
(Standardized Coefficients)			
Year fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Number of Observations	4351	1439	1286
R squared	0.786	0.801	0.816

Input Tariffs and Export Diversification.

Does the increased availability of imported inputs lead to export diversification and/or movements along supply chains?

Goldberg et al (2010) in the context of India's trade liberalization.

$$\text{Diversification}_{ict} = \text{Input Tariff}_{ict} + \mu_t + \delta_c + \theta_i + \epsilon_{ict}$$

$$\text{Upstreamness/Downstreamness Index}_{ict} = \text{Input Tariff}_{ict} + \mu_t + \delta_c + \theta_i + \epsilon_{ict}$$

Measuring Tariffs on Intermediate Inputs.

- Product-level tariff data from TRAINS.
- Input-Output Tables from Nicita and Olarreaga's TPP dataset (original source is GTAP).
- These IO tables are homogeneous across countries and correspond to the early 1990's.
- The availability of tariff data and input-output tables restricts the set of countries I consider.

Countries Considered

Argentina	Indonesia	Thailand
Bolivia	Mexico	Turkey
Chile	Morocco	Uruguay
China	Nepal	Venezuela
Colombia	Peru	South Africa
Ecuador	Philippines	
India	Sri Lanka	

Effect of Tariffs on Imported Intermediate Inputs on the Number of Exported Products and on the Upstreamness/Downstreamness of Exports.

Table VIIA

	Upstreamness/Downstreamness Index	Number of Exported Products
Input Tariff	-0.007***	-0.14**
	0.001	0.068
Input Tariff	-0.26	-0.07
(Standardized Coefficients)		
Year fixed effects	Yes	Yes
Country fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Number of Observations	731	732
R - squared	0.786	0.751

Conclusions.

- High concentration of exports in low income countries.
- Trade liberalization leads to increased diversification of exports and imports, and to movements downstream along supply chains.
- There is a link between access to imported intermediate inputs and export diversification.