Modeling & Forecasting the International Dimensions: Business cycles, exchange rates, and cross-border flows capital and trade flows

(Day 1 Afternoon)

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ISF at Darden School

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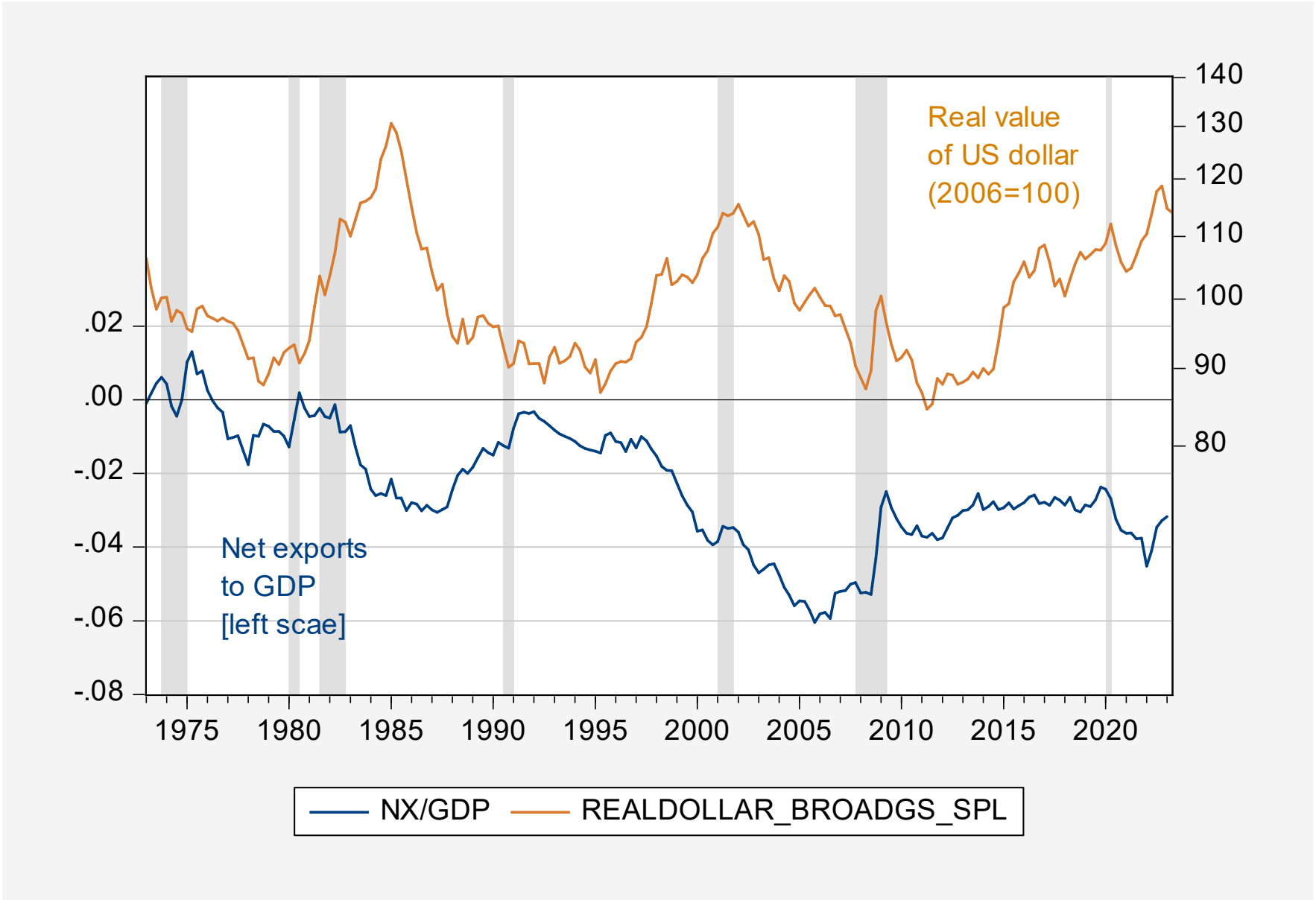
Trade Balances

Motivation


Real value
of US dollar
(2006=100)
Net exports
to GDP
[left scae]
140
130
120
110
100
90
80
.02
.00
-.02
-.04
-.06
-.08
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
NX/GDP
REALDOLLAR_BROADGS_SPL

The Debate

- Does Houthakker-Magee persist?
- Why are income elasticities increasing?
- Are price elasticities really low?
- How hard is it to explain trade flow dynamics in the last recession?
- What are the prospects for rebalancing?

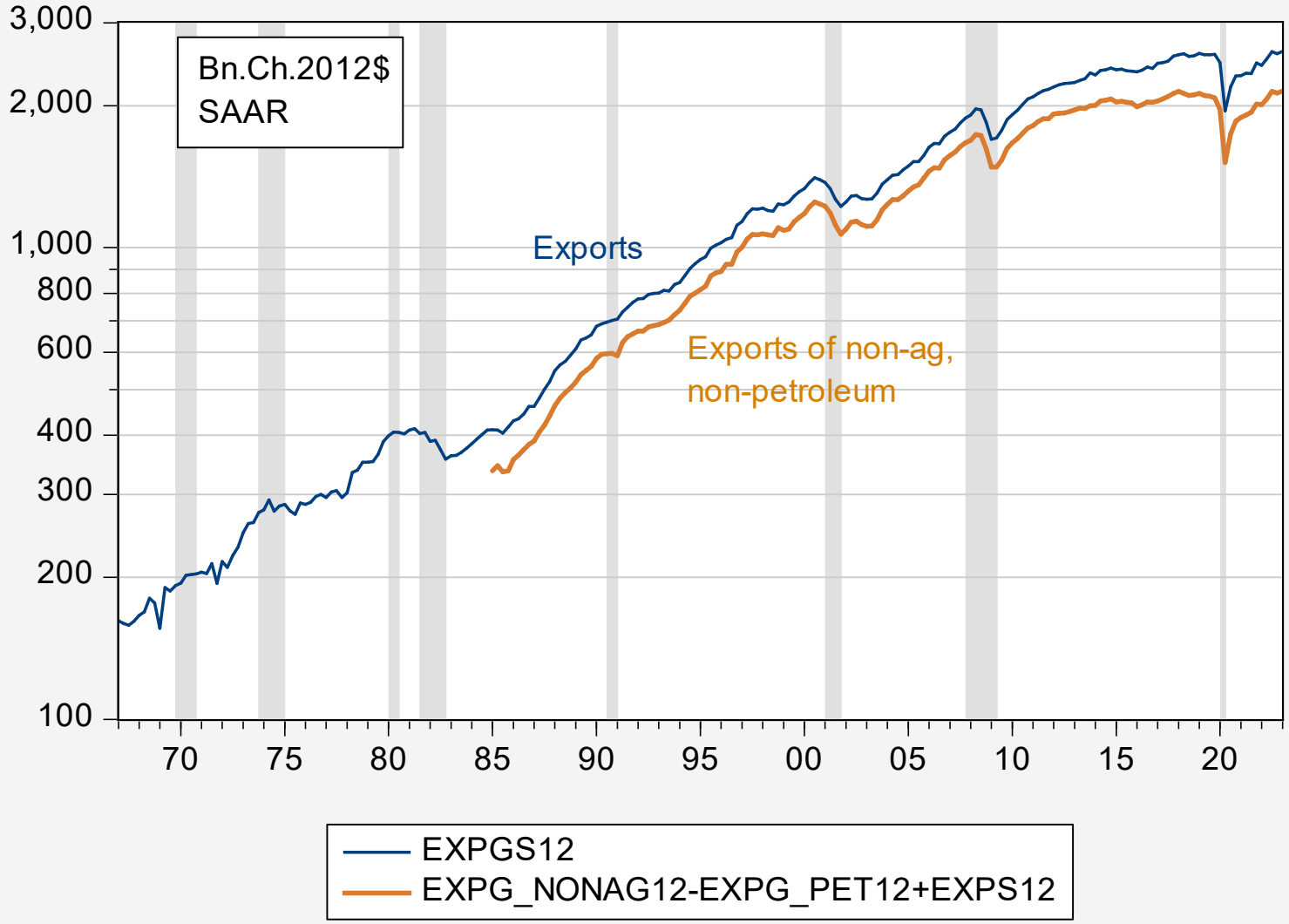
Outline

- Literature, recent and not so recent
- Theory
- Data
- Empirical methodology
- Basic results
- Supply side
- Vertical specialization, the dot com boom, etc.
- Conclusions

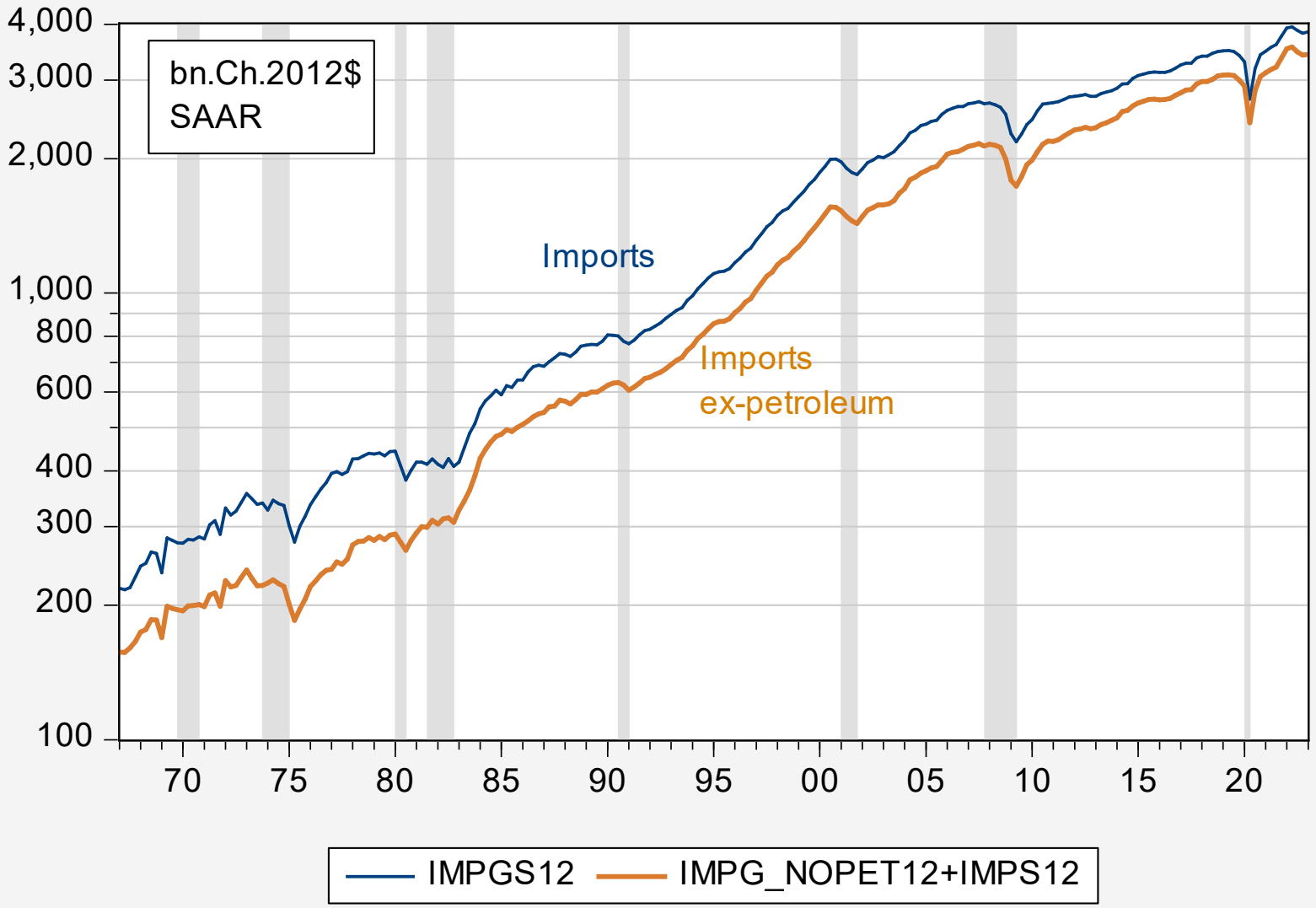
Literature

- Houthakker-Magee finds income elasticity asymmetry.
- Income elasticities are high!
- And rising!
- Price elasticities (wrt exchange rates) small for US imports.

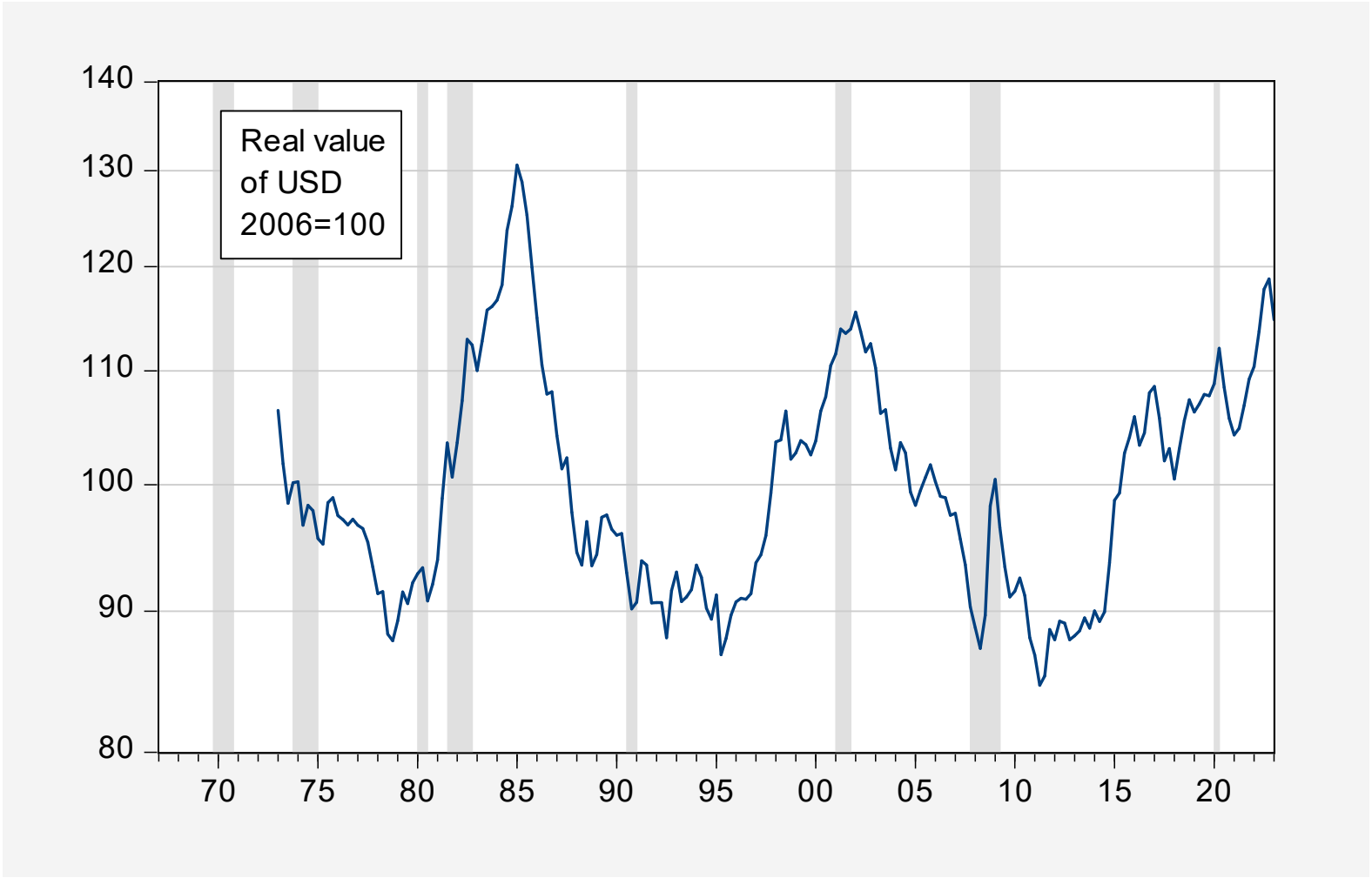
The data: US Exports



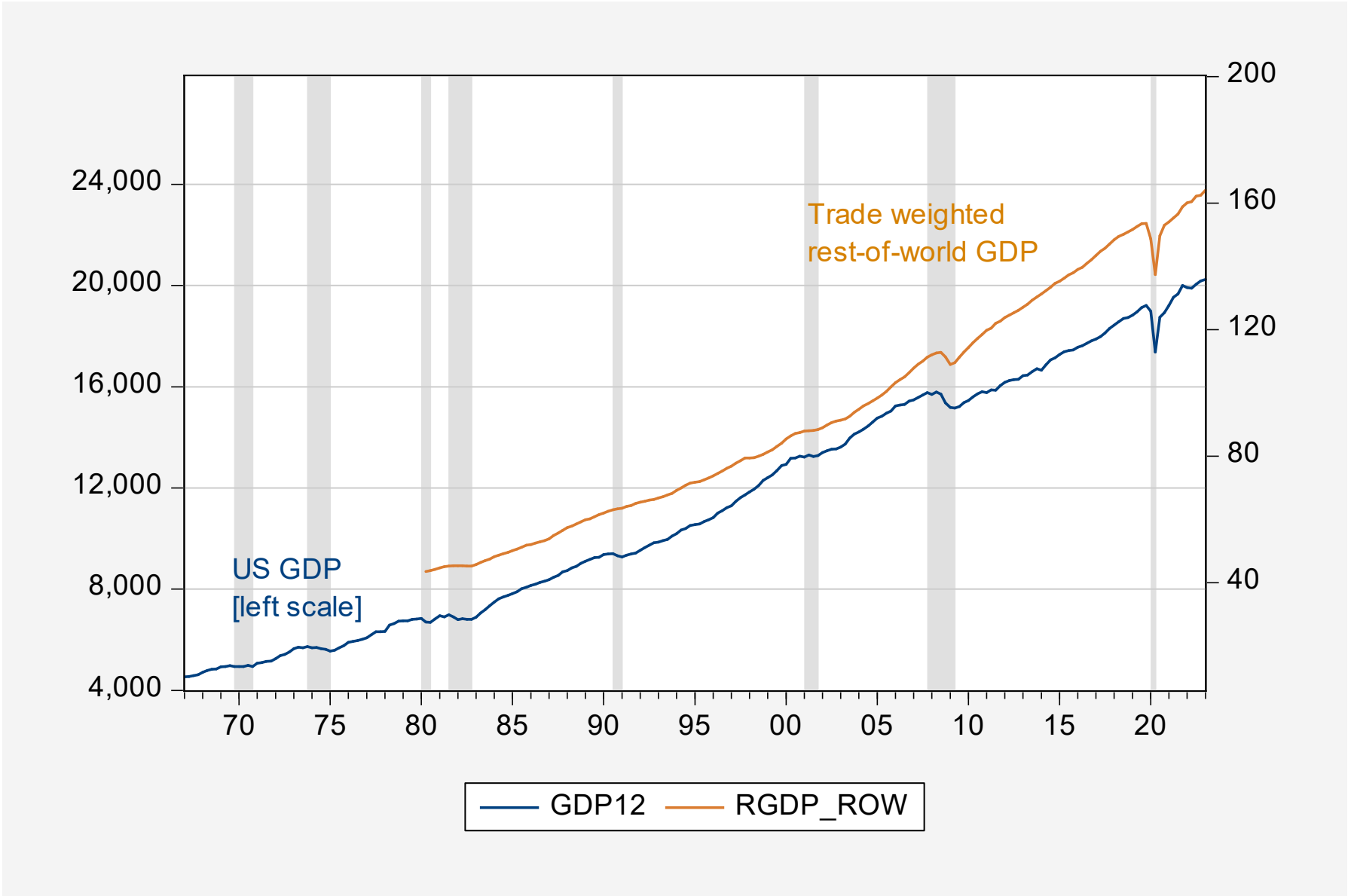
The Data: US Imports



Data: Real Exchange Rates



Data: GDP's


24,000
20,000
16,000
12,000
8,000
4,000
200
160
120
80
40
70
75
80
85
90
95
00
05
10
15
20
Trade weighted
rest-of-world GDP
US GDP
[left scale]
GDP12
RGDP_ROW

A (Partial Equilibrium) Theory

$$D_{im}^{US} = f_1^{US}(Y^{US}, \hat{P}_{im}^{US})$$

$$D_{im}^{RoW} = f_1^{RoW}(Y^{RoW}, \hat{P}_{im}^{RoW})$$

$$S_{ex}^{US} = f_2^{US}(\hat{P}_{ex}^{US}, Z^{US})$$

$$S_{ex}^{RoW} = f_2^{RoW}(\hat{P}_{ex}^{RoW}, Z^{RoW})$$

Quasi-Reduced Form Eqns.

$$\hat{P}_{im}^{US} \times P^{US} = E \times \hat{P}_{ex}^{RoW} \times P^{RoW} \Rightarrow \hat{P}_{im}^{US} = Q\hat{P}_{ex}^{RoW}$$

$$Q = \frac{EP^{RoW}}{P^{US}}$$

$$im_t = \beta_0 + \beta_1 q_t + \beta_2 y_t^{US} + \beta_3 z^{RoW} + \varepsilon_{2t}$$

$$ex_t = \delta_0 + \delta_1 q_t + \delta_2 y_t^{RoW} + \delta_3 z^{US} + \varepsilon_{1t}$$

Exports: Cointegrating Relation

Date: 06/23/23 Time: 22:50
Sample (adjusted): 1986Q2 2023Q1
Included observations: 148 after adjustments
Trend assumption: Linear deterministic trend
Series: LOG(EXPG12-EXPG_PET12+EXPS12) LOG(RGDP_ROW) LOG...
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.131151	29.39298	29.79707	0.0556
At most 1	0.056209	8.586204	15.49471	0.4050
At most 2	0.000164	0.024311	3.841465	0.8760

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.131151	20.80678	21.13162	0.0554
At most 1	0.056209	8.561893	14.26460	0.3244
At most 2	0.000164	0.024311	3.841465	0.8760

Max-eigenvalue test indicates no cointegration at the 0.05 level
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**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LOG(EXPG1...	LOG(RGDP...	LOG(REALDOLLAR_BROADGS_SPL)
6.029977	-5.851196	9.382184
0.512874	0.628854	-11.94959
-8.083335	13.56749	-2.731407

Unrestricted Adjustment Coefficients (alpha):

D(LOG(EXP...	-0.007434	-0.000437	-0.000277
D(LOG(RGD...	-0.000934	-0.000288	-0.000130
D(LOG(REA...	0.001989	0.005001	1.82E-05

1 Cointegrating Equation(s): Log likelihood 1251.557

Normalized cointegrating coefficients (standard error in parentheses)

LOG(EXPG1...	LOG(RGDP...	LOG(REALDOLLAR_BROADGS_SPL)
1.000000	-0.970351	1.555924
	(0.13577)	(0.50383)

Adjustment coefficients (standard error in parentheses)

D(LOG(EXP...	-0.044824
	(0.01507)
D(LOG(RGD...	-0.005632
	(0.00547)
D(LOG(REA...	0.011991
	(0.01133)

Imports: Cointegrating Relation (?)

Date: 06/23/23 Time: 22:53
Sample (adjusted): 1974Q2 2023Q1
Included observations: 196 after adjustments
Trend assumption: Linear deterministic trend
Series: LOG(IMPG_NOPET12+IMPS12) LOG(GDP12) LOG(REALDOLL...
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.072597	21.55735	29.79707	0.3238
At most 1	0.028487	6.785487	15.49471	0.6027
At most 2	0.005703	1.120907	3.841465	0.2897

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Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.072597	14.77186	21.13162	0.3052
At most 1	0.028487	5.664581	14.26460	0.6566
At most 2	0.005703	1.120907	3.841465	0.2897

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**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LOG(IMPG_...	LOG(GDP12)	LOG(REALDOLLAR_BROADGS_SPL)
16.89836	-39.16416	3.924291
15.21119	-33.96125	-11.47680
0.446380	1.426431	3.817883

Unrestricted Adjustment Coefficients (alpha):

D(LOG(IMP...	-0.001079	-0.003751	-0.001501
D(LOG(GDP...	0.001239	-0.000629	-0.000710
D(LOG(REA...	-0.004081	0.002349	-0.000626

1 Cointegrating Equation(s): Log likelihood 1572.968

Normalized cointegrating coefficients (standard error in parentheses)

LOG(IMPG_...	LOG(GDP12)	LOG(REALDOLLAR_BROADGS_SPL)
1.000000	-2.317631	0.232229
	(0.04117)	(0.18533)

Adjustment coefficients (standard error in parentheses)

D(LOG(IMP...	-0.018229
	(0.03766)
D(LOG(GDP...	0.020938
	(0.01383)
D(LOG(REA...	-0.068969
	(0.02731)

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Previous “Fixes”

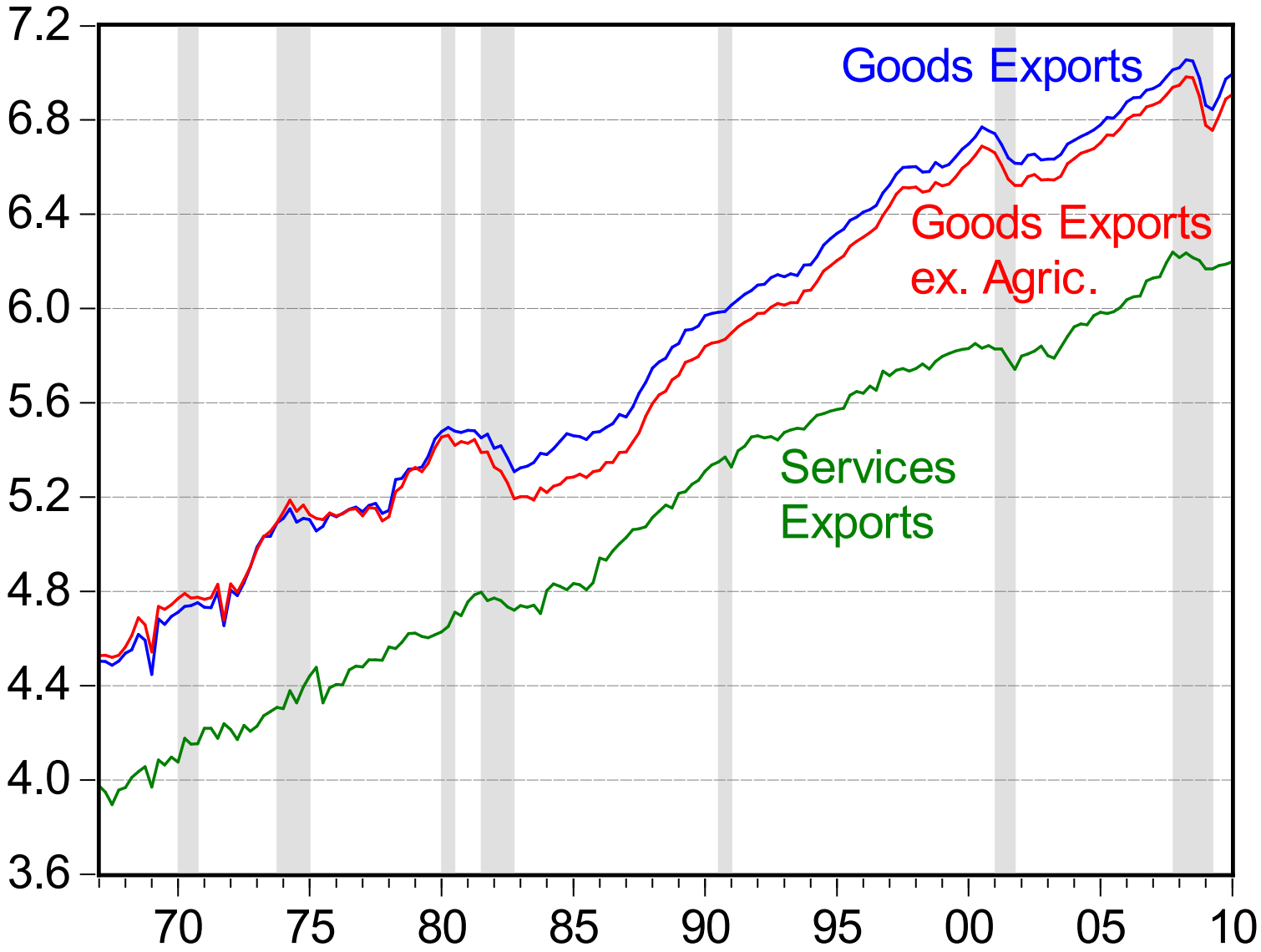
- Disaggregation
- Supply factors
- Tariffs/Vertical Specialization

Estimates from a Standard Model

Table 1: Estimates of Export and Import Elasticities, 1975q1-2010q1

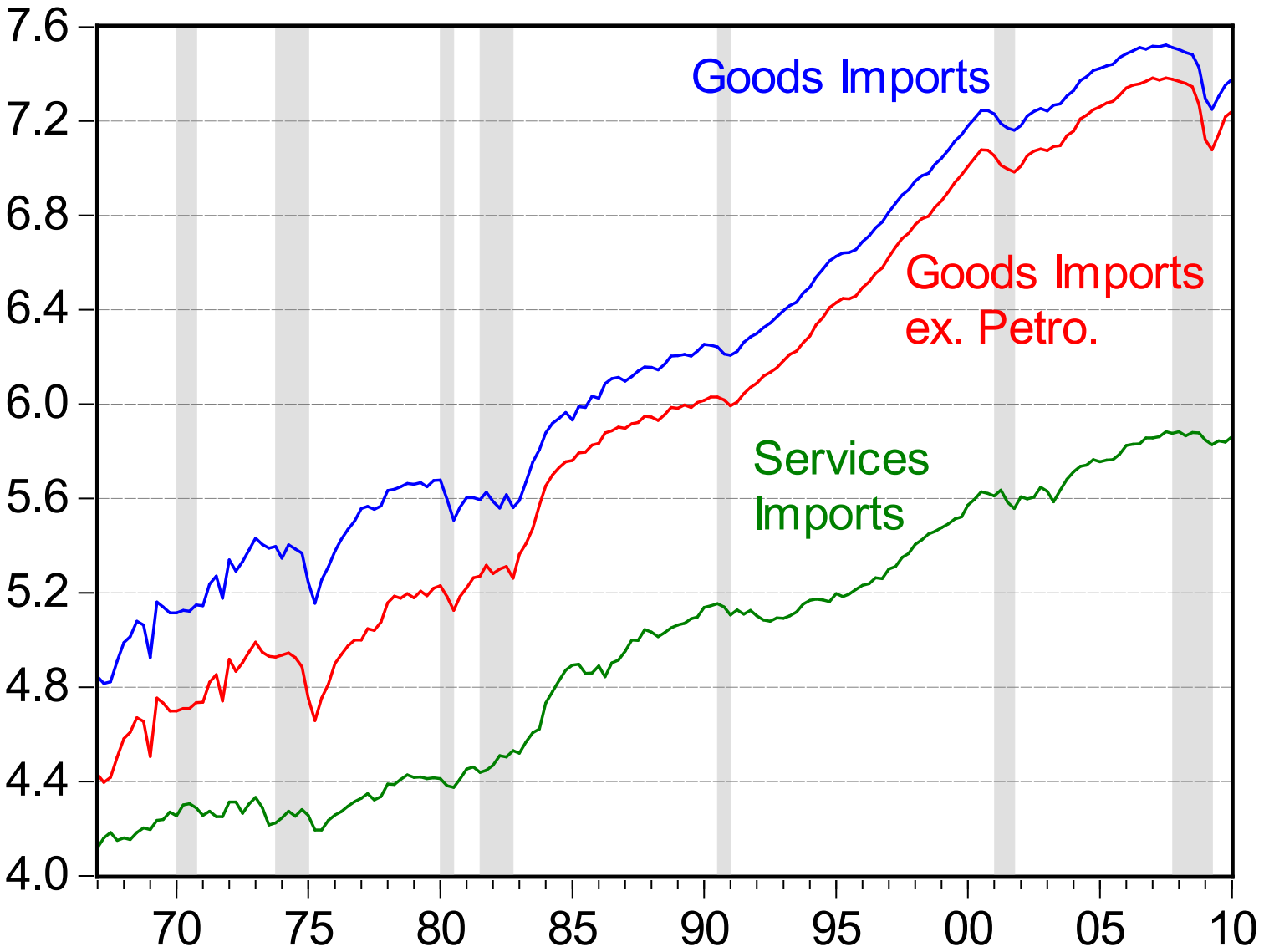
	Exports of Goods and Services				Imports of Goods and Services			
	OLS	DOLS[a/]	ECM[b/]	VECM	OLS	DOLS[a/]	ECM[b/]	VECM
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Income (Demand)	**1.780**	**1.811**	**1.820**	**1.991**	**2.174**	**2.190**	**2.171**	**2.222**
	[0.032]	**[0.031]**	**[0.056]**	**[0.042]**	**[0.036]**	**[0.028]**	**[0.052]**	**[0.035]**
Exchange rate	**0.435**	**0.568**	**0.944**	**0.947**	**-0.197**	-0.151	**-0.308**	**-0.163**
	[0.094]	**[0.095]**	**[0.259]**	**[0.166]**	**[0.074]**	[0.086]	**[0.200]**	**[0.126]**
Adj. R2	0.99	0.99	0.37	Na	0.99	0.99	0.41	Na
SER	0.066	0.052	0.019	Na	0.055	0.047	0.024	Na
N	140	138	141	141	141	139	141	141
Coint. Vectors	Na	na	1	1,1	na	na	1	1,1

Exports



Source: BEA, 2010q1 2nd release; in billions Ch.2005$, SAAR, in logs

Imports

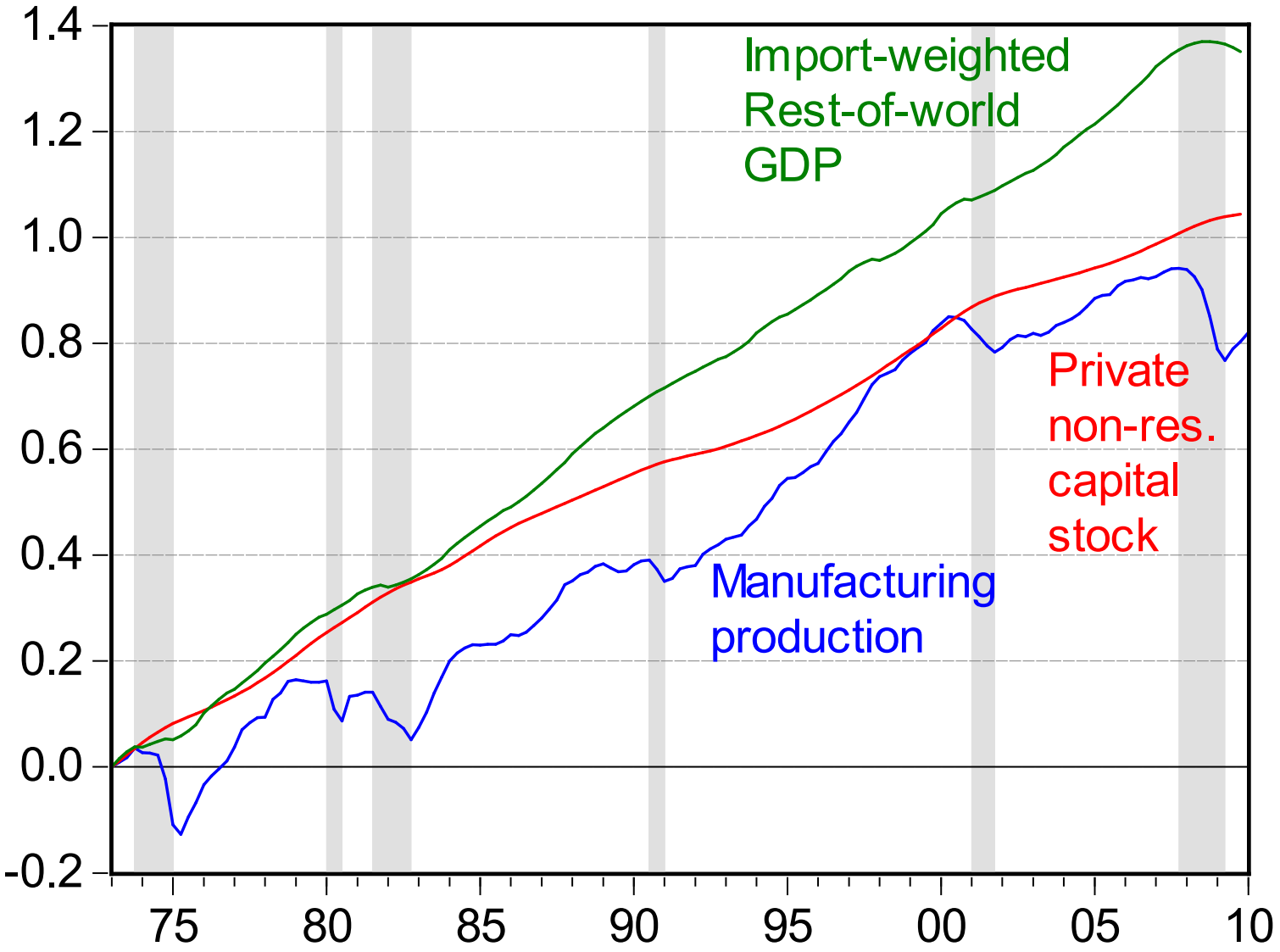

7.6
7.2
6.8
6.4
6.0
5.6
5.2
4.8
4.4
4.0
70
75
80
85
90
95
00
05
10
Goods Imports
Goods Imports
ex. Petro.
Services
Imports

Imports

Table 3: Import Equations, 1975q1-2010q1

	Total goods & svcs. [1]	Total goods & svcs. [2]	Total goods [3]	Total goods [4]	Total goods ex oil [5]	Total goods ex oil [6]	Total svcs. [7]	Total svcs. [8]
Income (Demand)	**2.190**	**2.891**	**2.306**	**3.221**	**2.612**	**2.537**	**1.650**	**1.219**
	[0.028]	**[0.337]**	**[0.035]**	**[0.434]**	**[0.017]**	**[0.332]**	**[0.029]**	**[0.404]**
Exchange Rate	**-0.151**	**-0.138**	-0.120	-0.103	**-0.445**	**-0.446**	**-0.289**	**-0.296**
	[0.086]	**[0.067]**	[0.116]	[0.094]	**[0.075]**	**[0.075]**	**[0.110]**	**[0.106]**
time		**-0.005**		**-0.007**		0.001		0.003
		[0.003]		**[0.003]**		[0.003]		[0.003]
Adj. R2	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
SER	0.047	0.045	0.061	0.059	0.038	0.038	0.056	0.056
N	139	139	139	139	139	139	139	139

Supply Capacity

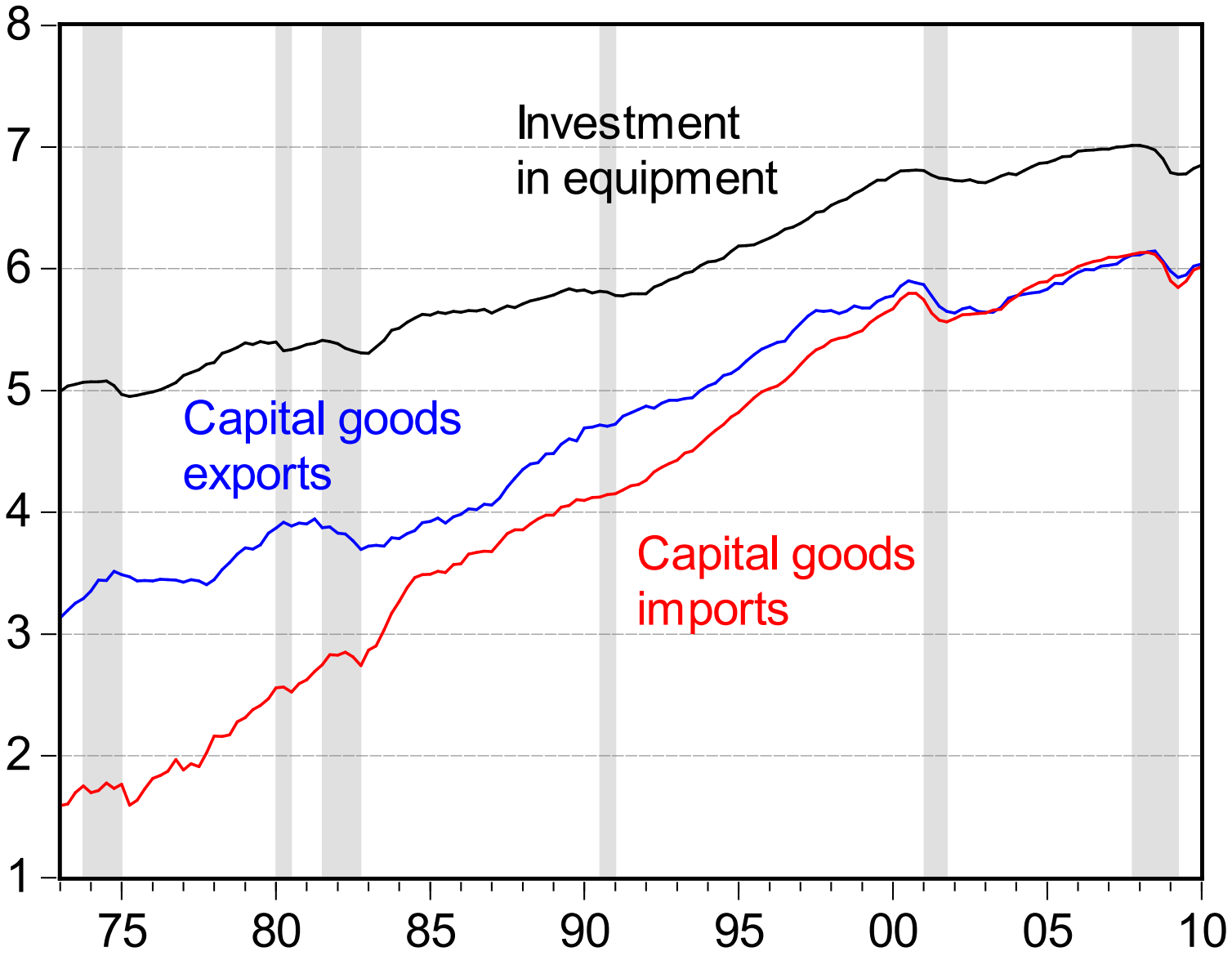


Incorporating Supply Capacity

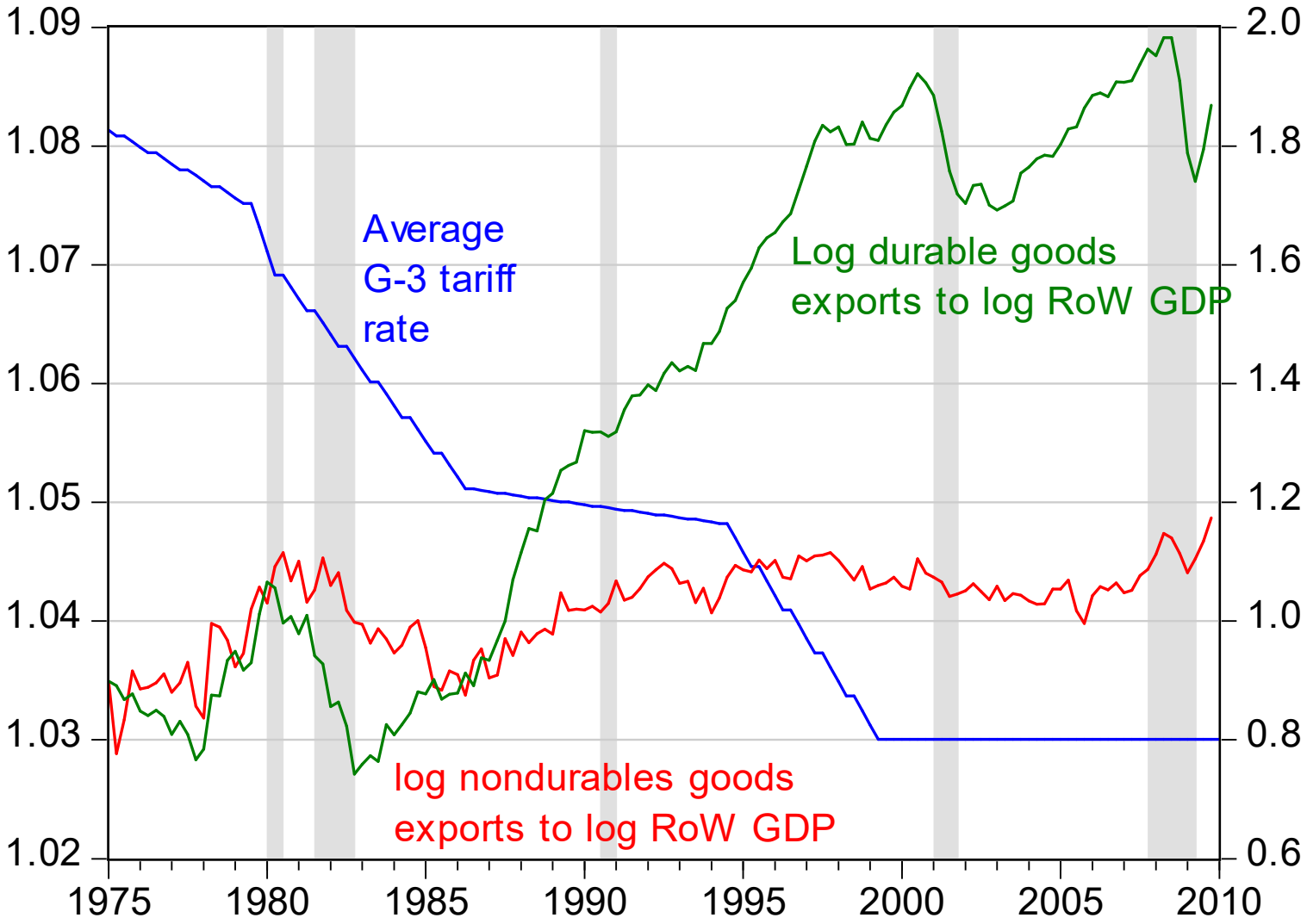
Table 4: Supply Augmented Specifications, 1975q1-2010q1

	Exports				Imports			
	Total goods, supply side	Total goods, supply side	Total goods, ex. Agric., Supply side	Total goods, ex. Agric., Supply side	Total goods supply side	Total goods supply side	Total goods ex Oil, supply side	Total goods ex Oil, supply side
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Income (Demand)	**0.890**	**2.451**	0.193	-0.111	**4.073**	**3.707**	**2.213**	**2.251**
	[0.184]	**[0.787]**	[0.178]	[4.012]	**[0.308]**	**[0.267]**	**[0.312]**	**[0.323]**
Output (Supply)	**1.048**	**0.977**	**1.766**	**1.789**	**-1.416**	**-4.711**	0.328	0.672
	[0.186]	**[0.177]**	**[0.178]**	**[0.198]**	**[0.261]**	**[0.783]**	[0.248]	[0.598]
Exchange Rate	**0.711**	**0.575**	**1.026**	**1.052**	0.049	**0.386**	**-0.477**	**-0.508**
	[0.080]	**[0.101]**	**[0.073]**	**[0.117]**	[0.077]	**[0.094]**	**[0.081]**	**[0.094]**
time		**-0.013**		0.002		**0.034**		0.006
		[0.016]		[0.007]		**[0.008]**		[0.006]
Adj. R2	0.99	0.99	0.99	0.99	.99	.99	0.99	0.99
SER	0.044	0.042	0.048	0.048	0.052	0.039	0.037	0.037
N	138	138	138	138	138	138	138	138

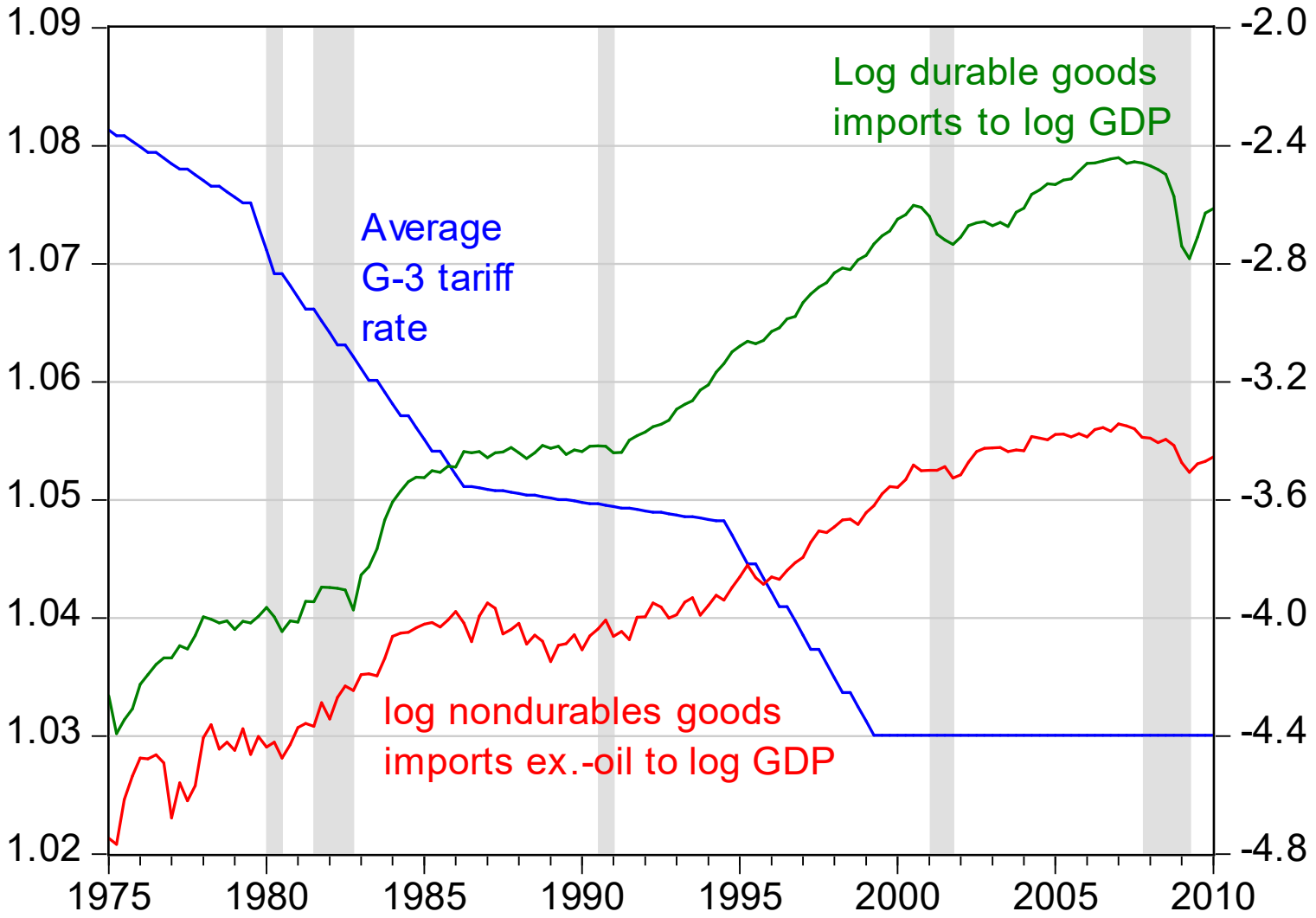
Capital Goods and VS



Durable Exports and Tariffs



Durable Imports and Tariffs



Vertical Specialization: Imports

	Imports of goods ex oil	Imports of goods ex Oil	Imports of goods ex Oil, ex Capital goods	Imports of Durable goods	Imports of Non-durable goods	Imports of Capital goods
	[7]	[8]	[9]	[10]	[11]	[11]
Income (Demand)	**2.213**	**0.903**	**1.736**	**1.047**	**2.836**	-0.618
	[0.312]	**[0.448]**	**[0.386]**	**[0.586]**	**[0.632]**	[0.880]
Income (Supply)	0.328	**1.033**	0.206	**0.988**	-0.703	**2.842**
	[0.248]	**[0.330]**	[0.270]	**[0.433]**	[0.457]	**[0.652]**
Exchange Rate	**-0.477**	**-0.428**	**-0.560**	**-0.365**	0.040	-0.084
	[0.081]	**[0.104]**	**[0.088]**	**[0.131]**	[0.163]	[0.192]
Tariff rate		**-208.65**	-88.78	**-192.75**	**-525.44**	240.18
		[86.02]	[71.70]	**[111.19]**	**[129.59]**	[166.65]
Tariff rate (sq.)		**95.48**	42.18	-86.55	**253.60**	**-128.09**
		[39.84]	[32.91]	[51.16]	**[60.53]**	**[77.68]**
Transport cost		-0.030	**0.032**	-0.031	-0.010	**-0.199**
		[0.021]	**[0.016]**	[0.027]	[0.025]	**[0.039]**
Adj. R2	0.99	0.99	0.99	0.99	0.99	0.99
SER	0.037	0.033	0.027	0.042	0.039	0.061
N	138	138	138	138	138	138

Summary

- Houthakker-Magee lives on.
- The income asymmetry is less marked in the disaggregated series.
- Disaggregated price elasticities are higher especially for US imports.
- Inclusion of proxy measures for supply capacity reduces the implied income elasticities
- Durable/Capital goods behave differently than nondurable – perhaps due to VS.

Global Imbalances

Interpreted as Current Account Imbalances

- Global imbalances could be of as asset/liabilities
- Latter makes more sense since large valuation effects
- IMF current reports both CA and gross position imbalances (See IMF World Economic Outlook)

Current Account Prospects

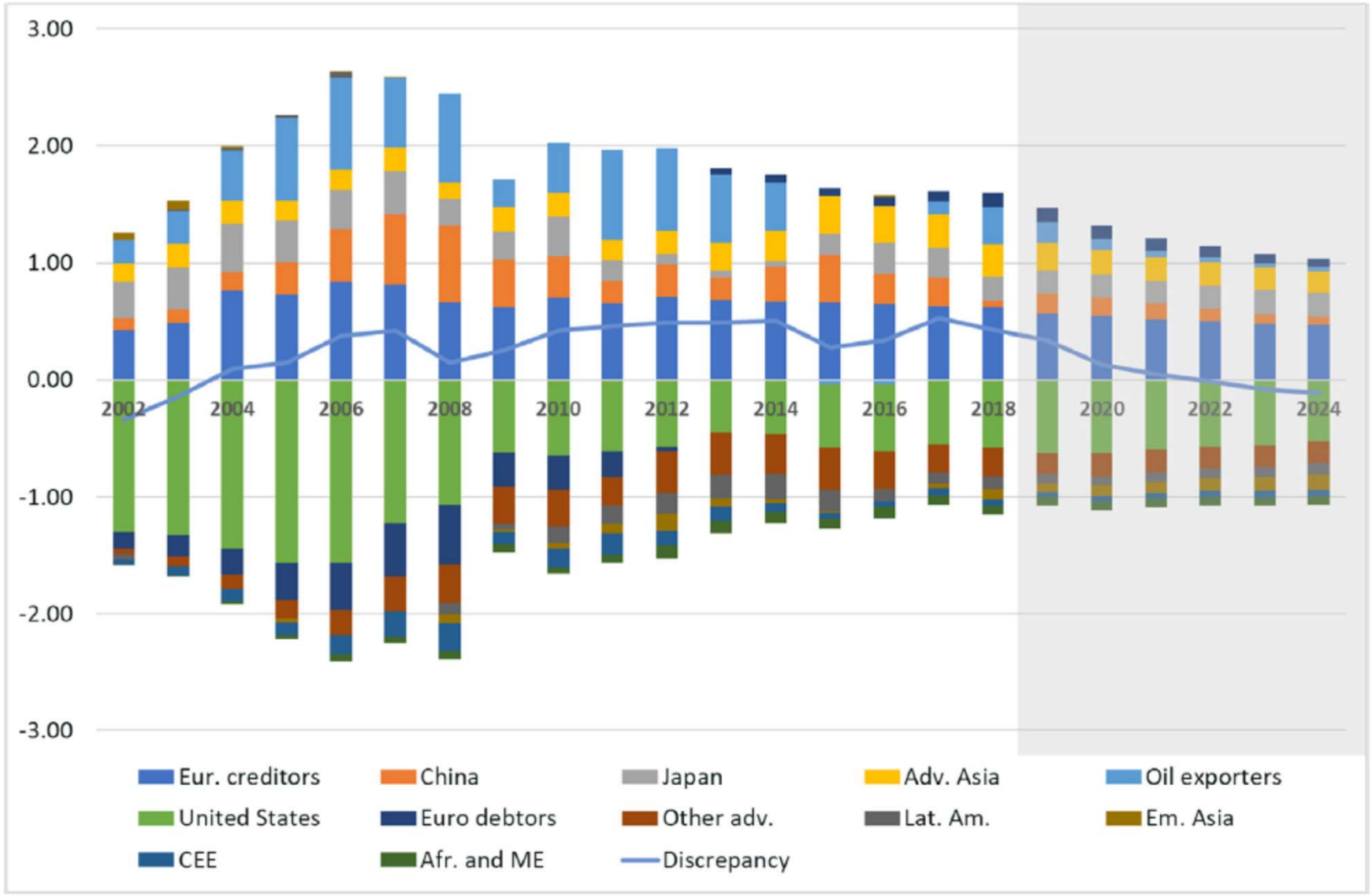


Fig. 1. Global Current Balances for Select Country Aggregates. Source: IMF, WEO, October 2019.

Chinn, Ito (JIMF, 2021)

Saving-Inv't based CA Imbalances

- Recount the Chinn-Prasad (2003), expanded to Chinn-Ito framework
- Re-examine institutional prism of Chinn-Ito (various)
- Allow for "Exorbitant Privilege"

Theories of the current account

- Basic approach, focusing on determinants of national saving and investment (demographics, public sector)
- Intertemporal approach (expectations of growth)
- Mercantilism
- Global saving glut/financial development and Bretton Woods II

Framework

- Basic approach uses National Saving Identity

$$C + S + T \equiv Y$$

$$C + I + G + CA \equiv Y$$

$$S + T \equiv I + G + CA$$

$$(S - I) + (T - G) \equiv CA$$

Assume causality runs from S, I, (T-G) to CA in "medium run"

The empirical approach

- Macro variables: Budget balance, initial NFA, per capita income, per capita income squared, income growth, TOT variability
- Demographics: youth, elderly dependency ratios.
- Structural/Policy: Trade, capital acct openness (Chinn-Ito)
- Financial deepening, institutional measures (LEGAL)

The empirical model

$$
\begin{aligned}
y_{i,t} = \alpha &+ \beta_1 BB_{i,t} \\
&+ \beta_2 FD_{i,t} + \beta_3 LEGAL_i + \beta_3 KAOPEN_{i,t} \\
&+ \beta_4 \left(FD_{i,t} \times LEGAL_{i,t} \right) + \beta_5 \left(LEGAL_{i,t} \times KAOPEN_{i,t} \right) + \beta_6 \left(KAOPEN_{i,t} \times FD_{i,t} \right) \\
&+ X_{i,t} \Gamma + u_{i,t} \ . \qquad (2)
\end{aligned}
$$

Dependent variables (y) = the CA balance, national saving, and investment

The empirical approach

- Data span 1973-2018, incl. IDCs and EMs and LDCs
- Use five year panels
- Data from *World Development Indicators*, *International Financial Statistics*, *World Economic Outlook* database, ICRG, IMF *AREAER*

Measures of Financial Development & Openness, Legal Development

- LEGAL = first principle component of Law and Order, Corruption and Bureaucratic Quality (Sourced from ICRG).
- KAOPEN = Chinn-Ito index, based upon the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAER)

Measures of Financial Development & Openness, Legal Development

- **FD**: Financial development

  - Private credit to GDP

  - In Ito and Chinn (2009), we try alternative measures (incl stock market size, trading volume, bond market)

  - IMF financial development index based on market, institutional development

Conclusions in Earlier Studies

- Current account is tracked by the model
- Level of CA for certain countries are not well explained (US, China), but changes are
- Fiscal consolidation in the US is not enough to close balance CA
- Financial development in China is not enough to close the balance
- Much of 2006-08 imbalances are unexplained

Basic Model (Chinn & Ito (*JIMF*, 2021))

Table 1
The Basic Model.

	FULL	IDC	LDC	EMG
	(1)	(2)	(3)	(4)
Gov't budget balance	0.481	0.422	0.499	0.277
	(0.061)***	(0.089)***	(0.069)***	(0.066)***
NFA (initial cond.)	0.027	0.015	0.028	−0.001
	(0.008)***	(0.009)*	(0.009)***	(0.004)
Relative income	0.050	0.051	0.045	0.190
	(0.015)***	(0.021)**	(0.022)**	(0.024)***
Relative income squared	−0.005	−0.015	−0.004	0.092
	(0.003)	(0.032)	(0.004)	(0.031)***
Relative dependency ratio (young)	−0.017	−0.037	−0.022	−0.030
	(0.010)*	(0.020)*	(0.013)*	(0.013)**
Relative dependency ratio (old)	−0.002	0.028	−0.005	−0.046
	(0.008)	(0.018)	(0.008)	(0.012)***
Fin Dev. - PCGDP	−0.004	0.001	0.003	0.009
	(0.007)	(0.009)	(0.011)	(0.010)
TOT volatility	0.075	−0.143	0.076	0.109
	(0.045)*	(0.143)	(0.048)	(0.075)
output growth, 5-yr avg	−0.276	0.086	−0.277	0.114
	(0.154)*	(0.222)	(0.154)*	(0.094)
Trade Openness	−0.015	0.020	−0.025	−0.015
	(0.006)***	(0.009)**	(0.008)***	(0.008)**
oil exporting countries	0.037		0.037	0.044
	(0.010)***		(0.011)***	(0.015)***
N	1,107	201	906	321
Adj. R2	0.39	0.44	0.38	0.47

Basic Model (Chinn & Ito (*JIMF*, 2021))

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	FULL	IDC	LDC	EMG
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The “Savings Glut”, Financial Development and Institutions

- Bernanke model suggests saving directed to US because of lack of property rights, institutions in emerging market economies.
- One can use proxy measures for financial development, and institutional development
- Financial development proxy measures are imperfect
- Institutional development proxy measures are subjective, and (mostly) time invariant

With Inst. Variables (Chinn & Ito (2021))

Table 2
Basic Model Augmented with Saving Glut Variables.

	FULL	IDC	LDC	EMG
	(1)	(2)	(3)	(4)
Gov't budget balance	0.483	0.339	0.507	0.291
	(0.055)***	(0.086)***	(0.064)***	(0.062)***
NFA (initial cond.)	0.035	0.016	0.034	0.033
	(0.004)***	(0.014)	(0.004)***	(0.006)***
Relative income	0.024	0.030	0.024	0.108
	(0.013)*	(0.028)	(0.014)*	(0.025)***
Relative income squared	−0.000	0.089	−0.000	0.039
	(0.002)	(0.071)	(0.003)	(0.026)
Relative dependency ratio (young)	−0.016	−0.063	−0.017	−0.011
	(0.010)*	(0.025)**	(0.012)	(0.012)
Relative dependency ratio (old)	0.004	0.032	0.003	−0.026
	(0.006)	(0.018)*	(0.007)	(0.012)**
Fin Dev. – PCGDP	0.002	0.004	0.028	−0.004
	(0.007)	(0.011)	(0.014)**	(0.019)
Legal	0.004	0.013	0.009	0.010
	(0.003)	(0.006)**	(0.005)*	(0.011)
pcgdp × legal	0.001	−0.018	0.009	0.002
	(0.003)	(0.013)	(0.004)**	(0.013)
Financial Openness (KAOPEN)	−0.002	−0.003	−0.001	−0.008
	(0.003)	(0.004)	(0.005)	(0.007)
KAOPEN × legal	0.001	0.011	0.000	0.002
	(0.001)	(0.004)***	(0.002)	(0.002)
KAOPEN × pcgdp	−0.001	0.014	0.001	−0.011
	(0.003)	(0.007)**	(0.004)	(0.007)
TOT volatility	0.078	−0.086	0.077	0.257
	(0.047)*	(0.145)	(0.049)	(0.077)***
output growth, 5-yr avg	−0.054	0.155	−0.070	0.032
	(0.090)	(0.199)	(0.095)	(0.088)
Trade Openness	−0.007	0.012	−0.020	−0.008
	(0.005)	(0.009)	(0.009)**	(0.010)
oil exporting countries	0.027		0.030	0.027
	(0.011)**		(0.011)***	(0.015)*
N	912	193	719	316
Adj. R2	0.49	0.47	0.49	0.53

With Inst. Variables (Chinn & Ito (2021))

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Basic Model Augmented with Saving Glut Variables.

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	(0.055)***	(0.086)***	(0.064)***	(0.062)***
NFA (initial cond.)	0.035	0.016	0.034	0.033
	(0.004)***	(0.014)	(0.004)***	(0.006)***
Relative income	0.024	0.030	0.024	0.108
	(0.013)*	(0.028)	(0.014)*	(0.025)***
Relative income squared	−0.000	0.089	−0.000	0.039
	(0.002)	(0.071)	(0.003)	(0.026)
Relative dependency ratio (young)	−0.016	−0.063	−0.017	−0.011
	(0.010)*	(0.025)**	(0.012)	(0.012)
Relative dependency ratio (old)	0.004	0.032	0.003	−0.026
	(0.006)	(0.018)*	(0.007)	(0.012)**
Fin Dev. – PCGDP	0.002	0.004	0.028	−0.004
	(0.007)	(0.011)	(0.014)**	(0.019)
Legal	0.004	0.013	0.009	0.010
	(0.003)	(0.006)**	(0.005)*	(0.011)
pcgdp × legal	0.001	−0.018	0.009	0.002
	(0.003)	(0.013)	(0.004)**	(0.013)
Financial Openness (KAOPEN)	−0.002	−0.003	−0.001	−0.008
	(0.003)	(0.004)	(0.005)	(0.007)
KAOPEN × legal	0.001	0.011	0.000	0.002
	(0.001)	(0.004)***	(0.002)	(0.002)
KAOPEN × pcgdp	−0.001	0.014	0.001	−0.011
	(0.003)	(0.007)**	(0.004)	(0.007)
TOT volatility	0.078	−0.086	0.077	0.257
	(0.047)*	(0.145)	(0.049)	(0.077)***
output growth, 5-yr avg	−0.054	0.155	−0.070	0.032
	(0.090)	(0.199)	(0.095)	(0.088)
Trade Openness	−0.007	0.012	−0.020	−0.008
	(0.005)	(0.009)	(0.009)**	(0.010)
oil exporting countries	0.027		0.030	0.027
	(0.011)**		(0.011)***	(0.015)*
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What about Exorbitant Privilege?

- US current account is flip side of US financial account.
- US can borrow more cheaply because of dollar hegemony
- I.e., USD is the key international currency
- Suggests country fixed effect for US
- Models will not say where effect comes from

Are Savings, Investment Exogenous?

- Gagnon suggests Foreign Exchange intervention can affect current account
- FX intervention should impact saving, investment decisions as well.

With Forex Intervention

Table 3
Basic OLS Model Augmented with Net Official Flows.

	FULL	IDC	LDC	EMG
	(1)	(2)	(3)	(4)
Gov't budget balance	0.415	0.328	0.445	0.282
	(0.059)***	(0.096)***	(0.069)***	(0.068)***
NFA (initial cond.)	0.031	0.008	0.029	0.031
	(0.004)***	(0.015)	(0.003)***	(0.006)***
Relative income	0.039	0.031	0.044	0.088
	(0.016)**	(0.031)	(0.018)**	(0.023)***
Relative income squared	−0.009	0.003	−0.010	0.024
	(0.008)	(0.086)	(0.009)	(0.025)
Relative dependency ratio (young)	−0.004	−0.061	−0.001	−0.016
	(0.011)	(0.028)**	(0.013)	(0.013)
Relative dependency ratio (old)	0.004	0.046	0.005	−0.024
	(0.008)	(0.022)**	(0.009)	(0.012)*
Net official flows	0.332	0.345	0.336	0.210
	(0.072)***	(0.193)*	(0.078)***	(0.069)***
Fin Dev. – PCGDP	−0.006	0.004	0.018	0.009
	(0.007)	(0.012)	(0.014)	(0.018)
Legal	0.003	0.012	0.010	0.017
	(0.003)	(0.007)	(0.005)*	(0.011)
pcgdp × legal	−0.000	−0.017	0.007	0.015
	(0.003)	(0.014)	(0.004)	(0.012)
Financial Openness (KAOPEN)	−0.001	−0.001	0.000	−0.013
	(0.003)	(0.004)	(0.005)	(0.006)**
KAOPEN × legal	0.002	0.013	0.002	0.001
	(0.001)	(0.005)***	(0.002)	(0.002)
KAOPEN × pcgdp	−0.003	0.020	−0.001	−0.016
	(0.004)	(0.009)**	(0.004)	(0.007)**
TOT volatility	0.098	−0.234	0.103	0.253
	(0.048)**	(0.147)	(0.050)**	(0.081)***
output growth, 5-yr avg	−0.204	0.152	−0.218	−0.106
	(0.076)***	(0.230)	(0.079)***	(0.095)
Trade Openness	−0.009	0.014	−0.024	−0.007
	(0.005)*	(0.010)	(0.008)***	(0.009)
oil exporting countries	0.015		0.016	0.028
	(0.011)		(0.011)	(0.015)*
N	817	167	650	287
Adj. R2	0.55	0.50	0.57	0.58

With Forex Intervention

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	(0.004)***	(0.015)	(0.003)***	(0.006)***
Relative income	0.039	0.031	0.044	0.088
	(0.016)**	(0.031)	(0.018)**	(0.023)***
Relative income squared	−0.009	0.003	−0.010	0.024
	(0.008)	(0.086)	(0.009)	(0.025)
Relative dependency ratio (young)	−0.004	−0.061	−0.001	−0.016
	(0.011)	(0.028)**	(0.013)	(0.013)
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	(0.008)	(0.022)**	(0.009)	(0.012)*
Net official flows	0.332	0.345	0.336	0.210
	(0.072)***	(0.193)*	(0.078)***	(0.069)***
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	(0.007)	(0.012)	(0.014)	(0.018)
Legal	0.003	0.012	0.010	0.017
	(0.003)	(0.007)	(0.005)*	(0.011)
pcgdp × legal	−0.000	−0.017	0.007	0.015
	(0.003)	(0.014)	(0.004)	(0.012)
Financial Openness (KAOPEN)	−0.001	−0.001	0.000	−0.013
	(0.003)	(0.004)	(0.005)	(0.006)**
KAOPEN × legal	0.002	0.013	0.002	0.001
	(0.001)	(0.005)***	(0.002)	(0.002)
KAOPEN × pcgdp	−0.003	0.020	−0.001	−0.016
	(0.004)	(0.009)**	(0.004)	(0.007)**
TOT volatility	0.098	−0.234	0.103	0.253
	(0.048)**	(0.147)	(0.050)**	(0.081)***
output growth, 5-yr avg	−0.204	0.152	−0.218	−0.106
	(0.076)***	(0.230)	(0.079)***	(0.095)
Trade Openness	−0.009	0.014	−0.024	−0.007
	(0.005)*	(0.010)	(0.008)***	(0.009)
oil exporting countries	0.015		0.016	0.028
	(0.011)		(0.011)	(0.015)*
N	817	167	650	287
Adj. R2	0.55	0.50	0.57	0.58

Forex Intervention

- Is statistically significant
- However, FX intervention is a policy that is not random
- Hence, interpretation of the coefficient is difficult
- Hard to instrument FX intervention

With Forex Intervention, IV'd

Table 4
Basic Model Augmented with Net Official Flows, Instrumented.

	FULL	IDC	LDC	EMG
	(1)	(2)	(3)	(4)
Net official flows	1.642	−1.534	1.228	1.509
	(0.535)***	(1.052)	(0.367)***	(0.653)**
N	687	146	541	250
Adj. R2	0.10	0.31	−0.02	0.43
F-statistics (p-value)	0.015	0.089	0.002	0.071
Overidentification test (p-value)	0.276	0.004	0.203	0.327

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Point estimates from OLS, heteroskedasticity robust standard errors in parentheses. The net official flow variable is instrumented with the exchange rate stability index (from Aizenman, et al.; 2013), the share of manufactured goods in total exports, and the standard deviations of the annual growth rate of international reserves holding in each five-year panel as the measure of reserve volatility. The estimates other than that of net official flows are omitted from presentation to conserve space. The F-statistics are for testing whether the instruments are jointly significant. When the null hypothesis is rejected, that means the instruments are not weak ones. The overidentification test is conducted against the null hypothesis that the instrumental variables are uncorrelated with the residuals. The rejection of the null hypothesis indicates that the specification of concern is overidentified.

Crises, Disasters & Pandemics

Uncertainty and Crises

Table 6: The Impacts of Uncertainties on CAB, NS, and INV

(a) Current Account

	Max WUI	Currency	Banking	Debt	All
	(1)	(2)	(3)	(4)	
Max. World Uncert. Index (Indiv.)	-0.018				-0.018
	(0.031)				(0.031)
D for currency crisis		0.005			0.007
		(0.006)			(0.006)
D for banking crisis			-0.005		-0.005
			(0.007)		(0.007)
D for debt crisis				-0.004	-0.006
				(0.009)	(0.009)
N	625	656	656	656	625
Adj. R2	0.47	0.45	0.45	0.45	0.47

Chinn and Ito (2023)

Disasters

Table 5: The Impacts of Disasters on CAB, NS, INV

(a) Current Account

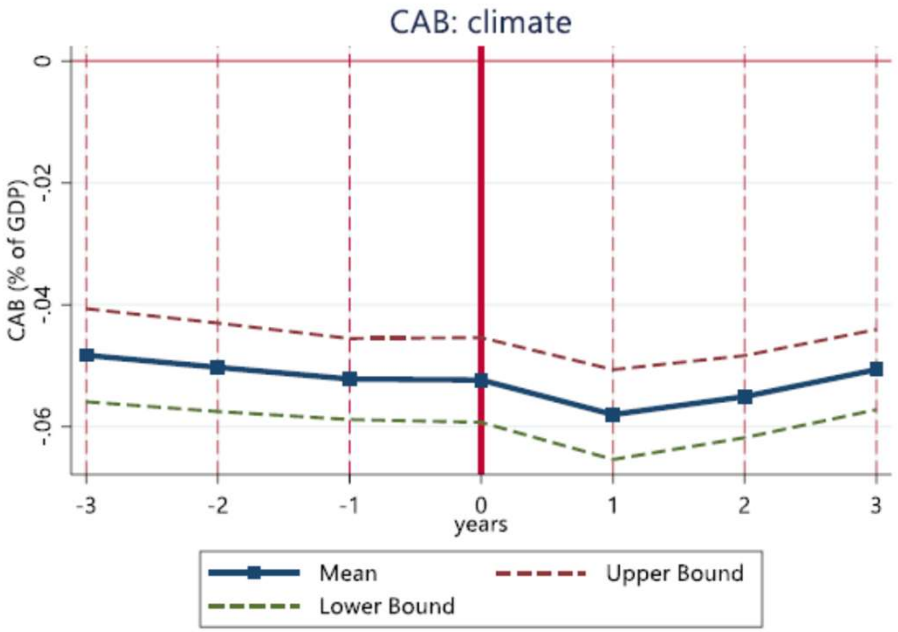
	War	Climato-logical	Biological	Geophysical	ALL ex. bio.	ALL
	(1)	(2)	(3)	(4)	(5)	(6)
# of war	0.004				0.003	0.003
	(0.001)***				(0.001)**	(0.001)**
# of climatological disasters		0.001			0.001	0.001
		(0.000)***			(0.000)***	(0.000)***
# of biological disasters			0.002			0.001
			(0.001)**			(0.001)
# of geophysical disasters				0.001	0.000	0.000
				(0.000)***	(0.000)	(0.000)
N	656	656	656	656	656	656
Adj. R2	0.45	0.46	0.45	0.45	0.46	0.46

Chinn and Ito (2023)

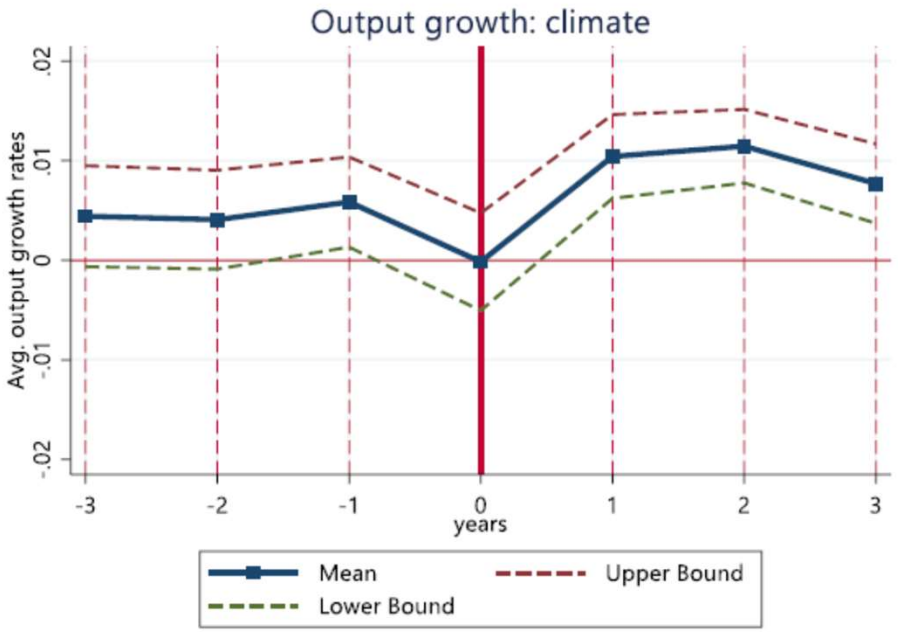
Event Studies: Climatalogical

Figure 6: Impacts of Climatological disasters

(a) CAB



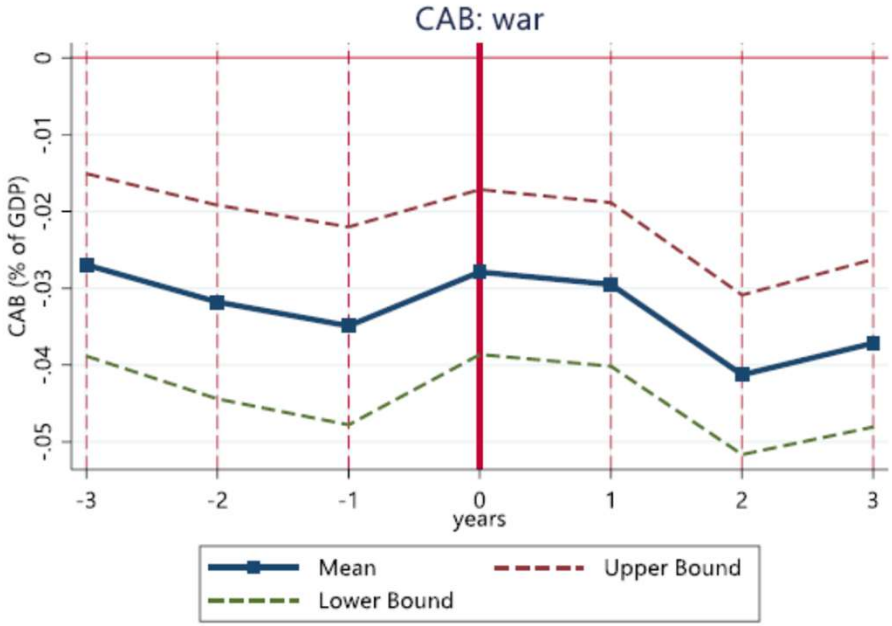
(b) Output growth



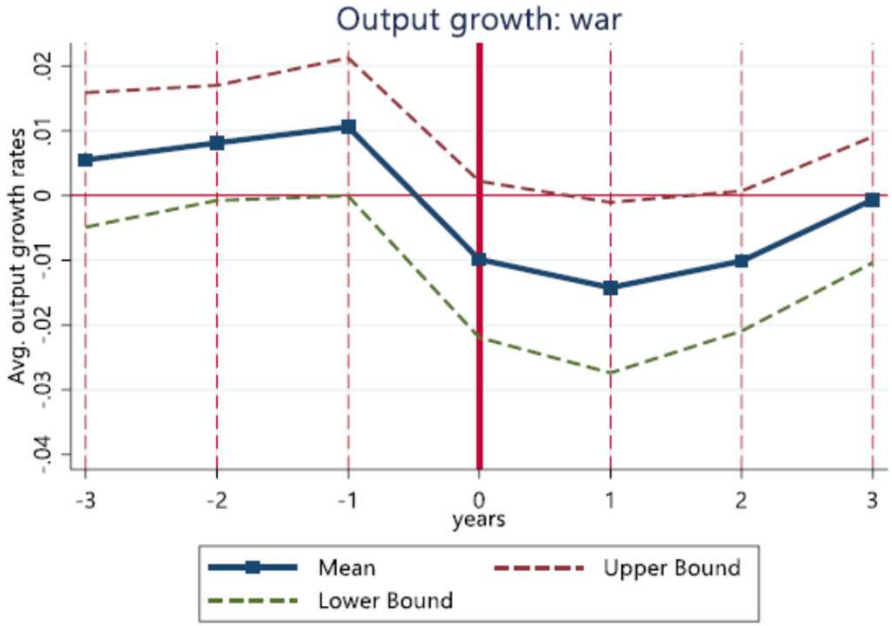
Event Studies: Wars

Figure 7: Impacts of wars

(a) CAB



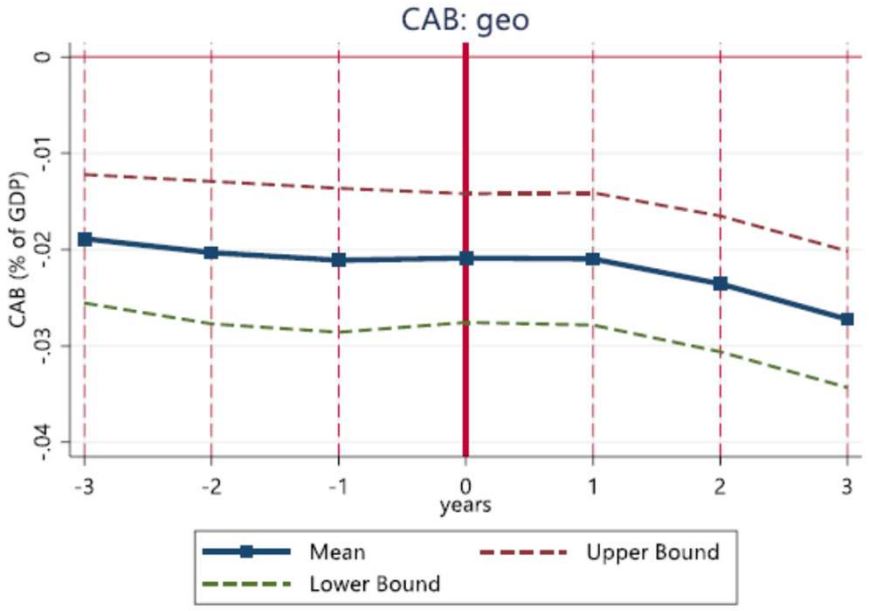
(b) Output growth



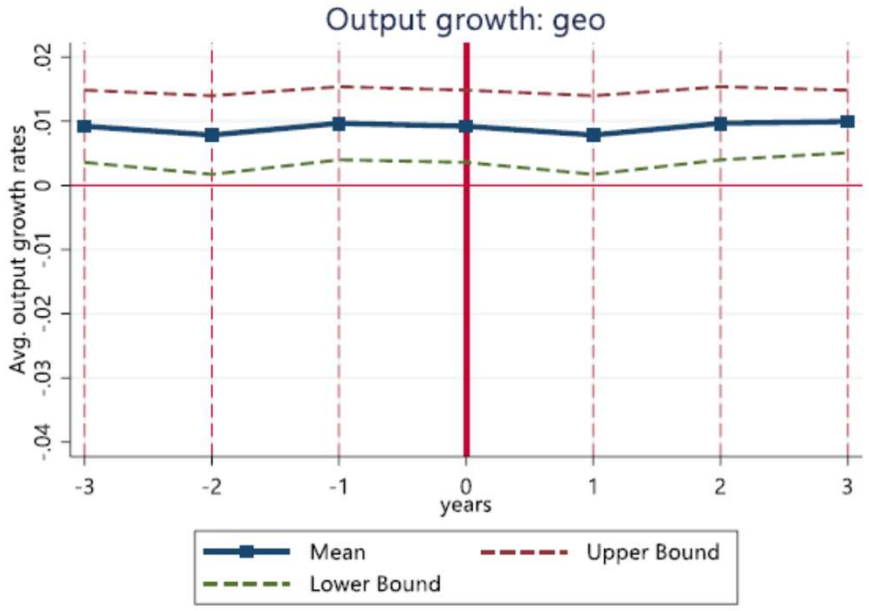
Event Studies: Geophysical

Figure 8: Impacts of Geophysical disasters

(a) CAB



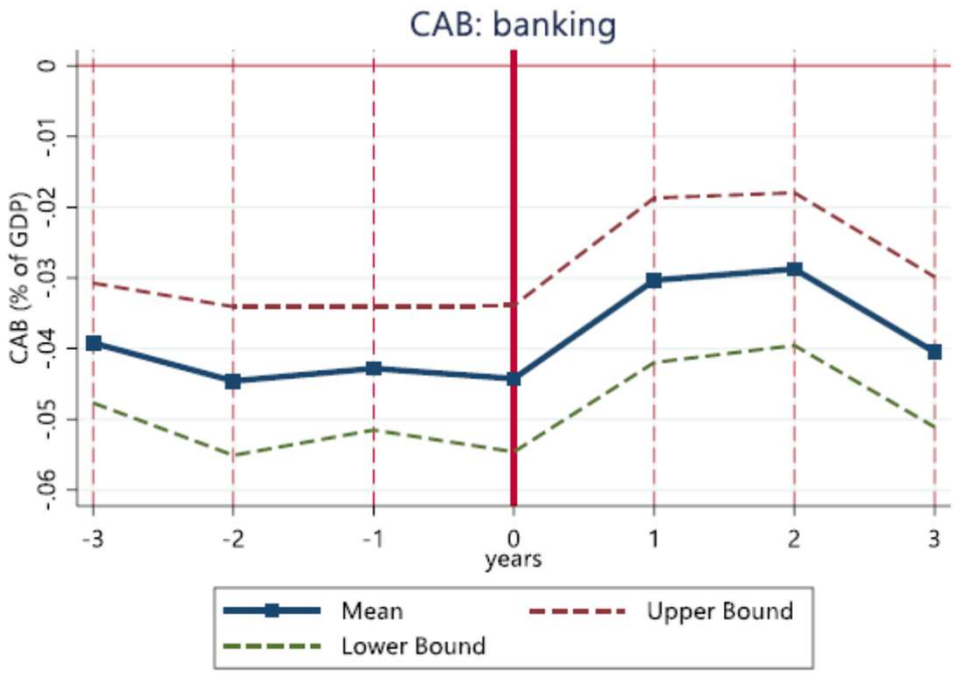
(b) Output growth



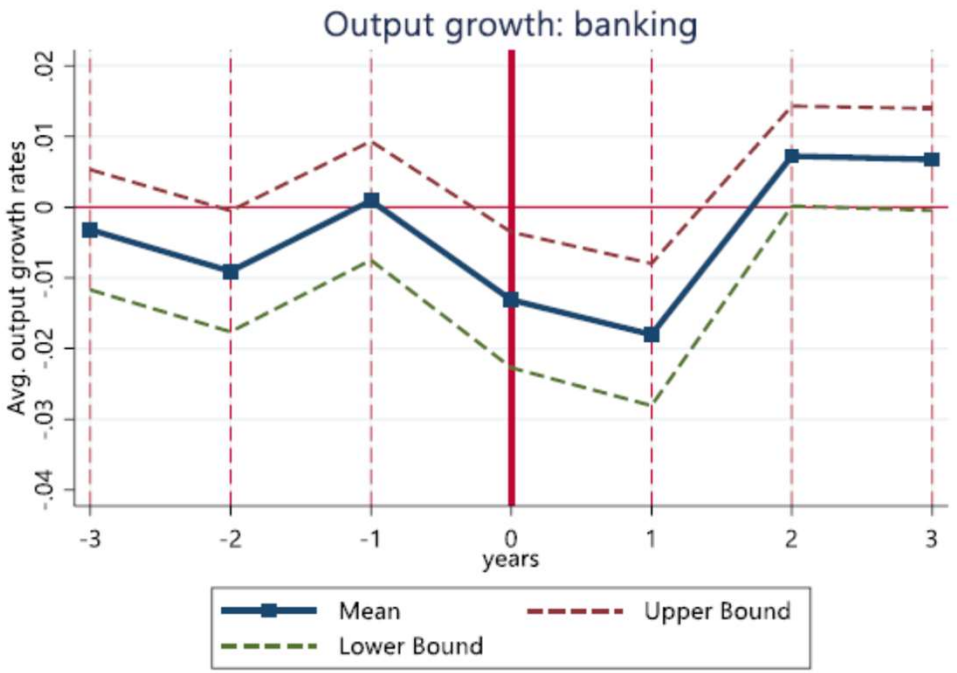
Event Studies: Banking Crises

Figure 11: Impacts of Banking Crisis

(a) CAB



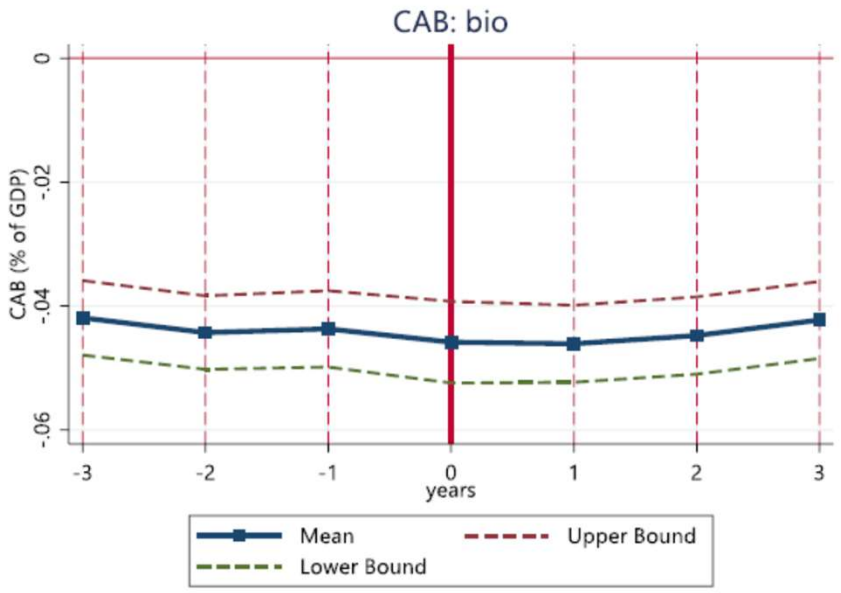
(b) Output growth



Event Studies: Biological

Figure 9: Impacts of Biological disasters

(a) CAB



(b) Output growth