Measuring Terms of Trade of Developing Countries

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Motivation

- Fluctuations in Terms of Trade (ToT) are one of the major sources of concern for policy makers, especially in Emerging Market and Developing Economies (EMDEs)
- Theoretical models predict that ToT shocks account for a large share of business cycle fluctuations (see, e.g., Mendoza, 1995)
- There is a renewed interest in understanding how important movements in ToT are for domestic business cycles of EMDEs (see, e.g., Fernández, Schmitt-Grohé and Uribe, 2017; Schmitt-Grohé and Uribe, 2018; Di Pace, Juvenal and Petrella, 2021)
- Are there trends of ToT for developing countries (i.e. Prebisch-Singer hypothesis)? And what are the drivers of ToT? (see, e.g., Grilli and Yang, 1988; Bidarkota and Crucini, 2000)

Measuring Terms of Trade

- **What is the definition of terms of trade?**

$$ToT = \frac{p^{x,\$}}{p^{m,\$}}$$

- ToT movements arise because of
  - A shift in $p^{x,\$}$
  - A shift in $p^{m,\$}$
  - A not perfectly offsetting movement in both
- So we may want to have separate figures for export and import prices

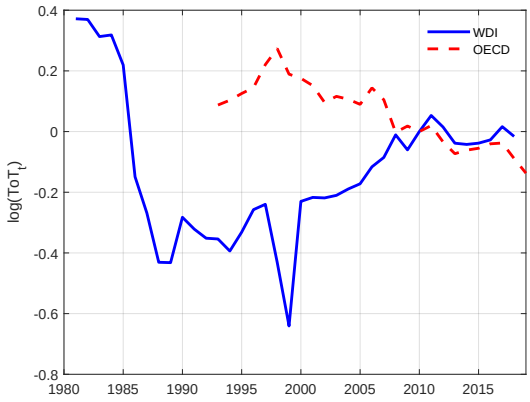
Existing Measures of ToT and their Limitations

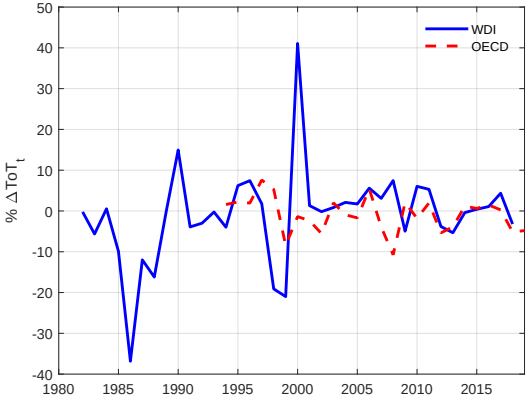
- The most popular measure of ToT comes for the Wold Bank World Development Indicators (WDI)
  - Based on unit values: are likely to contain biases originated in changes in the mix of heterogeneous products or incorrect recording of quantities (see Kravis and Lipsey, 1971; and Silver, 2009)
  - Official measures contain some trends which are difficult to explain: for example, the ToT for Sudan sourced from the WDI are constant for 18 years
- The OECD provides alternative measures of ToT only for a small selection of emerging countries

Terms of Trade: WDI vs. OECD statistics

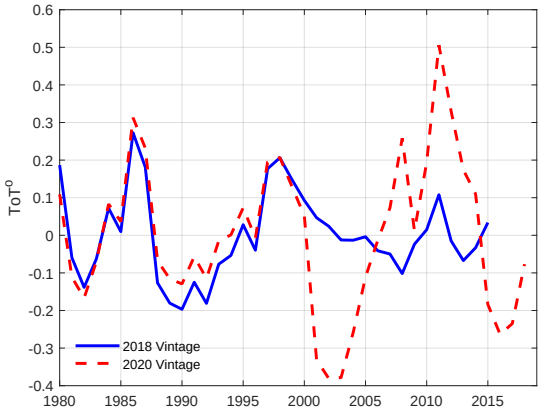
Example: Indonesia

For the countries in the two databases, the measures of ToT can be quite disparate

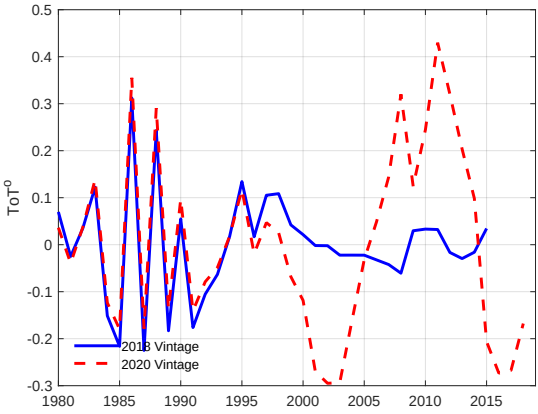




Data Revisions in WDI Measures of ToT



(a) Honduras



(b) Guatemala

Notes: The data have been quadratically detrended.

Export and Import Price Indices

- We construct our own measure of $P^{x,\$}$ and $P^{m,\$}$ using commodity and manufacturing prices matched with time-varying trade shares
- Following the indications of the IMF Export and Import Prices Manual we build $P^{x,\$}$ and $P^{m,\$}$ as

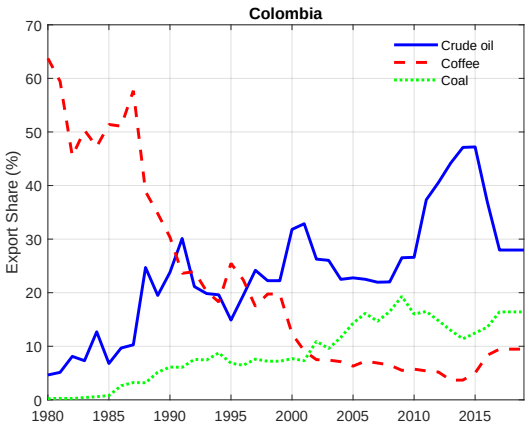
$$P^{0:t} = \prod_{\tau=1}^{t} \left[\sum_{j=1}^{No.Goods} \left(w_{j,\tau-1} \frac{P_{j,\tau}}{P_{j,\tau-1}} \right) \right]. \quad (1)$$

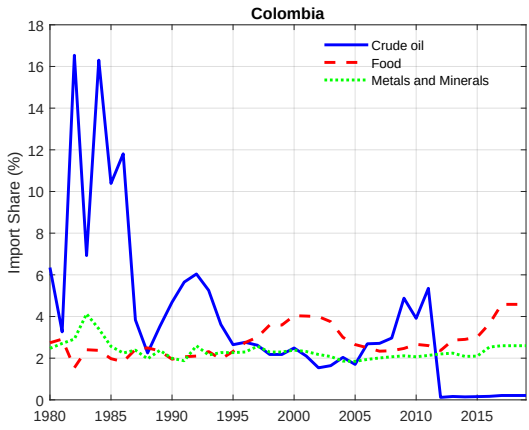
  - Trade shares: Sectoral export and import values (SITC Rev. 2) for 988 categories are matched with 62 commodity and industry classifications to recalculate export and import shares (MIT Atlas/COMTRADE)
  - Prices: 47 commodity sectors (World Bank) + 15 manufacturing categories (which we proxy using US PPI, from FRED)

- We focus on a sample of 38 emerging and low-income countries. The sample is annual and covers the period 1980-2019

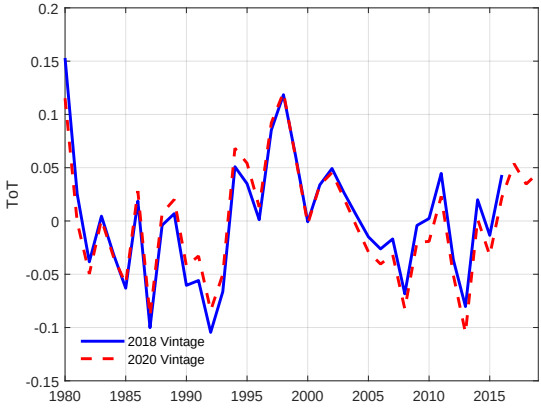
Export and Import Shares

- When constructing $P^{x,\$}$ and $P^{m,\$}$ we account for changing composition of exports and imports. This is important...





Data Revisions in our Measures of ToT



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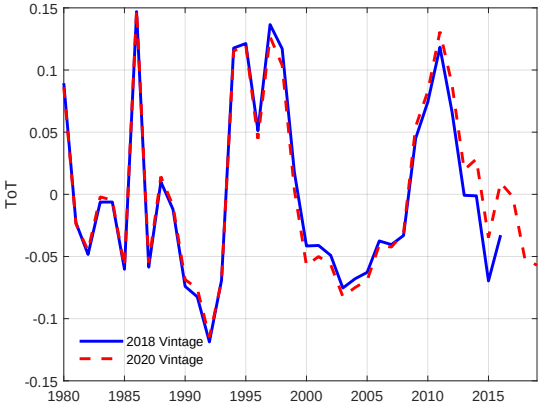
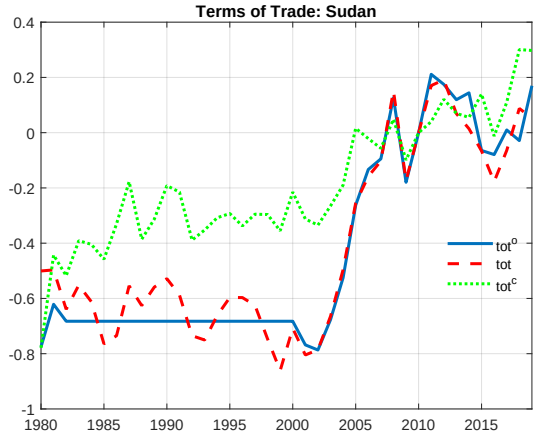
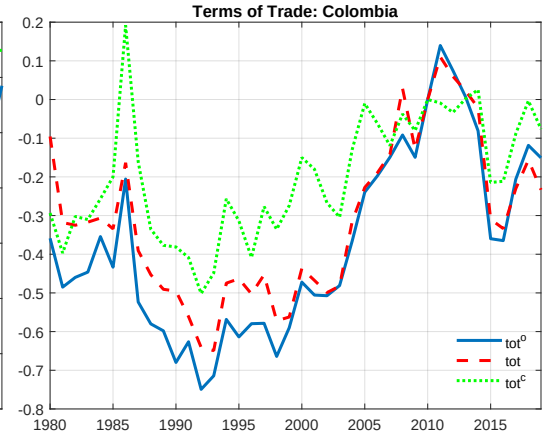


(b) Guatemala

Notes: The data have been quadratically detrended.

Terms of Trade Measures: A Comparison





Commodity Terms of Trade overstate the volatility of $p^{x,\$}$ and particularly of $p^{m,\$}$

Terms of Trade Measures: A Comparison

	Terms of Trade (our measure)			Terms of Trade (unit values)			Commodity Terms of Trade				
	$\sigma(ToT)$	$\rho_1(ToT)$	$Corr(ToT, y)$	$\sigma(ToT^o)$	$\rho_1(ToT^o)$	$Corr(ToT^o, y)$	$\sigma(ToT^c)$	$\rho_1(ToT^c)$	$Corr(ToT^c, y)$	$Corr(ToT, ToT^o)$	$Corr(ToT, ToT^c)$
Algeria	33.5	80.2	70.9	35.6	79.4	60.9	29.8	78.4	72.1	95.0	94.4
Argentina	10.5	73.9	59.1	10.5	53.5	63.5	7.4	52.0	-49.3	55.3	-37.1
Bangladesh	8.6	83.0	-3.6	10.2	70.4	-4.2	7.6	75.3	30.3	88.8	80.1
Bolivia	15.0	78.1	28.4	21.0	82.1	4.1	9.2	58.2	0.0	80.6	21.1
Brazil	5.2	67.0	64.9	10.1	51.8	41.0	10.7	68.2	-25.6	46.1	23.4
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South Africa	7.9	79.0	64.9	5.5	63.5	29.7	8.0	60.5	-45.8	74.9	9.5
Sudan	17.9	74.0	50.6	16.1	73.5	47.9	10.0	25.4	-15.0	90.4	48.8
Thailand	6.2	55.1	37.3	5.6	67.3	56.2	11.6	59.9	44.9	49.0	71.6
Turkey	4.8	72.7	-12.9	6.3	61.1	52.9	9.7	75.8	27.2	39.2	73.3
Uruguay	7.6	75.4	52.4	9.1	63.2	40.8	17.0	77.0	23.4	81.5	76.8
Median	9.0	69.7	17.9	13.6	67.9	17.5	11.1	61.4	2.9	61.7	71.5

Notes: σ denotes standard deviation, ρ_1 is the first order autocorrelation, and *Corr* indicates correlation. ToT, ToT^o and ToT^c represent our measure of terms of trade, the official one based on unit values, and the commodity terms of trade, respectively. All entries are in percentage terms and variables are calculated as the quadratically detrended logarithm of the original data to remove low frequency trends.

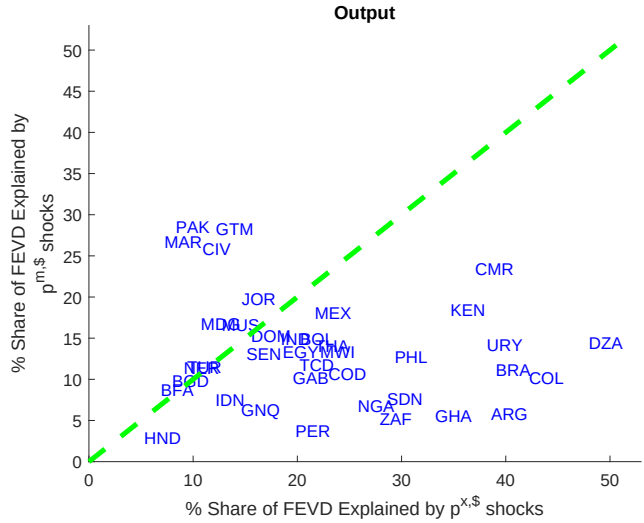
Export and Import Prices: Descriptive Statistics

	Export Prices			Import Prices			
	$\sigma(p^{x,\$})$	$\rho_1(p^{x,\$})$	$Corr(p^{x,\$}, y)$	$\sigma(p^{m,\$})$	$\rho_1(p^{m,\$})$	$Corr(p^{m,\$}, y)$	$Corr(p^{x,\$}, p^{m,\$})$
Algeria	36.2	79.1	68.7	6.5	74.7	17.9	49.9
Argentina	15.5	76.5	63.2	5.4	77.2	67.2	95.9
Bangladesh	3.3	59.2	-5.5	9.9	77.5	1.3	53.3
Bolivia	19.6	77.3	21.3	6.3	75.9	-1.3	80.3
Brazil	12.8	76.8	83.4	9.8	74.3	74.9	93.0
...							
South Africa	14.4	79.8	74.9	7.1	75.3	78.4	94.7
Sudan	22.8	74.0	56.5	6.4	61.4	59.7	82.4
Thailand	8.5	60.3	28.0	9.0	73.9	0.9	75.3
Turkey	6.7	63.7	0.9	9.0	76.1	7.5	85.1
Uruguay	10.8	75.7	48.3	11.0	78.5	11.2	75.8
Median	14.5	71.2	30.8	7.4	74.9	20.6	81.6

Notes: σ denotes standard deviation, ρ_1 is the first order autocorrelation, and *Corr* indicates correlation. All entries are in percentage terms and variables are calculated as the quadratically detrended logarithm of the original data to remove low frequency trends.

Terms-of-Trade Shocks are Not all Alike (DiPace, Juvenal & Petrella,2021)

How important are ToT fluctuations for EMDEs?



Summing up

- We put together a comprehensive database of ToT measures: includes aggregate prices for the broad basked of exports and imports as well as commodity exports and imports
- The price of exports and imports aggregate *transparently* existing (international) price indexes using country-specific trade weights
- The sample is annual (1980-2019) and covers 38 emerging and low-income countries

- **Extensions (for the future):**
  - We aim at extending the sample in terms of countries and time span
  - Try to construct similar measures at quarterly frequencies