

UCLA

UCLA Electronic Theses and Dissertations

Title

The Chains That Bind: Global Value Chain Integration and Currency Conflict

Permalink

<https://escholarship.org/uc/item/1px9r9pd>

Author

WELDZIUS, RYAN

Publication Date

2018

Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA

Los Angeles

The Chains That Bind:
Global Value Chain Integration and Currency Conflict

A dissertation submitted in partial satisfaction
of the requirements for the degree
Doctor of Philosophy in Political Science

by

Ryan M. Weldzius

2018

© Copyright by
Ryan M. Weldzius
2018

ABSTRACT OF THE DISSERTATION

The Chains That Bind:
Global Value Chain Integration and Currency Conflict

by

Ryan M. Weldzius

Doctor of Philosophy in Political Science

University of California, Los Angeles, 2018

Professor Ronald L. Rogowski, Chair

This dissertation asks: how do global value chains influence currency conflict? I argue that global value chain integration shifts the traditional exchange rate preferences of exporting firms away from a desire for a competitive, undervalued exchange rate—the cornerstone of a currency war—, towards a more stable, equilibrium-level exchange rate. As firms increasingly rely on the cross-border exchange of intermediate inputs, they will tend to prefer exchange rate stability over competitiveness, thus alleviating currency conflict.

In the late 1980s and into the 1990s, a revolution in information technology drastically lowered communication costs within and across borders. Concurrent innovations in shipping and containerization and a surge in regional trade agreements considerably lowered trade costs between countries. Reduced trade and communication costs led many firms in advanced economies to outsource parts of their production process to lower-wage countries with whom they had a trade agreement. This fragmentation of the production process into global value chains reshaped international trade, and with it, currency politics.

In a globalized economy where firms import many of the inputs that comprise a final exported good, an undervalued exchange rate no longer gives a boost to exports due to the increased cost of the imported inputs. Currency undervaluation is a costly venture by policymakers, which requires a trove of foreign exchange reserves, a high savings rate, and, in most cases, controls on international capital mobility. Global value chain (GVC) integration decreases the benefits of an undervalued currency beyond its cost, thus constraining governments from manipulating their currencies for competitive gain. Additionally, as countries move up the value chain and specialize in complex intermediate inputs—e.g., airplane parts—, concern over exchange rate stability exceeds interest in exchange rate competitiveness due to exchange-rate pass-through—the effect of an exchange rate movement on the price of a good. All else equal, further GVC integration will tend to increase firm preferences for exchange rate stability and weaken preferences for an undervalued exchange rate.

These arguments are tested with cross-sectional time-series data that cover 62 countries—accounting for over 80% of global trade—between 1995 and 2011. I exploit the richness of the trade data by measuring annual GVC participation at the country, country-partner, and country-sector levels of observation. In the first empirical chapters, I test the argument that GVC integration puts upward pressure on undervalued exchange rates towards their equilibrium level. Utilizing two distinct measures of currency misalignment, I show that the more integrated a country becomes in GVCs—specifically, the more foreign inputs as a share of gross exports—the weaker its commitment to an undervalued currency. Moreover, as a country moves up the value chain, producing highly-specialized inputs, there is a similar revaluation of the exchange rate. All else equal, GVC integration constrains governments from utilizing competitive exchange rate policies.

The third empirical chapter evaluates the policy implications of the argument and recommends inclusive trade measures to promote value chain integration. Fol-

lowing the information and communications technology (ICT) revolution of the late 1980s, firms could transmit data and communicate across borders quicker than in previous decades. The missing elements to take advantage of the low-cost labor were lowered trade barriers and protections for foreign firms. The regional trade agreements between North and South that ballooned in the 1990s provided this critical component for GVC integration. I test this argument using annual GVC data at the country-partner level regressed on the presence of a regional trade agreement between partners, as well as the standard gravity model covariates that predict trade between countries—distance, economy size, and shared history. My empirical strategy includes a marginal structural model with inverse probability weights, ensuring that there is balance in the time-varying covariates across different treatment histories, and allowing me to make causal claims (albeit with strong assumptions) about the treatment effect of regional trade agreements. Indeed, I find that regional trade agreements are a highly significant predictor of GVC integration, increasing GVCs between countries by 17% and 57% as a share of gross exports. The ICT revolution was a necessary condition for the emergence of GVCs, but not sufficient. Policymakers should consider using regional trade agreements, which increases general welfare in all countries involved, as an inclusive measure to combat currency conflict.

In sum, my dissertation shows that global value chain integration alleviates currency conflict. As firms rely increasingly on the cross-border exchange of intermediate inputs, and, as these firms move up the value chain to produce highly-specialized goods or services, their exchange rate preference will tend to move away from an undervalued exchange rate. A main determinant of GVC integration is the presence of a regional trade agreement between partner countries. The deep provisions found in these agreements protect firms investing in foreign markets and the removal of trade barriers allows for freer movement of inputs across borders. Together, I have shown an inclusive approach to combating currency

conflict.

The dissertation of Ryan M. Weldzius is approved.

Aarón Tornell

Chad J. Hazlett

Arthur A. Stein

Ronald L. Rogowski, Committee Chair

University of California, Los Angeles

2018

*To Maura, Robert, Timothy, David, and Sharon, for your unwavering support on
all of my scholarly pursuits.*

TABLE OF CONTENTS

1	Introduction	1
1.1	Global Value Chains & Currency Conflict	3
1.2	The Argument in Brief: Chains That Bind	9
1.3	Roadmap of the Dissertation	15
2	Global Value Chain Theory of Currency Politics	17
2.1	The “Unholy Trinity” of Domestic Economic Policy	18
2.2	Foundations of Currency Politics	23
2.2.1	International Exposure to Exchange Rate Fluctuations	24
2.2.2	Exchange Rate Pass-Through	26
2.2.3	Tradability of Inputs and Outputs	28
2.3	The Chains That Bind: GVCs and Currency Politics	31
2.4	Empirical Implications of the Theoretical Model	37
3	Cross-Country and Sectoral Patterns in International Economic Policy	40
3.1	Estimating Currency Misalignments	40
3.2	Measuring Global Value Chain Linkages	47
3.3	Measuring Other Potential Covariates	62
4	The Chains That Bind: Empirical Results	67
4.1	Testing the Argument: Production Networks and Currency Misalignment	67
4.1.1	International Exposure and Currency Misalignment	69

4.1.2	GVC Participation and Currency Misalignment	71
4.1.3	Global Supply Chain Participation and Currency Misalign- ment	74
4.1.4	Sectoral GVC Participation and Currency Misalignment . .	78
4.1.5	GVC Participation and Exchange Rate Convergence	81
4.2	Appendix: Supplementary Results	85
5	Building These Chains of Love	89
5.1	Building the Chains: Data and Results	91
6	Conclusion	99
A	Time-Series Plots, By Country	102

LIST OF FIGURES

1.1	Chinese Currency Manipulation	6
2.1	Expected Preferences for International Exposure and Tradability .	30
2.2	Expected Preferences for International Exposure and GVC Participation	33
3.1	Currency Valuation (BEER Approach), Country Sample	44
3.2	Balassa-Samuelson Estimated Real Exchange Rate (ERER), by year	46
3.3	Global Value Chain Participation Index, 1995-2011	52
3.4	Currency Manipulators: Global Value Chain Components, 1995-2011	53
3.5	Supply Chain (Manufacturing) Participation Index, 1995-2011 . .	56
3.6	Currency Manipulators: Global Supply Chain Components (manufacturing only), 1995-2011	57
3.7	GVC Linkages with Top-Five GVC-Trading Partners, Select Countries	61
4.1	Predicted Effects of Exports/GDP on Currency Misalignment . .	71
4.2	Predicted Effect of GVC Participation on Currency Misalignment, Moderated by Exports/GDP	74
4.3	Predicted Effect of Global Supply Chain Participation on Currency Misalignment, Moderated by Exports/GDP	75
4.4	Predicted Effect of Global Supply Chain Backward Linkages on Currency Misalignment, Moderated by Exports/GDP	77
A.1	Argentina: GVC and Trade Variables	103
A.2	Argentina (cont.): Currency Manipulation Variables	104

A.3	Australia: GVC and Trade Variables	105
A.4	Australia (cont.): Currency Manipulation Variables	106
A.5	Brazil: GVC and Trade Variables	107
A.6	Brazil (cont.): Currency Manipulation Variables	108
A.7	Brunei Darussalam: GVC and Trade Variables	109
A.8	Brunei Darussalam (cont.): Currency Manipulation Variables	110
A.9	Bulgaria: GVC and Trade Variables	111
A.10	Bulgaria (cont.): Currency Manipulation Variables	112
A.11	Cambodia: GVC and Trade Variables	113
A.12	Cambodia (cont.): Currency Manipulation Variables	114
A.13	Canada: GVC and Trade Variables	115
A.14	Canada (cont.): Currency Manipulation Variables	116
A.15	Chile: GVC and Trade Variables	117
A.16	Chile (cont.): Currency Manipulation Variables	118
A.17	China: GVC and Trade Variables	119
A.18	China (cont.): Currency Manipulation Variables	120
A.19	Colombia: GVC and Trade Variables	121
A.20	Colombia (cont.): Currency Manipulation Variables	122
A.21	Costa Rica: GVC and Trade Variables	123
A.22	Costa Rica (cont.): Currency Manipulation Variables	124
A.23	Croatia: GVC and Trade Variables	125
A.24	Croatia (cont.): Currency Manipulation Variables	126
A.25	Cyprus: GVC and Trade Variables	127
A.26	Cyprus (cont.): Currency Manipulation Variables	128

A.27 Czech Republic: GVC and Trade Variables	129
A.28 Czech Republic (cont.): Currency Manipulation Variables	130
A.29 Denmark: GVC and Trade Variables	131
A.30 Denmark (cont.): Currency Manipulation Variables	132
A.31 Estonia: GVC and Trade Variables	133
A.32 Estonia (cont.): Currency Manipulation Variables	134
A.33 Hong Kong: GVC and Trade Variables	135
A.34 Hong Kong (cont.): Currency Manipulation Variables	136
A.35 Hungary: GVC and Trade Variables	137
A.36 Hungary (cont.): Currency Manipulation Variables	138
A.37 Iceland: GVC and Trade Variables	139
A.38 Iceland (cont.): Currency Manipulation Variables	140
A.39 India: GVC and Trade Variables	141
A.40 India (cont.): Currency Manipulation Variables	142
A.41 Indonesia: GVC and Trade Variables	143
A.42 Indonesia (cont.): Currency Manipulation Variables	144
A.43 Israel: GVC and Trade Variables	145
A.44 Israel (cont.): Currency Manipulation Variables	146
A.45 Japan: GVC and Trade Variables	147
A.46 Japan (cont.): Currency Manipulation Variables	148
A.47 Korea: GVC and Trade Variables	149
A.48 Korea (cont.): Currency Manipulation Variables	150
A.49 Latvia: GVC and Trade Variables	151
A.50 Latvia (cont.): Currency Manipulation Variables	152

A.51 Lithuania: GVC and Trade Variables	153
A.52 Lithuania (cont.): Currency Manipulation Variables	154
A.53 Malaysia: GVC and Trade Variables	155
A.54 Malaysia (cont.): Currency Manipulation Variables	156
A.55 Malta: GVC and Trade Variables	157
A.56 Malta (cont.): Currency Manipulation Variables	158
A.57 Mexico: GVC and Trade Variables	159
A.58 Mexico (cont.): Currency Manipulation Variables	160
A.59 Morocco: GVC and Trade Variables	161
A.60 Morocco (cont.): Currency Manipulation Variables	162
A.61 New Zealand: GVC and Trade Variables	163
A.62 New Zealand (cont.): Currency Manipulation Variables	164
A.63 Norway: GVC and Trade Variables	165
A.64 Norway (cont.): Currency Manipulation Variables	166
A.65 Peru: GVC and Trade Variables	167
A.66 Peru (cont.): Currency Manipulation Variables	168
A.67 Philippines: GVC and Trade Variables	169
A.68 Philippines (cont.): Currency Manipulation Variables	170
A.69 Poland: GVC and Trade Variables	171
A.70 Poland (cont.): Currency Manipulation Variables	172
A.71 Romania: GVC and Trade Variables	173
A.72 Romania (cont.): Currency Manipulation Variables	174
A.73 Russia: GVC and Trade Variables	175
A.74 Russia (cont.): Currency Manipulation Variables	176

A.75 Saudi Arabia: GVC and Trade Variables	177
A.76 Saudi Arabia (cont.): Currency Manipulation Variables	178
A.77 Singapore: GVC and Trade Variables	179
A.78 Singapore (cont.): Currency Manipulation Variables	180
A.79 Slovak Republic: GVC and Trade Variables	181
A.80 Slovak Republic (cont.): Currency Manipulation Variables	182
A.81 Slovenia: GVC and Trade Variables	183
A.82 Slovenia (cont.): Currency Manipulation Variables	184
A.83 South Africa: GVC and Trade Variables	185
A.84 South Africa (cont.): Currency Manipulation Variables	186
A.85 Sweden: GVC and Trade Variables	187
A.86 Sweden (cont.): Currency Manipulation Variables	188
A.87 Switzerland: GVC and Trade Variables	189
A.88 Switzerland (cont.): Currency Manipulation Variables	190
A.89 Taiwan: GVC and Trade Variables	191
A.90 Taiwan (cont.): Currency Manipulation Variables	192
A.91 Thailand: GVC and Trade Variables	193
A.92 Thailand (cont.): Currency Manipulation Variables	194
A.93 Tunisia: GVC and Trade Variables	195
A.94 Tunisia (cont.): Currency Manipulation Variables	196
A.95 Turkey: GVC and Trade Variables	197
A.96 Turkey (cont.): Currency Manipulation Variables	198
A.97 United Kingdom: GVC and Trade Variables	199
A.98 United Kingdom (cont.): Currency Manipulation Variables	200

A.99	United States: GVC and Trade Variables	201
A.100	United States (cont.): Currency Manipulation Variables	202
A.101	Viet Nam: GVC and Trade Variables	203
A.102	Viet Nam (cont.): Currency Manipulation Variables	204
A.103	Euro Area 12: GVC and Trade Variables	205
A.104	Euro Area 12 (cont.): Currency Manipulation Variables	206
A.105	Austria: GVC and Trade Variables	207
A.106	Belgium: GVC and Trade Variables	208
A.107	Finland: GVC and Trade Variables	209
A.108	France: GVC and Trade Variables	210
A.109	Germany: GVC and Trade Variables	211
A.110	Greece: GVC and Trade Variables	212
A.111	Ireland: GVC and Trade Variables	213
A.112	Italy: GVC and Trade Variables	214
A.113	Luxembourg: GVC and Trade Variables	215
A.114	Netherlands: GVC and Trade Variables	216
A.115	Portugal: GVC and Trade Variables	217
A.116	Spain: GVC and Trade Variables	218

LIST OF TABLES

3.1	Summary Statistics: Main Explanatory and Outcome Variables . . .	55
3.2	Backward and Forward Linkages, Sector Level	59
3.3	Summary Statistics: Main Control Variables	65
4.1	GVCs and Currency Valuations, BEER Approach, Restricted Sample [†]	70
4.2	Global Supply Chains and Currency Valuations, BEER Approach, Restricted Sample [†]	76
4.3	Sectoral Trade and Currency Valuations, BEER Approach, Re- stricted Sample [†]	79
4.4	Sectoral GVCs and Currency Valuations, BEER Approach, Re- stricted Sample [†]	80
4.5	GVCs and Currency Convergence, BEER Approach, Restricted Sample [†]	84
4.6	Sector Codes	85
4.7	Manufacturing Codes	85
4.8	GVCs and Currency Valuations, BEER Approach, Full Sample [†] .	86
4.9	GVCs and Currency Valuations, Balassa-Samuelson Approach, Re- stricted Sample [†]	87
4.10	Global Supply Chains and Currency Valuations, Balassa-Samuelson Approach, Restricted Sample [†]	88
5.1	Global Value Chain Determinants	94
5.2	Global Value Chain Determinants, Marginal Structural Model with Inverse Probability Weights	95
5.3	Global Value Chain Determinants, DESTA Measures of PTAs . .	97

5.4	Global Value Chain Determinants, RTAs signed 1998-2005	98
-----	--	----

ACKNOWLEDGMENTS

The completion of the dissertation would not be possible without the generous support and guidance I received from family, friends, colleagues, and advisors. I would like to reflect on these people who have supported me through this intense academic pursuit.

I would first like to thank my advisors, Ronald Rogowski and Arthur Stein, without whom this research endeavor would have suffered. Ron advised me before I arrived at UCLA, writing to me while I was finishing my masters in Berlin. In perfect German, he easily persuaded me to join him at UCLA for my Ph.D. studies. It was by far the best academic decision I made as he has been the most attentive mentor, supporting me in every facet of my career. Art has helped me to think hard about my theoretical ideas, why they should matter in the field, and how to creatively solve the puzzle. Our face-to-face conversations about global value chains were invaluable, and his suggested readings unmeasurable. I am forever indebted to Ron and Art for their continuous support and guidance. The other members of my committee, Aaron Tornell and Chad Hazlett, also provided invaluable support during this process. Aaron advised me on the economics of currency valuations and trade since my first semester at UCLA, allowing me to join his seminar of economics Ph.D. students and present several research projects over the years. He was influential by challenging my political economy theories from a rigorous economics background. Chad advised me on various occasions on the proper empirical strategy—going through many revisions—always reminding me to keep it simple. I consider myself blessed to have had the chance to study with each of these remarkable professors.

Faculty at UCLA have enhanced my graduate training and provided input on different parts of this research project. In particular, I thank Leslie Johns, Deborah Larson, Jeffrey Lewis, Margaret Peters, Michael Ross, Michael Thies, and

Marc Trachtenberg. Each of them has guided me towards interesting research questions, provided the methodological skills for answering them, and challenged me to write to a broader audience, all of which has found its way into this dissertation or into other ongoing projects.

I would also like to thank scholars from outside of UCLA (or formerly at UCLA) who provided feedback on various aspects of this project. I thank Jesse Acevedo, Marc Bacchetta, Mark Copelovitch, Robert Gulotty, Galen Jackson, Alexander Keck, Paasha Mahdavi, Joshua Malnight, Stephen Nelson, Steve Palley, Lauren Peritz, Dennis Quinn, David Steinberg, and Stephen Weymouth for all of your invaluable input on this research project.

I am grateful to my fellow graduate students in the Department of Political Science. I thank Soumi Chatterjee for being the colleague who supported me the most on this venture, both academically and personally. This dissertation would not have been completed without your persistent encouragement. You are a treasured and lifelong friend. I also thank George Derpanopoulos, Angela Ocampo, Shawn Patterson, Jessica Stewart, and Adria Tinnin. It was an honor to share classes with you and get through graduate school together.

Last, and certainly not least, I am forever grateful to my nuclear family and my LA-family. To my family who has supported me through years of graduate school, in particular my parents Maura and Robert Weldzius, I am forever indebted to you for the love and generosity you have shown me throughout every step of my academic career. To my brothers, Tim and Dave Weldzius, my sister, Sharon Petker, and my sister- and brother-in-law Amanda Weldzius and James Petker, I thank you for keeping me grounded, never asking me if I am going to run for office, and continuously asking me, “Have you finished your dissertation *yet!*!” And finally to my LA family, Federica Di Blasio, Jon Hand, Chris and Noël Plourde, Ben and Melissa Rovner, and Liz Tsubota, thank you for supporting me with friendship and merriment during my time in Los Angeles. You all made LA

into my new home and I am forever grateful to have each of you in my life. And a final shoutout to the local places who supported me with free WiFi, caffeine, and a cold beverage after a long day of coding and writing: Mike and Ali of Toasted & Roasted and Joey of City Tavern. Keep on keepin' on.

VITA

Education

- 2012 M.Sc. (Economics and Management Science), Humboldt-Universität zu Berlin.
- 2010 M.A. (Politics), New York University.
- 2007 B.A. (Political Science), DePaul University.

Employment

- 2018- Postdoctoral Research Fellow. Washington University in St. Louis.
- 2014-2018 Teaching Fellow. University of California, Los Angeles.
- 2013 Intern. Economic Research and Statistics Division, World Trade Organization.
- 2013, 2015 Graduate Student Researcher. University of California, Los Angeles.
- 2011-2012 Graduate Student Researcher. Humboldt-Universität zu Berlin.
- 2011-2012 Social Coordinator. International Office, Humboldt-Universität zu Berlin.
- 2006-2009 Portfolio Manager. Millennium Properties R/E, Inc., Chicago.

PUBLICATIONS

“Ethanol Plant Location and Land Use: A Case Study of CRP and the Ethanol Mandate,” with Jennifer Ifft and Deepak Rajagopal. 2018. *Applied Economic Perspectives and Policy*.

CHAPTER 1

Introduction

The mostly anarchic international system is defined by continuing power struggles between states that seek domestic security, often at the expense of others. The global order established after World War II codified rules for these international power clashes, in particular with respect to international finance and trade. No longer, or so it was stated, would states be able to engage in *beggar-thy-neighbor* practices that improved their domestic economy while impairing the economies of their neighbors. Following the partial dissolution of this order in the early 1970s after the U.S. officially closed the gold window, there was growing fear that policymakers may attempt to use purposive exchange rate depreciations as a *de facto* protectionist measure against imports and an implicit subsidy of exports—fears that resurfaced following the 2008-09 global financial crisis. In an integrated international economy with freely floating exchange rates, a return to the beggar-thy-neighbor competitive exchange rate policies of the interwar years would have disastrous effects on the global order. Despite grumblings of a currency war in 2010, these fears went largely unsubstantiated.

In the early-1990s as trade and communication costs continued to fall, developed and emerging market economies began integrating outside of (but allowed by) the post-war international institutions by means of regional trade agreements (RTAs). The number of RTAs increased from around 100 in 1990 to over 450 today, doubling intra-RTA trade as a share of world trade between 1990 and 2008, from

28% to 51%.¹ Importantly, these trade agreements included protections for multinational corporations investing in foreign markets—beyond the investment protections provided in the bilateral investment treaties (BITs) signed in the decades prior—, which incentivized firms to fragment the production process into global value chains, expanding at a rate of 4% per annum through 2015 according to the World Bank.² Some economists attribute the lack of competitive depreciations following the 2008-09 global financial crisis to a disconnect between exchange rates and exports brought about by global value chain integration Ahmed, Appendino and Ruta (2015); Ollivaud, Rusticelli and Schweltnus (2015); Cheng et al. (2016). In a globalized economy where firms import many of the inputs that comprise an exported good, a currency depreciation no longer gives a competitive boost to exports due to the increased cost of the foreign inputs. I argue that these global value chain linkages weaken the traditional preferences among exporting firms for an undervalued exchange rate. Given the size and importance of these global firms, an increase in global value chain integration decreases the benefits of an undervalued currency beyond its cost, thus constraining governments from manipulating their currencies for competitive gain. Furthermore, as countries move up the value chain and specialize in complex intermediate inputs, concern over exchange rate stability exceeds interest in exchange rate competitiveness. All else equal, further global value chain integration will tend to increase firm preferences for exchange rate stability and weaken preferences for an undervalued exchange rate.

Utilizing time-series cross-sectional data covering 62 advanced and emerging

¹Excluding intra-EU trade, intra-RTA trade as a share of world trade was 18% in 1990 and 35% in 2008. Egger et al. 2011 estimates that a RTA leads to a 102% increase in trade between partner countries on average. The data on the number of RTAs from World Trade Organization 2011, 2018, intra-RTA trade from Bagwell, Bown and Staiger 2016. See also Limão 2016 for a historical survey of regional trade agreements and their economic effects within and between countries.

²See Ahmed, Appendino and Ruta 2015; World Bank Group 2017.

market economies over the period 1995-2011, I find strong evidence that global value chain integration acts as a “golden straitjacket” on currency manipulation, pushing undervalued currencies towards their equilibrium levels. This revaluation effect also carries through to countries moving up the value chain, specializing in high-quality intermediate goods. Moreover, I find that regional trade agreements between trading partners are a main causal mechanism of global value chain integration—controlling, of course, for the standard gravity model covariates: distance between countries, economy sizes, and shared history. The results suggest that global value chain linkages may act as a bulwark against currency manipulation, implying that inclusive measures that bind economies together—in particular, regional trade agreements (RTAs)—are an alternative to the protectionist measures currently floating around the policy community.

1.1 Global Value Chains & Currency Conflict

In open economies where goods and capital cross borders frequently, a country’s exchange rate is the most important price. All other prices are connected to the exchange rate and thus a firm, sector, or other socioeconomic group’s exposure to currency fluctuations affect their preferences for exchange rate policy. Policymakers who are answerable to special interests or a broader electorate will consider the exchange rate preferences of these socioeconomic groups when crafting exchange rate policy. If seeking to appease or strengthen their industrial base, policymakers may engage in a *competitive devaluation* of their currency, in which the government purposefully forces down the exchange rate relative to their trading partners, thus making the foreign price of their exports cheaper. Similarly, governments may also engage in *competitive non-appreciations* in which they block the upward revaluation or appreciation of their exchange rates, thus holding the

exchange rate at a relatively “undervalued” level.³ Out of fear of losing a share of world export markets, a competitive devaluation (or non-appreciation) by one country is often reciprocated by an equal or greater devaluation by their main competitor(s), escalating into a so-called “currency war.”

A currency war emerged between the Western democracies—the United Kingdom, Denmark, Sweden, the United States, Belgium, France, and Italy⁴—in the 1930s in response to the Great Depression. At the time, policymakers had limited tools to respond to economic shocks due to the fixed exchange rates of the gold standard. When the protectionist tariffs policymakers imposed on imports deepened the depression,⁵ some countries abandoned the gold standard, in effect exporting their domestic unemployment and sparking a currency war among the advanced economies.⁶ In the wake of the 2008-09 global financial crisis, policymakers feared a return to the inward-looking policies that proceeded from the Great Depression: a modern-day currency war with catastrophic consequences in a highly-integrated globalized economy.⁷

³For example, the Swiss National Bank introduced a “ceiling” on the value of the Swiss franc in 2011 due to its strengthening following the eurozone debt crisis. See Bergsten and Gagnon 2017 for more on this topic.

⁴In order of when each went off the gold standard. The U.K. stopped converting pound sterling into gold in September 1931, quickly followed by Denmark and Sweden the same month, the U.S. in 1933, Belgium 1935, France and Italy in 1936. See Eichengreen 1992.

⁵The Smoot-Hawley Tariff Act of 1930 raised effective tariff rates to almost 60% on some 20,000 products. Scholars argue that this protectionist measure and the retaliatory measures from other countries that followed exacerbated the Great Depression. Irwin 2011 provides a thorough survey of events.

⁶Despite the conflictual nature of the term “currency war,” those countries who abandoned the gold standard early and allowed for a freely-floating exchange rate recovered from the depression faster than those who maintained parity with gold. For historical surveys, see Eichengreen 1992 and Frieden 2007.

⁷A new-type of unintended currency war *did* actually emerge in 2009-2010 in which the currencies of the advanced economies (AEs) depreciated against those of the emerging market economies (EMEs) due to the unorthodox monetary policies utilized by the AEs. The side effects of these policies was a large spillover of capital flows to EMEs, such as Brazil, which put strong pressure on inflation and domestic credit markets in EMEs. They countervailed these destabilizing effects with textbook countercyclical policy but also macroprudential instruments to affect systemic financial risk. In 2010, the Brazilian Finance Minister Guido Mantega res-

More recently, President Trump stoked the flames of a currency war by enacting unilateral tariffs on Chinese imports and reaffirming China as a so-called “currency manipulator.”⁸ In 1995, China pegged its exchange rate to the U.S. dollar (USD) which indeed began a decades-long real undervaluation of the renminbi (RMB). Various estimates of the RMB’s undervaluation ranged from 18 to 54% Frankel (2006); Coudert and Couharde (2008); the method used in this analysis estimates the range of undervaluation between 5 and 25% in the decade following 1995 (see Figure 1.1; more on this approach in Chapter 3). The outcome of this competitive exchange rate policy was an increase in China’s exports as a share of gross domestic product (GDP) from 18% in 1995 to over 35% in 2005 when the central government scrapped the peg and allowed the RMB to appreciate. Despite the Chinese government’s change in exchange rate policy in 2005 and its efforts since 2014 to prop up the RMB by selling over \$1 trillion from its reserves due to capital outflows, Trump continues to label China with the outdated nomenclature.

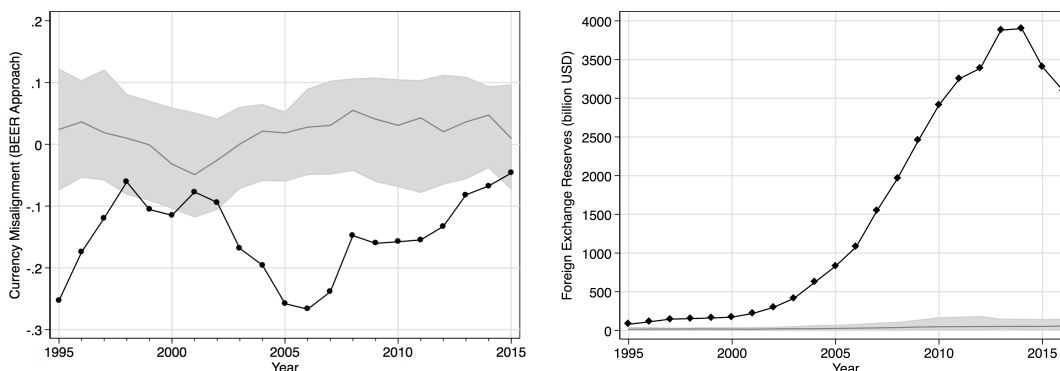
This competitive exchange rate policy, which has clear benefits—such as increased exports (Freund and Pierola, 2012), investment (Rodrik, 2008), domestic savings, and capital accumulation (Levy-Yeyati, Sturzenegger and Gluzmann, 2013)—, also comes with heavy costs. First and foremost, consumers bear the highest cost due to the increased price on imported goods, which acts as a real wage reduction for all workers. Although this real wage decrease may offer benefits in the long-run (see again, Levy-Yeyati, Sturzenegger and Gluzmann, 2013), it keeps the purchasing power of consumers diminished in the short-term. This

urrected the term “currency war” in response to the AEs, justly warning, “We’re in the midst of an international currency war, a general weakening of currency. This threatens us because it takes away our competitiveness.” Jonathan Wheatley and Peter Garnham, 27 September 2010, “Brazil in ‘Currency War’ Alerts,” *Financial Times*. In this dissertation, I focus on currency wars where currency depreciation/devaluation is the first-order goal, not a consequence of unorthodox monetary policy.

⁸Benjamin J. Cohen April 2018, “Will Trump Launch a Currency War, Too?” *Project Syndicate*. <https://www.project-syndicate.org/commentary/trump-currency-war-with-china-by-benjamin-j--cohen-2018-04>.

Figure 1.1: Chinese Currency Manipulation

(a) China's Undervaluation, BEER Approach[†] (b) China's Foreign Exchange Reserves



Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 51 countries with the mean denoted by the dark grey line. †: the BEER (behavioral equilibrium exchange rate) approach estimates the deviation of a country's exchange rate from its long-run equilibrium by considering the relationship between the real exchange rate and its fundamentals, in particular, the terms of trade, the net foreign asset position, and the relative productivity of the tradable sector. A value below zero denotes an undervalued exchange rate; above zero, an overvalued exchange rate.

increased cost of imported goods also affects firms reliant on foreign inputs, which increases the price of final goods and thus reduces export competitiveness of GVC-dependent firms—a central argument of this dissertation. Thus, a government will only enact a policy of undervaluation if supported by industry (the main benefactors) and, importantly, conditional on the government exhibiting some control over financial markets.⁹ With this control, central banks (acting on behalf of the government) can intervene in foreign exchange markets to undervalue the exchange rate. It does this by purchasing foreign currency in exchange for domestic currency, which floods the international market with a greater supply of the domestic currency, thus putting downward pressure on the exchange rate. China

⁹Steinberg's 2015 conditional preference theory of currency undervaluation models a government's exchange-rate policy outcome on societal preferences, as in Frieden 1991, but conditional on domestic control over labor and financial markets. Here I take into account control over the financial market, in particular, direct intervention in foreign exchange markets, but do not explicitly address control over labor markets. Instead, I assume that policymakers act with the intent to appease the strongest political base, whether that be labor, industry, or large exporting firms.

amassed a trove of foreign exchange reserves during its decade of undervaluation, increasing tenfold from \$80.3 billion in 1995 to \$830 billion in 2005 (see Figure 1.1).

Countries that run chronic trade deficits—Exhibit A, the United States¹⁰—regularly chastise this *beggar-thy-neighbor* policy of devaluing one’s exchange rate.¹¹ Since the international rules and institutions established to address such imbalances have fared poorly, in particular the International Monetary Fund (IMF),¹² national governments have sought punitive measures to stop such practices. The World Trade Organization (WTO) reported that from mid-October 2015 through mid-May 2016 the G20 economies introduced new barriers to trade at the fastest pace since the 2008-09 global financial crisis, the vast majority of which came in the form of antidumping (AD) duties—89 of the 145 new measures introduced.¹³ The WTO allows member countries to impose AD duties on partner countries if the partner country exports a product at a lower price than would be charged in the exporter’s home market. This price misalignment is often the consequence of export subsidies and/or an undervalued currency. These AD duties are clear evidence of international concern over and action to combat currency manipulation. Even in a divided U.S. legislature, both chambers of Congress continue to hold bipartisan support for the “Currency Reform for Fair Trade Act” (H.R.2378) introduced in 2010, again in 2015 (H.R.820), and yet again in 2017 (H.R.2039). It would amend Title VII of the Tariff Act of 1930 to allow the imposition of a

¹⁰The U.S. continues to run a trade deficit, with a lower bound of 1.5% of GDP in 1995 to a peak of 6% of GDP in 2006.

¹¹Ironically, some of these countries engaged in similar practices following the 2008-09 global financial crisis using unorthodox monetary policies as described earlier.

¹²The IMF ratified the Second Amendment in 1978, which legalized floating exchange rates and removed the Fund’s responsibility for overseeing a system of exchange rate values. See Eichengreen 1998.

¹³Shawn Donnan, 21 June 2016, “WTO Warns on Rise of Protectionist Measures by G20 Economies,” *Financial Times*.

countervailing or antidumping duty on any import from a country with a fundamentally undervalued exchange rate. The bill, which would apply to all future trade agreements as well as to Mexico and Canada under NAFTA, would likely have the support of President Trump who espouses a hardline on correcting trade deficits by controlling other country's domestic policies rather than those of the U.S.¹⁴

Like President Trump continuing to label China a currency manipulator, I find that policymakers are anachronistic in their evaluation of the problem of currency manipulation and the punitive solutions they offer to solve it. For centuries world trade involved the exchange of finished or primary goods between countries, for example, Portuguese wine for British cloth. Following the Ricardian model of comparative advantage (Ricardo, 1817), a country exports the goods it produces most efficiently, and likewise imports the goods that it produces least efficiently. This workhorse model of international trade along with theoretical updates made by Eli Heckscher and his student Bertil Ohlin in the 1920s carried the fields of economics and political science until the second unbundling of globalization¹⁵ in the mid to late 1980s. Decreases in (i) transportation costs from containerized shipping, (ii) trade costs from regional trade agreements, and, most importantly, (iii) communication costs due to the information communication technology (ICT) revolution created new opportunities for firms to minimize costs in production and hence maximize revenue. Rather than producing in a single country, firms unbundled the production process into global value chains¹⁶ (GVCs), extending

¹⁴Correcting trade deficits begins with increasing the rate of savings within an economy and decreasing the borrowing, two things the president has exacerbated with the Tax Cuts and Jobs Act of 2017, which have increased the federal deficit and is projected to increase the debt over the following decade.

¹⁵The first great unbundling of international trade, according to Baldwin 2013, refers to the period of falling trade costs from the invention of the steam engine until the mid to late 1980s.

¹⁶In this dissertation I focus on global *value chains* (GVCs), as well as global *supply chains*. GVCs include the design, manufacturing, and marketing involved in bringing a product to market, while global supply chains include the manufacturing and distribution-related processes

Adam Smith’s theory of the division of labor to an international scale. This fragmentation of the production process upended the standard models of international trade and the political implications that follow.

This dissertation analyzes one of the political implications of global value chain integration: the role GVCs play in exchange rate politics. The concept of taxing currency manipulators or placing duties on their exports to discourage their *beggar-thy-neighbor* behavior would certainly work if the world operated in a pre-1980s Ricardian system. As the following chapters will illustrate, however, the intensity of integration between countries since the second unbundling has created a network of global value chains that ostensibly bind governments’ exchange rate policy choices, specifically their desire to maintain an undervalued exchange rate. The more integrated a country becomes in global value chains the lower the benefits of an undervalued currency, making devaluation politically unsustainable. Thus, rather than offering punitive, inward-looking solutions for yesterday’s problems, I offer an inclusive, pro-growth solution for today’s.

1.2 The Argument in Brief: Chains That Bind

My political explanation for the role of GVCs in exchange rate preferences, which is fleshed out in greater detail in Chapter 2, has three main objectives: (*i*) to explain why some currency manipulators have allowed their exchange rates to appreciate, (*ii*) to provide an explanation for the absence of a currency war following the 2008-09 global financial crisis, and (*iii*) to offer a policy solution for dealing with currency manipulators in the future.

Much like in formulating trade policy, policymakers consider many variables when creating exchange rate policy—e.g., political institutions, domestic and international macroeconomic conditions, and the preferences of socioeconomic ac-

exclusively.

tors. My argument focuses on the exchange rate preferences of these socioeconomic actors—i.e., individuals, firms, and sectors—but still considers the institutional and macroeconomic environment as second-order conditions. The exchange rate regime (fixed or floating) and level (depreciated or appreciated) have measurable distributional effects for socioeconomic actors *within* a country, driven by the distributional effects *between* countries, from which one can deduce exchange rate preferences. Accordingly, the politics of exchange rates has a close parallel to the politics of trade policy: international exposure to each dictates societal preferences. For example, an import-competing firm should prefer a policy that protects its home market from imports. This policy can take the form of (i) product- or sector-specific measures such as tariffs, voluntary export restraints (VERs), domestic quotas, or non-tariff barriers, or (ii) an economy-wide measure such as an exchange rate depreciation (or devaluation), which makes the relative price of foreign products more expensive for domestic consumers. Like import-competing firms, an exporting firm should prefer a policy that supports its exports on the international market, which, all else equal, would also take the form of a depreciated (or devalued) exchange rate.¹⁷

My argument conditions these traditional exchange rate preferences on a socioeconomic group or country’s reliance on global value chains. Between the establishment of the WTO in 1995 and 2011, the latest year for which GVC data are available, the percentage of foreign inputs in domestic exports (in technical terms, the share of foreign value added in gross exports) increased from 21% to 28% across all sectors, and 28% to 36% in the manufacturing sector.¹⁸ Moreover,

¹⁷An exchange rate depreciation refers to the real or nominal decrease in value of a currency relative to other currencies. This occurs with a currency in a floating exchange rate regime. An exchange rate devaluation, on the other hand, is the purposeful decrease in value of an exchange rate in a fixed, pegged, or semi-fixed exchange rate regime. In my analysis I use a measure that treats currency depreciations and devaluations equivalently and thus will use the term “undervaluation” throughout to refer to both.

¹⁸The total value added involved in GVCs as a share of gross exports increased modestly, from 50% in 1995 to 54% in 2011; however, this is attributed to a decrease in forward linkages, or

according to a 2013 report from the UN Conference on Trade and Development (UNCTAD),¹⁹ 80% of total world trade takes place within the value chains of multinational corporations. These increasing GVC linkages are affecting the relationship between prices and trade. Recent empirical work shows evidence of a disconnect between exchange rates and exports, that is, the elasticity of exports to the exchange rate is decreasing (see Ahmed, Appendino and Ruta, 2015; Ollivaud, Rusticelli and Schwellnus, 2015; Cheng et al., 2016). No longer do economies get the predicted boost to exports from a depreciation of their currency. The data suggests that GVC integration is behind this exchange rate disconnect. If an increasing amount of a country’s exports are reliant on imported inputs, then a depreciated currency will have a neutral effect: while the exported good should have a more competitive price due to the undervalued exchange rate, this relative price change is lost due to the increased cost of the imported inputs. I argue that the greater a firm or country’s integration in GVCs the stronger its preference for a stable, equilibrium-level exchange rate (SELXR).²⁰

Building upon Frieden’s (1991; 2014) seminal works on currency politics, I model a firm’s exchange rate preferences along three dimensions: (*i*) a firm’s international exposure to exchange rate risk, (*ii*) the completeness of exchange rate pass-through on a firm’s goods or services, and (*iii*) the tradability of a firm’s inputs and outputs. The first dimension—a firm’s exposure to exchange rate risk—measures a firm’s dependence on international markets. The more a firm relies on cross-border trade and payments as opposed to dealing exclusively

upstream production, which dropped from 29% in 1995 to 26% in 2011. The GVC participation index is merely the sum of backward linkages (foreign value added as a share of gross exports) and forward linkages (indirect domestic value added in intermediates as a share of gross exports).

¹⁹See UNCTAD 2013.

²⁰I define a stable, equilibrium level exchange rate (SELXR) as a flexible exchange rate, i.e., a central bank maintains monetary autonomy, but there is minimal deviation from its equilibrium exchange rate, which is the level at which a country maintains a balanced internal and external account. More on the construction of this measure in Chapter 3. This argument finds its closest parallel to the theory of optimum currency areas developed by Mundell (1961).

within the domestic borders, the stronger the firm’s preference for a fixed or stable exchange rate. For these firms heavily engaged in cross-border exchange, their support for a fixed or stable exchange rate increases with their reliance on long-term contracts denominated in foreign currency (especially if they lack domestic forward markets to hedge against currency fluctuations) and the time horizon of the firm’s investments. My argument does not deviate from this dimension of Frieden’s theory. A firm involved in GVCs (*i*) will be heavily involved in cross-border exchange, (*ii*) tends to be reliant on long-term contracts for its value chain components, and (*iii*) will have a long time horizon on its investments, especially if the firm is the direct owner of the different nodes in the value chain—i.e., operational hedging.

The second dimension, exchange rate pass-through, refers to the effect of exchange rate movements on the price of goods. Research in the field of economics finds that exporting firms with incomplete pass-through—i.e., large movements in the exchange rate have little effect on the price of internationally-traded goods—are more likely to be heavily-reliant on imported inputs (Amiti, Itskhoki and Konings, 2014). According to Frieden, the more incomplete a firm’s pass-through, the greater its support for a fixed exchange rate and the weaker its preference over the level. This also falls in line with my argument, although I will explicitly relate a firm’s exchange rate pass-through to its reliance on GVCs and level of specialization. Furthermore, I argue that firms with incomplete pass-through prefer a fixed *or* stable, equilibrium-level exchange rate, thus allowing for monetary autonomy in times of crisis.²¹

²¹In a world of open capital markets, a fixed exchange rate precludes a country from using monetary policy in a time of crisis. This trilemma of international finance, also called the “unholy trinity,” indicates the limits of country-level policy in a globalized world. A country may only pursue two of the following three options: free flow of capital, monetary autonomy, and a fixed exchange rate regime. Assuming capital openness, I add nuance to Frieden’s theory by allowing firms to prefer a floating exchange rate that is relatively stable, i.e., it does not deviate wildly from its equilibrium value, either by direct intervention from policymakers (i.e., undervaluation) or by market forces (i.e., policymakers intervene to stabilize the exchange rate), which allows for independent monetary policy according to the trilemma.

Finally, in the third dimension of Frieden’s model, tradability of a firm’s inputs and outputs, the explicit inclusion of GVCs modifies the model’s predictions on exchange rate preferences. While Frieden uses the structure of a firm’s inputs and outputs to evaluate their preference for the level of the exchange rate on two ends of a continuum—i.e., relatively weaker (more depreciated) to relatively stronger (more appreciated)—, as before, I allow for the middle option of a stable, equilibrium-level exchange rate. The model predicts that the larger the share of *tradable* goods and services in a firm’s *output* or the larger the share of *nontradable* goods and services in a firm’s *inputs*, the stronger its support for a more *depreciated* exchange rate. Conversely, firms with a larger share of nontradable output or tradable inputs will tend to prefer a more appreciated exchange rate. This clearly leaves discordant preferences for a firm with tradable outputs (preference: depreciated exchange rate) that relies on tradable inputs (preference: appreciated exchange rate). I argue that these GVC-dependent firms will prefer a stable, equilibrium-level exchange rate, which follows from the dimensionality of international exposure and exchange rate pass-through. While an exporting firm may receive a competitive boost from an undervalued exchange rate, this effect is negated as the firm relies on more imported inputs for the final exported good.

The role of firms, especially exporting firms, are increasingly important in setting foreign economic policy. Since the second unbundling of globalization, Marc Melitz (2003) pioneered a new strand of models that consider firms with varying levels of productivity. The political implications of this “new” new trade theory—following the new trade theory developed by Paul Krugman, Gene Grossman, and Elhanan Helpman in the late 1970s and early 1980s —illustrated the increasing influence of large, exporting firms in international economic outcomes and domestic political economy bargaining (see e.g., Kim, 2017; Osgood, 2017). Hence, in this dissertation, I consider the exchange rate preferences of these large, highly-productive exporting firms, which tend to account for a large share of a

country's exports—e.g., 96% in the U.S. (Bernard et al., 2007). If the purpose of an undervalued exchange rate is to promote exports, then it is the preferences of these firms that should matter in the crafting of such policy.

Policymakers must weigh the costs of an undervalued currency against its benefits when considering a policy of undervaluation. An undervalued currency acts as a “secret tariff”²² of sorts on imported goods; while tariffs tend to be product- or sector-specific, an undervalued exchange rate increases the price of *all* foreign imports, which disproportionately hurts consumers. The substitution effects of this policy are a switch to more-expensive domestic goods, while the income effects include a reduction in purchasing power (Broz and Frieden, 2001) as well as a decline in real wages (Levy-Yeyati, Sturzenegger and Gluzmann, 2013). These income effects also extend to borrowers who face an increased foreign debt burden (Walter, 2008) and higher domestic borrowing costs (Gagnon, 2011). As the benefits of an undervalued exchange rate decline, which I argue is a consequence of global value chain integration, the costs to the government make the policy politically unsustainable.

Global value chains proliferated after the second unbundling of globalization in the late 1980s, but have not abounded in every region. While NAFTA member countries (Canada, Mexico, U.S.) are some of the most integrated in GVCs (61% of intra-regional GVC flows in 2010), to the immediate south, Latin America and the Caribbean continues to be one of the least GVC-integrated regions (only 11% of total GVC flows were intra-regional in 2010).²³ The lowering of communication and transport costs is a necessary condition for these value chains to take root, but they are not sufficient. I also argue that firms seek a predictable environment

²²As tariffs trend towards obsolescence, there is a growing fear that countries will undervalue their currency as a protectionist measure. NPR's Planet Money aptly named this protectionist measure the “secret tariff.” See Kestenbaum 2015.

²³Compared to 42% in East and Southeast Asia and 57% in the European Union according to intra-regional GVC flows data from 2010.

for their long-term investments when building these value chains, which they receive via the “deep provisions” found in regional trade agreements (RTAs). These protections found in RTAs, I argue, are a necessary condition for value chains to burgeon. Moreover, they are an inclusive solution to managing currency manipulators given the material benefits from RTAs, such as increased trade flows and general welfare gains to all RTA partners.²⁴

In summary, policymakers are likely to undervalue the exchange rate when exporting and/or import-competing firms have significant political capital. This policy comes at a cost to consumers, holders of foreign-denominated debt, and importing firms. The benefits of an undervalued exchange rate decrease as more firms integrate in global value chains. These global value chains flourish as countries codify protections for foreign firms in regional trade agreements. Given the limited impact of exchange rate fluctuations conditional on global value chain integration, GVCs become the chains that bind governments from engaging in competitive exchange rate policy. The following section outlines the roadmap for the remainder of this dissertation.

1.3 Roadmap of the Dissertation

How do global value chain linkages affect the exchange rate preferences of socioeconomic actors, and are these linkages empirically important determinants of exchange rate policy within countries? In Chapter 2, I address the first of these questions by elucidating further my theory of global value chain integration and societal exchange rate preferences as outlined in this chapter. Therein, I develop the testable implications of this theory to motivate the analyses that follow.

The remainder of the dissertation provides an overview of the data (Chapter

²⁴Limão 2016 provides a thorough survey of the literature on the determinants and impacts of regional/preferential trade agreements.

3) followed by the empirical tests of my argument on the role that GVCs play in exchange rate politics (Chapter 4) and how regional trade agreements are an inclusive policy action to promote GVC integration, thus mitigating currency conflict (Chapter 5).

In Chapter 4, I address the question asked above, are GVC linkages empirically important determinants of exchange rate policy within countries? I use time-series cross-sectional data from 62 countries between 1995 and 2011 to test the argument that GVC integration puts upward pressure on undervalued exchange rates towards their equilibrium level. I overview the data and show select distributions in Chapter 3. The results uphold the argument that the more integrated a country becomes in global value chains, the weaker its support for an undervalued exchange rate; these results are robust to various empirical specifications and an alternative measure of currency manipulation. This effect seems to be most important for the manufacturing sector, a sector that tends to exhibit incomplete pass-through. I test the effect on five other major sectors finding that manufacturing, which accounts for the majority of GVC participation, has the strongest effect on currency re-alignment.

In Chapter 5, I explore solutions to currency manipulation, testing for the strongest predictors of GVC integration. Here I find that besides the standard gravity model covariates—distance between countries, economy sizes, shared history—the existence of a regional trade agreement between two countries is the strongest predictor of future GVC integration. This provides the best evidence to date that an inclusive, pro-growth policy of further integration via RTAs can address the *beggar-thy-neighbor* policy of currency manipulation. Rather than casting out these countries with punitive measures thus forcing them to utilize inward-looking economic policy that exacerbates the problem, deficit countries concerned with currency manipulators can use international trade agreements to make undervaluation politically unsustainable.

Chapter 6 summarizes the findings and discusses the broader relevancy of the arguments made herein. Moreover, I discuss how the politics of exchange rates will continue to change as firms continue to improve their production processes in a never-ending search to cut costs.

CHAPTER 2

Global Value Chain Theory of Currency Politics

In this chapter, I detail my global value chain theory of exchange rate preferences. I begin by reviewing the literature on the economic policy trade-offs in the post-Bretton Woods era of international capital mobility. In the latter decades of the 20th century, many scholars argued that international capital openness would severely limit domestic economic policy options, leading to a convergence of macroeconomic policies (see e.g., Garrett and Lange, 1991; Andrews, 1994; Milner and Keohane, 1996). The empirical evidence, however, did not support such predictions, leaving states mostly autonomous in their national economic policy decisions (Bearce, 2009). I revisit this debate of macroeconomic convergence, focusing on global value chain integration as a mechanism that constrains monetary policy outcomes, specifically, exchange rate undervaluation.

National economic policy outcomes have distributional effects within an economy, which influence societal preferences and create political cleavages. I examine exchange-rate policy decisions through this lens of societal preferences, arguing that as global value chain integration deepens, societal preferences for relative price stability increases—specifically amongst GVC-dependent firms. Given the relative size and wealth of these firms, their exchange rate preferences dominate, binding governments resolute on undervaluing their exchange rate for competitive gain. Public choice theory provides a framework for understanding the outcome of this political competition: larger, more prosperous societal groups tend to win, often leaving the majority—who find it imprudent to engage in collective action—

with an undesired policy outcome. In this case, global value chain integration aligns the exchange rate preferences of large exporting firms (i.e., multinational corporations or MNCs) with those of domestic consumers (i.e., the majority).

In Section 2.1, I outline the framework for understanding the trade-offs in open-economy economics: capital mobility, monetary autonomy, and exchange rate stability. In Section 2.2, I detail Frieden’s (2014) model for interpreting the trade-offs of exchange-rate policy choice, followed by my theoretical amendments in Section 2.3, which explicitly consider the role of GVCs in exchange rate politics. Finally, I consider the empirical implications of my theoretical model in Section 2.4

2.1 The “Unholy Trinity” of Domestic Economic Policy

The literature on the determinants of societal preferences for national economic policy is vast, but the seminal work is arguably Frieden (1991). Frieden proposes a framework for analyzing the political economy of capital openness in the post-Bretton Woods international economy.¹ He argues that the distributional implications of international capital movements inform the societal preferences for national economic policies, such as financial integration, monetary flexibility, and exchange rate policy. When states allow capital to flow freely across borders, domestic policymakers face a trade-off between monetary policy autonomy and exchange-rate stability. This trade-off is commonly referred to in the international macroeconomics literature as the Mundell-Fleming-Dornbusch trilemma,²

¹The Bretton Woods international economy developed after World War II featured a fully-negotiated international monetary regime that allowed for countries to maintain autonomous monetary policy. This system worked as long as countries maintained controls on the cross-border movement of capital. The post-Bretton Woods era refers to the years following the end of this international monetary regime, when the United States in 1971, unable to defend its peg to gold due to a steady opening of international capital flows, increasing domestic debt, and accommodating monetary policy, officially terminated gold convertibility of the U.S. dollar.

²See Mundell 1960, 1963; Fleming 1962; Dornbusch 1973*a,b*, 1976.

but more often in the political science literature as the “impossible trinity” (Broz and Frieden, 2001) or, more provocatively, the “unholy trinity” (Cohen, 2002). It states that from a menu of three potentially-desirable domestic policy options—(i) international capital mobility, (ii) domestic monetary autonomy, and (iii) domestic exchange-rate stability—policymakers can achieve *at most* two of the three concurrently.

Cross-border capital movements in the first 25 years after World War II primarily took the form of long-term direct investment, e.g., building factories in foreign countries to serve their domestic market. As financial markets evolved, these long-term investments became much larger, the vehicles for capital investment more diversified, the time horizon shorter, and trading more frequent. This put pressure on policymakers to increase capital openness in their domestic economies, which varies widely between developing and developed economies³ and creates a trade-off for policymakers between monetary autonomy and exchange-rate stability, as stated above. Many developing economies resolve this trade-off by imposing limits on capital movement across its borders. China, for example, has maintained some of the most restrictive capital controls,⁴ measuring in the bottom 20th percentile of capital account openness. These capital controls allowed the Chinese government to maintain a fixed and undervalued exchange rate from 1995-2005 while maintaining short-term monetary autonomy.

As with each condition in the trilemma, there are trade-offs in maintaining

³All countries in the Group of Ten (G10) maintained the highest rating of capital openness (2.42) between the years 1995 and 2010. The G10 includes Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom, and the United States. The remaining 44 countries in my sample (consisting mostly of developing/emerging market economies) increased their average capital openness from a low of 0.45 ($\sigma=1.4$) in 1995 to 0.96 ($\sigma=1.4$) in 2010. Capital account openness index from Karcher and Steinberg 2013.

⁴These controls include government permission to transfer capital across borders, preventing foreign companies from investing in core industries, imposing minimum stay requirements on capital, and taxation of cross-border capital movements. See Ma and McCauley 2008 for an analysis on the efficacy of these capital control measures.

international capital mobility. In an international economy with integrated financial markets, there are clear efficiency gains from capital openness for investors and policymakers alike. The ability to attract capital investments from abroad creates more productive opportunities within the domestic economy. Moreover, by allowing the free movement of capital, governments provide a signal to market participants that they will not expropriate wealth from international investors, thus reducing one avenue of state corruption (Jensen, 2003). Most importantly for the argument made in this dissertation, in the highly-integrated contemporary international economy, capital mobility allows firms to hedge against various risks, for example, purchasing foreign exchange derivatives to hedge against exchange rate fluctuations (Garrett, 1998; Knight, 2010)—I will return to this principal of financial hedging later in the chapter. All else equal, international capital openness promotes investment in the domestic economy, leading to further opportunities for domestic economic prosperity.

The imposition of capital controls, on the other hand, have the opposite effect: they impede foreign investment in the domestic economy, provide the government with a tool for domestic and foreign wealth appropriation, and deprive investors of potential opportunities to hedge against risks in the international market.⁵ Why then would a government impose such controls on the free movement of capital? While capital openness allows for investments to flow into a country, it also allows capital to flee, which it can do at an alarming pace. With the globalization of financial markets, a group of investors (or even a single, wealthy investor⁶) can have deleterious effects on a domestic economy by quickly withdrawing capital in a herd-like manner—e.g., the capital flight that preceded the 1994 peso crisis

⁵For a survey of the literature on the effectiveness of capital controls, see Edwards 1999.

⁶For example, George Soros' speculative attack on the pound sterling in 1992 forced the U.K. to withdraw from the European Exchange Rate Mechanism (ERM) on September 16, Black Wednesday. The estimated cost of Black Wednesday was over £3 billion according to the Treasury.

in Mexico, the 1997 Asian financial crisis, or the 2001 Argentine economic crisis, among others. Importantly for this study, the countries who undervalue their currencies also maintain some form of capital controls. This allows them to maintain control over the second and third options of the trilemma, domestic monetary autonomy and exchange rate stability, to which I turn next.

Domestic monetary autonomy simply refers to the ability of national governments to control the levers of monetary policy, in particular, the setting of domestic borrowing costs. By setting the interest rate at a specific level, the government can direct the domestic economy towards specific economic objectives. For example, following an adverse economic shock the central bank may choose to lower interest rates in order to stimulate domestic investment and jump start a sluggish economy. Likewise, when an economy is overheating, the central bank can taper domestic production by increasing the interest rate, which promotes domestic savings and decreases investment. While this autonomy is beneficial in the short term, there can also be long-term benefits to giving up control over monetary policy—e.g., price stability via an inflation anchor, or trade and investment growth from the formation of a currency union. This trade-off between monetary autonomy and exchange rate stability was the focus of much research over the last quarter century.⁷ In this dissertation, I do not take issue with the monetary autonomy trade-offs, but rather focus on the trade-offs within the last option of the trilemma, exchange rate stability.

The third domestic policy option, exchange rate stability, refers to the choice between fixing the domestic currency's value to an external benchmark—such as a fixed asset (e.g., gold) or another country's currency (e.g., China pegged to the U.S. dollar between 1995 and 2005)—or allowing the exchange rate to float.

⁷See e.g., Frieden 1991; Cooper 1992; Garrett 1998; Bernhard and Leblang 1999; Leblang 1999; Bernhard, Broz and Clark 2002; Broz and Frieden 2001; Frieden 2002; Bearce 2003; Simmons, Hainmueller et al. 2005; Walter 2008; Bearce 2009; Frieden 2014. Steinberg and Walter (2012) provide a great survey of the literature.

The long-term benefits of a fixed exchange rate are similar to those of forgoing autonomous monetary policy: price stability and trade promotion (Frankel and Rose, 2002). A country that suffers from chronic inflation may opt to peg its currency to a low-inflation anchor—e.g., Argentina, Brazil, and Mexico pegged their currencies to the U.S. dollar in the 1990s—, thus importing monetary stability by holding domestic inflation at the level of the anchor country (Edwards, 1996). However, many such efforts to peg an exchange rate have ended in spectacular economic collapses due to the costs of maintaining a credible commitment to the peg. For example, Mexico spent \$25 billion in foreign reserves defending the peso’s dollar peg in 1994 and, despite borrowing a further \$25 billion, ultimately retreated to a floating exchange rate sending the peso diving in value and sparking a banking and credit crisis (Obstfeld and Rogoff, 1995).

While some countries commit to an exchange rate peg to signal a credible inflation target, other countries heavily-engaged in international trade may find it optimal to create a currency union—e.g., the European Monetary Union (EMU). The lack of currency variation and volatility between countries creates an optimal setting for engaging in international transactions. These so-called optimum currency areas⁸ (OCAs) lead, on average, to a three-fold increase in trade between currency union members and a one-third of a per cent increase in per capita income for every one per cent increase in a country’s overall trade as a share of GDP (Frankel and Rose, 2002). Although a common currency provides lower and more stable inflation, lower interest rates, and increased trade, this comes with the cost of no independent monetary policy, thus constraining domestic responses to an economic shock. The argument laid out in this dissertation has the closest parallels to that of OCA theory: as countries become more integrated in global value chains, they may find it optimal to maintain exchange rate stability, albeit not necessarily with a fixed exchange rate, but with a relatively stable exchange

⁸The seminal work on OCAs is Mundell 1961.

rate that is not purposefully misaligned, or more specifically, not undervalued.

The tradeoff for exchange rate stability is the ability to control the exchange rate level: a relatively weak/depreciated currency versus a relatively strong/appreciated currency. A currency depreciation lowers the domestic price of traded goods, making exports more competitive in the international market. Conversely, a currency appreciation increases the domestic price of traded goods, making exports more expensive and imports cheaper. The income and substitution effects of these exchange rate movements inform the societal preferences for exchange rate policy. It is within this dimension of the trilemma that I explore the potential for economic convergence. In the next section, I delve deeper into the exchange rate component of the trilemma, using Frieden (2014) as a framework for understanding the societal preferences that materialize from the distributional consequences of exchange rate fluctuations.

2.2 Foundations of Currency Politics

Frieden (2014) derives the exchange rate policy preferences of socioeconomic actors—workers, consumers, firms, sectors, or other social groups— from an examination of the distributional impact of the policy choice. The preference over the exchange rate *regime* and *level* is determined by three critical factors⁹ (note that going forward I will explicitly discuss the exchange rate preferences in terms of *firms*, but these preferences should follow for any socioeconomic group involved in global value chains):

1. *International exposure*: the greater a firm’s immersion in cross-border trade

⁹Frieden 2014, p. 20 notes that there are a multitude of ways to add nuance to an analysis of exchange rate preferences, but limits his analysis to these three factors, which he believes (as does this author) provide a strong foundation for a broader analysis of exchange rate politics.

and investment, the greater its support for a fixed exchange rate.¹⁰

2. *Pass-through*: the more incomplete a firm's pass-through—i.e., the more limited the effect of a change in the exchange rate on domestic prices—the greater its support for a fixed exchange rate.¹¹
3. *Tradability*: (1) the larger the share of tradable (non-tradable) goods and services in a firm's output (inputs), the stronger its support for a depreciated exchange rate. (2) And conversely, the larger the share of tradable (non-tradable) goods and services in a firm's inputs (output), the stronger its support for an appreciated exchange rate.¹²

Several studies have tested these predictions and the results vary on the predictions of international exposure and tradability.¹³ This leaves open the possibility that adding more nuance to the conditions of international exposure and tradability—specifically, the role of GVCs—may better explain exchange rate preferences. Moreover, Amiti, Itskhoki and Konings (2014) have found that exporting firms with low pass-through are more likely to be heavily-reliant on imported inputs, i.e., GVC-dependent. This finding provides a parallel between GVC-dependence and Frieden's prediction on how exchange rate pass-through affects a firm's exchange rate preference, which I address in Section 2.3. But first, I provide further details on each of the three factors Frieden uses to inform societal exchange rate preferences.

¹⁰ *Ibid.*, p. 23.

¹¹ *Ibid.*, p. 35.

¹² *Ibid.*, p. 28.

¹³ Again, see Steinberg and Walter (2012) for a comprehensive survey of the literature.

2.2.1 International Exposure to Exchange Rate Fluctuations

Exchange market volatility tends to harm socioeconomic groups exposed to exchange rate fluctuations, for example, international traders and investors and the producers of tradable goods and services.¹⁴ These actors tend to prefer exchange rate stability over monetary flexibility; they can respond to a dip in domestic demand by shifting business to foreign markets.¹⁵ Frieden (2002) cites the role of these actors in the early years of European monetary integration: the higher the level of manufactured exports to Germany and Benelux, the more fixed a country's exchange rate became with the Deutsche Mark. Those who stood to profit from the predictability of a fixed exchange rate supported monetary integration in the Eurozone, whereas those who stood to lose, especially import-competing firms, opposed integration and preferred monetary autonomy to adjust to domestic macroeconomic conditions.

Scholars argued in the 1990s and 2000s that as exporters and international investors grew in wealth and size—and thus, political power—that there could be a similar movement toward monetary convergence (fixed exchange rates and similar interest rates) across the advanced industrial democracies. As Bearce (2009) reveals, however, this monetary convergence hypothesis was not supported by the data. A potential explanation is that there tends to be very little lobbying for exchange rate policy (Broz and Frieden, 2001). This lack of lobbying for specific exchange rate policy may be due to economy-wide effects of the policy (versus the sector- or product-specific effects of most trade policy) or because firms find other means to protect against exchange rate risk. Knight (2010) argues that firms can save time and resources lobbying for government action on exchange rates by

¹⁴Frieden (1991) notes that tradables producers whose competition is not primarily on price but instead on quality will be less sensitive to exchange rate fluctuations.

¹⁵Bearce and Tuxhorn (2017) find evidence of these preferences from original survey work, which shows that individuals whose employer does the majority of its business in foreign markets have a lesser preference for domestic monetary flexibility.

instead hedging against exchange-rate risk within the firm. Firms can substitute government policy with either operational hedging, that is, moving production to other countries, or financial hedging, the purchasing of foreign exchange derivatives. Financial hedging protects a firm's currency exposure over a lengthy time horizon. Due to the cost of these financial derivatives and their inability to completely protect firms against currency movements, a firm's support for a fixed exchange rate will tend to increase with "its reliance on long-term implicit or explicit contracts denominated in foreign currency," or "the length of its investment horizons."¹⁶ Moreover, firms engaged in operational hedging may carry substantial foreign-currency debts, which, according to Frieden, weakens a firm's support for an undervalued currency. Operational and financial hedging are both costly and do not change the bottom-line preferences of the firm: if exchange rates regulate the relationship between domestic and foreign prices, and the profitability of an internationally-exposed firm critically depends on the predictability of exchange rate movements, then a firm involved in cross-border trade or investment will prefer a relatively stable (or fixed) exchange rate.

2.2.2 Exchange Rate Pass-Through

The relationship between exchange rates and prices is an important element to the understanding of currency politics. Prices tend to be relatively rigid (often called "sticky" prices), taking some time to respond to exchange rate movements. This exchange rate pass-through (ERPT)—i.e., the extent to which prices respond to exchange rate changes—is an essential component in competitive exchange rate policy. The mechanism through which a currency depreciation transmits to the real economy is via expenditure switching (by consumers and domestic producers reliant on foreign inputs) from foreign to domestic goods. If prices

¹⁶Frieden 2014, p. 23.

are sensitive to exchange-rate movements, then a depreciation should induce the sort of substitution effects that boosts exports and diminishes foreign imports. It follows that export-oriented producers and import-competing firms would prefer a relatively weak (and flexible) exchange rate. However, if prices are insensitive to exchange rate movements—i.e., ERPT is incomplete—then these same producers would prefer currency flexibility less, and likewise, a fixed exchange rate more. According to Frieden (2014, p. 35), “This implies that concern over the level of the exchange rate will be concentrated in sectors with full or nearly full pass-through, while concern over exchange rate risk will be concentrated in sectors with incomplete pass-through.” The sectors with full or nearly full pass-through include food and energy, while manufacturing tends to exhibit incomplete pass-through.¹⁷

Burstein and Gopinath (2014) provide a survey of the empirical and theoretical literature on the relationship between prices and exchange rates. They find that, due to local price-setting, ERPT into consumer prices is lower than into prices of goods as they come into the dock—i.e., border prices. Moreover, ERPT into these border prices tends to be incomplete in the long run, but this varies considerably across countries. Together with empirical evidence from periods of large devaluations, their findings point to limited expenditure switching for small or moderate exchange rate movements, but the *possibility* of higher expenditure switching for (i) intermediate inputs at the producer level or (ii) large devaluations that accompany a large economic contraction. The former findings directly relate to the argument made in this dissertation. If global value chains rely on the cross-border trade of intermediate inputs and the evidence points to potentially high expenditure switching from a small or moderate exchange rate movement, then GVC-dependent firms should be very much concerned with exchange rate stability. This follows from the findings of Amiti, Itskhoki and Konings (2014) who

¹⁷See Campa and Goldberg 2005 for pass-through estimates by sector across OECD countries.

reveal that sectors with incomplete pass-through are more likely to be heavily-reliant on imported inputs; these sectors will tend to be more concerned with exchange rate risk as stated above. With regards to the finding on large devaluations and expenditure switching, my theoretical argument is based on empirical work that explores the effects of devaluations on ERPT using more recent data. The data used in Burstein and Gopinath (2014) are mostly from large devaluations in the 1990s,¹⁸ before GVCs fully flourished, and thus may not pick up the more contemporaneous effects (or lack thereof) of currency devaluations in GVC-integrated countries as in Ahmed, Appendino and Ruta (2015), Ollivaud, Rusticelli and Schwellnus (2015), and Cheng et al. (2016).

2.2.3 Tradability of Inputs and Outputs

A firm's profits will be increasing in output prices and decreasing in input prices, and thus firm-level exchange rate preferences will be dependent on a firm's mix of inputs and outputs. Frieden (2014) varies these inputs and outputs along a tradability continuum, where some firms produce more tradable goods and others more non-tradable goods.¹⁹ Firms with *(i)* a larger share of tradable goods and services in their total output and/or *(ii)* a larger share of non-tradable goods and services in their inputs should prefer, all else equal, a relatively depreciated exchange rate. Conversely, firms with *(iii)* a larger share of non-tradable goods and services in their total output and/or *(iv)* a larger share of tradable goods and services in their inputs should prefer a relatively appreciated exchange rate. Where

¹⁸Episodes of large devaluations used in Burstein and Gopinath 2014: Finland, Italy, Sweden, and U.K. (1992); Mexico (1994); Korea (1997); Thailand (1997); Brazil (1998); Argentina (2001); and Iceland (2007).

¹⁹A tradable good or service is, as the name implies a good or service that can be sold in a location away from where it is produced—e.g., exporting an automobile, selling domestic stocks to a foreign buyer, or a technology customer service desk fielding calls from a foreign country. A non-tradable good or service is one that cannot be sold elsewhere, for example, construction services, electricity supply, or a haircut.

then does this leave firms involved in global value chains, i.e., tradable outputs that rely on tradable or non-tradable inputs? According to this continuum, there are discordant expectations about exchange rate preferences.

I illustrate the discordant exchange-rate preferences in Figure 2.1. The rows of the 2×2 matrices delineate a firm's expected preference for the exchange-rate regime, differentiated by international exposure, while the columns delineate a firm's expected preference for the exchange-rate level, differentiated by the total tradability of their inputs and outputs, respectively. The expected preferences only change along the tradability dimension (columns) between matrices—note, that in this simple framework, I do not include ERPT, but will do so when I introduce GVCs to the model. Clearly there are competing preferences over the level of the exchange rate, conditional on whether a firm's operations rely on outputs or inputs, as well as their tradability. A large, multinational firm integrated in GVCs will undoubtedly rely on foreign markets to sell its goods and/or services, as well as foreign inputs to produce the good or service. Accordingly, this internationally-exposed firm, reliant on tradable inputs *and* outputs, will have unique exchange rate preferences that meet its goal of profitability.

My characterization of Frieden's expected preferences is not to insist that he is incorrect in the formation of his model or challenge the findings therein. In fact, Frieden acknowledges the role of global value chains in determining preferences over the exchange rate regime: "An enterprise that relies heavily on earnings from exports or foreign production, or is a substantial user of imported inputs or capital, can be hard hit by exchange rate fluctuations" (2014, p. 22). These firms, he asserts, should exhibit greater support for a fixed exchange rate. The issue arises when empirical studies do not consider the nuances involved in firm production structures, measuring a country's tradability of inputs and outputs separately, rather than as an integrated network as in this dissertation. In the next section, I propose an amendment to this simplified model that explicitly

incorporates GVC integration.

Figure 2.1: Expected Preferences for International Exposure and Tradability

		Tradability of Outputs	
		Low	High
International Exposure	Low	Flexible (+)	Flexible (-)
	High	Fixed (+)	Fixed (-)

		Tradability of Inputs	
		Low	High
International Exposure	Low	Flexible (-)	Flexible (+)
	High	Fixed (-)	Fixed (+)

Note: (+) defines a preference for a strong (appreciated) exchange rate; (-) defines a preference for a weak (depreciated) exchange rate.

2.3 The Chains That Bind: GVCs and Currency Politics

At the outset of this chapter, I proposed that the earlier debates on monetary convergence deserve a reconsideration in light of changing patterns of international trade, in particular, global value chain integration. As I illustrated in the previous section, discordant preferences over the exchange-rate level arise when considering the tradability of a firm's inputs and outputs, a critical feature of large, multinational firms. In this section, I propose a model of exchange rate preferences that explicitly accounts for GVC integration. Rather than the divergent preferences over the exchange rate level drawn from a firm's input/output tradability, I follow Frieden's (2014) conjecture that a firm heavily reliant on foreign inputs will prefer exchange rate stability, all else equal. However, rather than predicting support for a fixed exchange rate, I propose that firm's support a stable, equilibrium-level exchange rate (SELXR), meaning a flexible exchange rate with minimal deviations from its equilibrium value. This allows for relative exchange-rate stability as well as freedom for policymakers to utilize the full toolkit of monetary responses following an economic shock. For currency manipulators specifically, this translates into upward pressure on the exchange rate as they become more integrated in GVCs.

In modeling the exchange rate preferences of firms, I maintain the three economic factors in Frieden (2014)—international exposure, ERPT, and tradability of inputs and outputs—but combine the characteristic of input and output tradability into one category: GVC participation. As firms rely more and more on foreign inputs to make up their final goods (whether for export or domestic consumption), an undervalued currency will make these intermediate inputs more expensive to import, thus offsetting the benefits of an undervalued currency for producers and exporters alike. Indeed, recent studies have found that the elasticity of exports to the real effective exchange rate (REER)—a measure of price

competitiveness—has decreased over time, a finding that the authors attribute to GVCs (Ahmed, Appendino and Ruta, 2015; Ollivaud, Rusticelli and Schwellnus, 2015; Cheng et al., 2016). The authors’ conclusion that currency depreciation (or undervaluation) no longer gives a boost to exports provides the micro-foundation for my theoretical model. Moreover, as I will explicate later, “moving up the value chain” also has an impact on exchange rate preferences as highly-specialized goods and services tend to exhibit incomplete ERPT.

Figure 2.2 illustrates the predicted exchange rate preferences for socioeconomic groups conditional on their (*i*) participation in GVCs and (*ii*) international exposure to exchange rate risk. As before, international exposure predicts the exchange rate regime, where highly-exposed firms prefer a fixed exchange rate, all else equal, and less-exposed firms prefer monetary autonomy via a flexible exchange rate (see the top line of each row within the matrix). The level of participation in GVCs constitutes the columns of the matrix and dictates a firm’s preference for the exchange rate level. Aggregating these firm-level preferences to the country level, I include in each cell of the matrix a country example that fits the cross-section of international exposure and GVC participation, with the corresponding percentage of trade involved in each—I estimate international exposure by a country’s total exports as a share of GDP and GVC participation by total value added involved in GVCs as a share of total exports.

For firms with low participation in GVCs (left column, Figure 2.2), I also condition their exchange rate preference on their international exposure. A firm that does not rely on GVCs and has low international exposure would prefer an appreciated currency given the increased purchasing power of domestic consumers, e.g., Argentina, which maintained an overvalued exchange rate for years prior to its 2001 financial crisis and subsequent devaluation. Argentina is not highly-exposed internationally (23.6% export-to-GDP ratio in 2011), nor is it heavily-reliant on GVCs (30.5% participation index); recall that Latin America and the Caribbean

Figure 2.2: Expected Preferences for International Exposure and GVC Participation

		GVC Participation	
		Low	High
International Exposure	Low	Flexible (+) e.g., Argentina (23.6%, 30.5%)	Flexible (SELXR) [†] e.g., Japan (15.2%, 47.4%)
	High	Fixed (SELXR) [†] e.g., Saudi Arabia [‡] (54.3%, 12.2%)	Fixed (SELXR) [†] e.g., Singapore (107.7%, 61.6%)

Note: (+) defines a preference for a strong (appreciated) exchange rate; (−) defines a preference for a weak (depreciated) exchange rate. Values for each row and column category in parentheses, i.e., (Exports as a share of GDP, Value added in GVCs as share of total exports). †: preference for a stable, equilibrium-level exchange rate (SELXR). ‡: Countries with low GVC participation but with a high international exposure tend to be exporters of raw materials, e.g., Saudi Arabia, Brunei Darussalam, and New Zealand.

is the least integrated in intra-regional GVC linkages.

For firms with low participation in GVCs and *high* international exposure would tend to prefer a fixed and/or stable, equilibrium-level exchange rate (SELXR), given the type of exports: firms who fall in this quadrant (bottom-left) tend to be exporters of primary commodities such as petroleum or agriculture, sectors where the prices tend to be set on international markets. For example, Saudi Arabia is very internationally exposed (54.3% export-to-GDP ratio), but given that it mostly exports raw materials, it falls in the bottom decile of the participation index (12.2%). The model predicts that Saudi Arabia would prefer a fixed exchange rate, and indeed, it has maintained a pegged exchange rate since the 1970s.

Firms that are highly dependent on GVCs (right column, Figure 2.2) will generally prefer a stable, equilibrium-level exchange rate (SELXR), all else equal. Note that in the bottom-right quadrant (as in the bottom-left quadrant), the preference is for a fixed exchange rate with a stable level, ostensibly a redundant classification. Here, however, I allow for countries who are heavily integrated in GVCs—as well as exhibit other factors of an OCA—to prefer a fixed exchange rate via a currency union, e.g., the eurozone. As I will illustrate in the next chapter, the eurozone is heavily integrated in intra-European trade, including in GVCs, which has correlated with exchange rate convergence amongst newly-acceded EU member states who have maintained currency sovereignty (e.g., Czech Republic, Hungary, Poland) and in some cases exhibit anti-EU rhetoric that should predict competitive currency policy but is not reflected in the data (e.g., Hungary).

Japan is an example of a country that is not very internationally exposed (exports comprise 15.2% of GDP) but is heavily reliant on GVCs (47.4% of gross exports involved in GVCs). Despite the Abenomics plan to depreciate the yen, the model predicts that the country should, all else equal, prefer a SELXR over an undervalued exchange rate. Finally, Singapore, a small, open economy, is very internationally exposed (107.7%) and heavily reliant on GVCs (61.6%). Deemed a currency manipulator by the Peterson Institute for International Economics, this model predicts that Singapore would find it politically unsustainable to maintain an undervalued currency given the decreasing economic benefits (and high costs) of such a policy choice.

General participation in GVCs provides the foundations for this theory of exchange rate preferences; however, as before, adding nuance to the model illuminates further how GVCs can affect exchange rate policy. Specifically, the position within the production network—i.e., upstream or downstream—and the sector of specialization also inform exchange rate preferences. Before investigating how the position or sector may affect preferences, it is important to clarify a com-

mon phrase used when discussing global value chains: The phrase “moving up the value chain” refers to a firm or country upgrading from low-skilled, low cost exports, such as textiles, to more highly-specialized exports, such as electronics, automobiles, or professional business services, whereas the terms “upstream” and “downstream” refer to the specific position along the value chain, with upstream industries providing the initial inputs that make their way downstream to be made into final goods. For example, the inputs that make the Boeing Dreamliner jet originate from arms-length firms spanning the globe: Latecoere (France) provides the passenger entry doors; Messier-Dowty (France) the landing gear; Alenia (Italy) the horizontal stabilizer and center fuselage; Fuji (Japan) the center wing box; Mitsubishi (Japan) the wings; GS Yuasa (Japan) the lithium-ion batteries; Kawasaki (Japan) the front fuselage, main landing gear wheel well, and fixed trailing edge of the wings; KAA (South Korea) the wing tips; Saab (Sweden) the cargo access doors; and Rolls-Royce (United Kingdom) the engine (along with General Electric in the United States).²⁰ These inputs flow downstream from their respective upstream origins to Everett, Washington (United States) for final assembly and export.

The rationale for why the position would matter follows from my earlier argument on GVC participation. A firm that is heavily reliant on foreign inputs—e.g., Boeing—would prefer a relatively stable exchange rate due to the price effects of exchange rate fluctuations. These firms tend to be downstream in the value chain and are said to be heavily reliant on “backward linkages,” in technical terms, a high ratio of foreign value added as a share of gross exports. Firms that export the inputs to be used by the downstream firms—e.g., Rolls-Royce in the U.K.—will tend to have exchange rate preferences that parallel those of traditional exporting firms, i.e., a relatively depreciated exchange rate. However, the more specialized

²⁰Sam Ro, “Boeing’s 787 Dreamliner is made of parts from all over the world,” *Business Insider*, 10 October 2013. <http://www.businessinsider.com/boeing-787-dreamliner-structure-suppliers-2013-10?utm>.

the export—again, e.g., engines from Rolls-Royce—the stronger the support for a relatively stable exchange rate. This is not because of the foreign value added (or GVC-dependence) argument I offered before, but because of the exchange rate pass-through (ERPT) to such goods. Recall from Section 2.2.2, firms that produce highly-specialized goods or services will tend to exhibit incomplete pass-through, i.e., a change in the exchange rate will not pass-through to the price of the good. Thus, as firms “move up the value chain,” they will tend to prefer a relatively stable exchange rate regardless of their position on the value chain, all else equal. On the other hand, upstream firms that exhibit more complete passthrough—e.g., they produce low-skilled inputs such as nuts and bolts—would continue to prefer a relatively depreciated exchange rate, similar to a traditional exporting firm.

Assuming that global value chains have the proposed effects on currency values, policymakers concerned with the *beggar-thy-neighbor* currency practices of other countries may find it beneficial to pursue policies that deepen these countries’ integration in value chains, thus binding their currency choices. Baldwin (2016) argues that the second unbundling, which led to the fragmentation of production across borders, began after the ICT revolution lowered communication costs between countries. This was a necessary condition but not sufficient for spurring the drastic growth in value chains and the convergence in incomes between North and South after the 1980s. While ideas could flow easier to other countries, not all economies have been as involved in production networks as others. I argue that it is the deep provisions found in regional trade agreements (RTAs) that affords firms the protections required to outsource production to foreign countries. Of course economic geography also matters and thus distance, shared language, and a common history will also be contributing factors in the proliferation of GVCs. However, the critical factor that leads to further integration in GVCs will be a RTA between partner countries. In Chapter 5, I expound further on how RTAs affect GVC integration and why this policy choice is Pareto-improving for all

parties involved. But first, in the following section I propose a series of testable hypotheses of my theoretical model as elucidated in this chapter.

2.4 Empirical Implications of the Theoretical Model

The theory outlined above lends itself to testable hypotheses. I propose a series of hypotheses that underscore the role international exposure, sectoral specialization, and global value chain linkages have in explaining exchange rate values. In particular, these testable hypotheses seek to show how increases in GVC participation can lead to exchange rate preferences for a stable, equilibrium-level exchange rate.

H1: The greater an economy's exports as a share of GDP, the stronger the preference for an undervalued exchange rate.

A firm's preference for exchange rate policy is contingent upon their exposure to international trade and investment. An exporting firm will prefer a relatively depreciated or undervalued currency. At the national level, the greater an economy's exports as a share of GDP—i.e., the more firms that are reliant on export markets—, the more the exchange rate will deviate (negatively) from its equilibrium level. This follows from Frieden's proposition on the role of *tradability* and *international exposure* in exchange rate preferences.

H2: The greater an economy's participation in global value chains, the weaker the preference for an undervalued exchange rate and the smaller the deviation of the exchange rate from its equilibrium level.

Firms that rely heavily on the cross-border exchange of intermediate inputs will not prefer an undervalued exchange rate (as in H1). The greater an economy's reliance on global value chain linkages, the weaker the preference for an undervalued exchange rate and the less the exchange rate will deviate from its equilibrium

level. However, the true preference may be uncertain due to the components that make the global value chain index: backward and forward linkages. Thus, I create two additional, more nuanced, hypotheses for these separate linkages.

H2(a): The greater an economy's participation in backward linkages, the weaker the preference for an undervalued exchange rate and the smaller the deviation of the exchange rate from its equilibrium level.

Firms that rely heavily on imported intermediate inputs will not prefer an undervalued exchange rate, but rather a stable, equilibrium-level exchange rate. This hedges against the exchange rate risk that comes with international trade. The greater an economy's participation in backward linkages, the weaker the preference for an undervalued exchange rate and the less the exchange rate will deviate from its equilibrium level.

H2(b): The greater an economy's participation in forward linkages, the stronger the preference for an undervalued exchange rate.

Firms that rely heavily on exporting intermediate inputs behave similarly to firms exporting final goods. An undervalued exchange rate provides a competitive boost to exports. Thus, the greater an economy's participation in forward linkages, the more the exchange rate will deviate (negatively) from its equilibrium level.

H3: The greater an economy's share of exports involved in GVCs with incomplete exchange-rate pass-through (highly-specialized goods and services), the weaker the preference for an undervalued exchange rate and the smaller the deviation of the exchange rate from its equilibrium level.

Firms that specialize in producing a good or service that exhibits incomplete exchange-rate pass-through will be sensitive to exchange rate movements. This sensitivity may arise from the level of specialization of the good or service—highly-specialized goods tend to exhibit more price rigidities than primary or lower-skilled

goods/services—or the reliance on foreign inputs—i.e., a high reliance on backward linkages. Note that these goods/services can be final or intermediate goods or services, thus, this hypothesis is also an offshoot of H2(b). I test hypotheses H1-H3 in Chapter 4.

H4: A main determinant of GVC integration between two countries, besides the traditional covariates of a standard gravity model—distance and economy size—, is the presence of a regional trade agreement (RTA) between the two countries.

The ICT revolution lowered communication costs between countries, but many trade barriers remained between North and South, and many developing countries in the South lacked the business-friendly environment that would attract investment from the North. Despite many bilateral investment treaties (BITs) between North and South, the development of global value chains would not explode until trade barriers were lowered and the “deep provisions” found in RTAs protected firms doing business in foreign countries. In Chapter 5, I test if the presence of a RTA between two partner countries is a crucial factor in GVC integration.

CHAPTER 3

Cross-Country and Sectoral Patterns in International Economic Policy

In this chapter I present the data on currency manipulation, global value chains, and other covariates that may affect a currency's value. Where necessary, I display the distributions of these data, relegating complete time-series plots of all variables, grouped by country, to Appendix A. All data are annual observations at the country level between 1995 and 2011, the years for which GVC data are available. I extend the data to 2015, where possible, in order to illustrate more contemporary patterns in currency values. The analyses follow in Chapter 4.

3.1 Estimating Currency Misalignments

The persistent (and, in some bilateral cases, widening) current account misalignments at the international level have resurged allegations of countries engaging in distortionary currency practices. In order to test my theory that global value chain integration puts upward pressure on undervalued exchange rates towards their stable, equilibrium value, I require a relatively precise calculation of my outcome variable: exchange rate misalignment. I do not claim to have an exact measure of a country's currency misalignment; however, in much the same way that we make assumptions about our empirical models in order to get a close approximation of the true value of the relationship between variables, I am confident that the two measures I describe below give a close approximation of a

currency's true misalignment.

The first element in my calculation, the measure of a country's real effective exchange rate (REER), is readily available and the measure chosen easily defended. The REER is an index of a weighted average of bilateral exchange rates adjusted by a measure of prices amongst trading partners. This tends to be a better indicator of the macroeconomic effects of exchange rates than a bilateral measure—e.g., the USD to EUR exchange rate differential only provides an estimate of price competitiveness between the U.S. and the Eurozone, while the USD REER gives the international competitiveness of the USD with respect to its largest trading partners (in this case, top-30 trading partners).

The calculation of the second element, a country's equilibrium real exchange rate (ERER), is trickier given the various estimation techniques, each with particular assumptions that produce nuanced results. I use as my primary estimation technique the behavioral equilibrium approach in Couharde et al. (2017)—the authors' EQCHANGE database contains these estimations for 182 economies between 1973 and 2016—and the Balassa-Samuelson approach (Balassa, 1964; Samuelson, 1964) as a secondary robustness check.

The behavioral equilibrium exchange rate (BEER) approach to estimating equilibrium real exchange rates (henceforth, ERERs) considers the ERER as a function of a country's medium- and long-term fundamentals. I use this approach for two key reasons: First and foremost, availability of the data. Couharde et al. (2017) estimate the BEER for the majority of country-year pairs in my sample—except for the European Monetary Union and Taiwan—and is publicly available in their EQCHANGE database. They also provide the currency misalignment measure by subtracting from this estimate their calculation of a country's REER.¹

¹I use the narrow estimate of a country's REER, which includes the top-30 trading partners in the weighting system, as opposed to the broad estimate which includes all countries. Moreover, I use the time-varying weighting system, i.e., the top-30 trading partners can vary over a 5-year window. The database also includes fixed weighting systems, with time periods of 1973-2016

The second reason for using this approach is that unlike other approaches that require normative projections of a country's current account balance—e.g., the macroeconomic balance approach or the external sustainability approach—the BEER approach directly estimates the ERES for each country using medium- and long-term fundamentals of the real exchange rate. These fundamentals, which are estimated sequentially, include: (i) productivity changes between the tradable and non-tradable sectors, relative to trading partners—i.e., the Balassa-Samuelson approach, which I will estimate separately as a robustness check; (ii) net foreign asset position; and (iii) terms of trade.

An improvement of these three medium- and long-term fundamentals is expected to appreciate the ERES. First, the Balassa-Samuelson effect (Balassa, 1964; Samuelson, 1964) takes into account that as countries grow wealthier, due to an increase in productivity, wages, and prices in the tradable sector relative to non-tradables, there should be a commensurate appreciation of the real exchange rate. Second, when a country runs a current account deficit, it builds up liabilities to the rest of the world, which requires it to eventually run a current account surplus to repay what it has borrowed. A country running a current account deficit, therefore, will tend to have an appreciated exchange rate, which requires a depreciation of its real exchange rate to offset its net foreign asset position. Finally, as noted in Couharde et al. (2017), the impact of changes in the terms of trade on the ERES is theoretically ambiguous. Recall from Chapter 2 how an exchange-rate change can have both income and substitution effects. An improvement in the terms of trade—the price of exports increases relative to imports—leads to domestic consumers substituting domestic goods for cheaper, foreign imports. The resulting overvalued exchange rate will have to depreciate to restore external balance. Consequently, the improved current account has income effects which may stimulate demand for non-traded goods, thus increasing domes-

and 2008-2012. Using different weighting systems does not change the main results.

tic prices and leading to an appreciation of the ERER. According to the empirical findings of De Gregorio and Wolf (1994), the income effect tends to dominate the substitution effect, and thus, the net result of an increase in the terms of trade is an appreciation of the ERER.

The authors estimate these three models in a panel setting, with the following form:

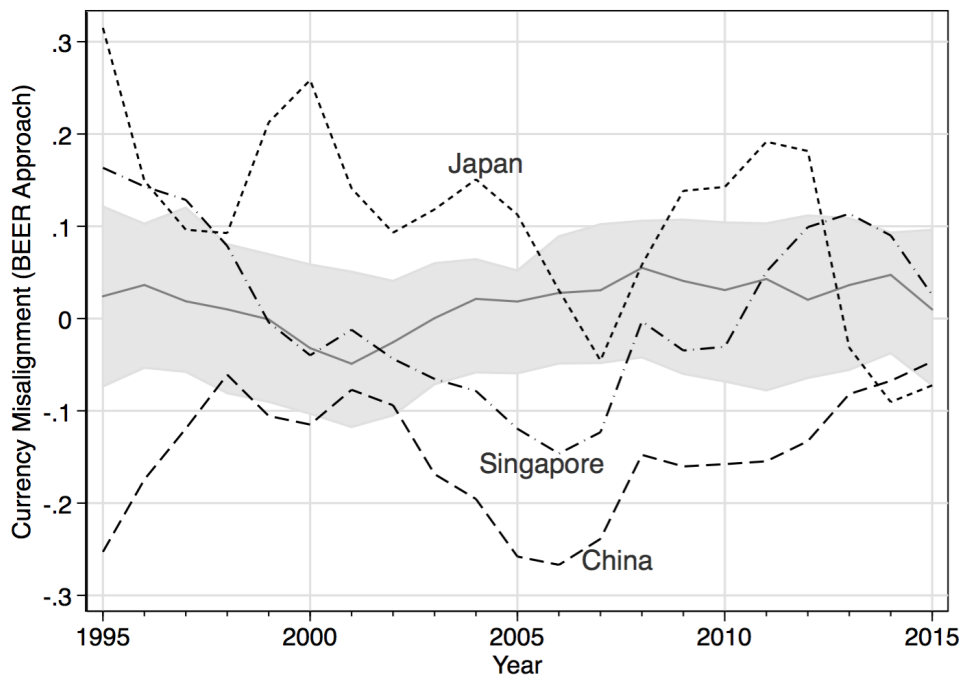
$$\text{(Model 1) : } REER_{it} = \mu_i + \beta BS_{it} + \epsilon_{it} \quad (3.1)$$

$$\text{(Model 2) : } REER_{it} = \mu_i + \beta_1 BS_{it} + \beta_2 NFAP_{it} + \epsilon_{it} \quad (3.2)$$

$$\text{(Model 3) : } REER_{it} = \mu_i + \beta_1 BS_{it} + \beta_2 NFAP_{it} + \beta_3 ToT_{it} + \epsilon_{it} \quad (3.3)$$

The ERERs are derived from the fitted value of the REER given by the estimated equilibrium relationship in the models. Figure 3.1 displays a sample of currency misalignment estimates using this approach. The light grey shaded area covers the 25th to 75th percentiles of the sample of 60 countries with the mean denoted by the dark grey line. Notably, China maintains an undervalued exchange rate throughout the sample; however, the decision by the People’s Bank of China to allow the RMB to appreciate post-2005 is clear by the continuing upward trajectory through 2015. The same is true for Singapore, another country deemed a currency manipulator, but with a slightly overvalued exchange rate at the end of the sample period. Japan shows the most variation in its currency misalignment, with a steep (and purposeful) depreciation of the yen in 2012 following the election of Shinzo Abe—the yen fell 14% against the U.S. dollar over the period of a year. Appendix A provides time-series plots for each country in the sample.

Figure 3.1: Currency Valuation (BEER Approach), Country Sample



Note: The light grey shaded area covers the 25th to 75th percentiles of the sample of 60 countries with the mean denoted by the dark grey line—missing estimates of Taiwan and the eurozone, but individual eurozone member countries (EA12) included. The BEER (behavioral equilibrium exchange rate) approach estimates the deviation of a country’s exchange rate from its long-run equilibrium by considering the relationship between the real exchange rate and its fundamentals, in particular, the terms of trade, the net foreign asset position, and the relative productivity of the tradable sector. A value below zero denotes an undervalued exchange rate; above zero, an overvalued exchange rate.

As noted before, the BEER estimates in the EQCHANGE database do not include estimates for Taiwan or the Euro area.² Thus, as a robustness check, I also estimate all of my models using the Balassa-Samuelson approach,³ as explained

²I use the Euro area 12 (EA12) as my estimate of the eurozone given the numerous additions to the currency bloc during the latter years of the sample period, 1995-2011. For robustness checks, I also exclude the EA12 and all EU countries that have or will accede to the eurozone and the results hold. The EA12 consists of Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain.

³See Balassa 1964 and Samuelson 1964. I use this as a secondary measure because the Balassa-Samuelson assumptions on price-determination and factor mobility do not always characterize accurately the features of a currency manipulator’s economy—e.g, China. Thus, the BEER approach is a better estimate of a country’s ERER.

earlier. I follow Rodrik’s (2008) approach in adjusting for Balassa-Samuelson effect. Utilizing data from the Penn World Table Version 9.0 and the Organization for Economic Cooperation and Development’s statistical division, OECD.stat, for the Euro area (12 countries),⁴ I first calculate the real exchange rate (RER) for each of the 51 countries in the sample (50 individual countries and the EA12). This is determined by dividing a country’s nominal exchange rate by its purchasing power parity (PPP), which I invert for ease of interpretation. The inverted RER allows me to classify negative deviations from the equilibrium exchange rate as an undervaluation and positive deviations as an appreciation; it also makes for an easier interpretation visually. Second, I estimate the equilibrium exchange rate by regressing the logged RER on logged real GDP per capita (RGDPPC) with year fixed effects:

$$\ln RER_{it} = \alpha + \beta \ln RGDPPC_{it} + f_t + \epsilon_{it}, \quad (3.4)$$

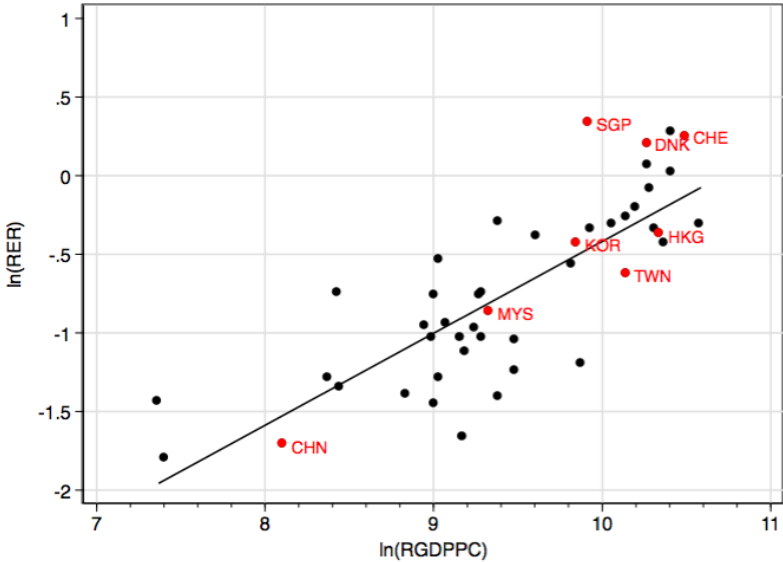
where f_t is the year fixed effect and ϵ_{it} is the error term. The estimated β from Equation 3.4 is 0.56 with a very high t -statistic of 39.6, suggesting a strong and accurately estimated Balassa-Samuelson effect (as incomes rise by 10 per cent, the RER increases by around 5.6 per cent). Finally, to calculate the main outcome variable, exchange rate under/overvaluation, I take the difference between the measured real exchange rate and the Balassa-Samuelson-adjusted exchange rate—i.e., the residual from Equation 3.4.

Figures 3.2a and 3.2b illustrate this estimation procedure for the years 1995 and 2011, respectively, with currency manipulators in RED. Most currency manipulators are below the fitted line, meaning their currencies are undervalued

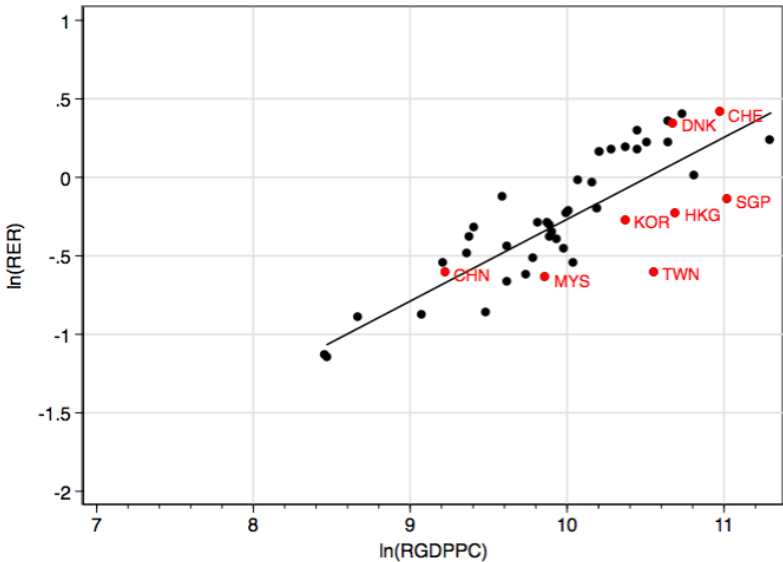
⁴I only include those countries that acceded into the eurozone by 2001. Although five more countries acceded between 2007 and 2011, this occurs in the midst of the Great Recession, a sovereign debt crisis, and the beginning of a quantitative easing program by the ECB. To address any anticipatory effects, I exclude the countries that were acceding or will be acceding after the end of the sample period and the results hold.

Figure 3.2: Balassa-Samuelson Estimated Real Exchange Rate (ERER), by year

(a) 1995



(b) 2011



Note: Each marker is a country-year observation with so-called currency manipulators marked with country abbreviations in RED.

(recall this is because of the inverted RER). Note that some manipulators remain above the fitted line, meaning their currency is relatively overvalued. These countries—e.g., Denmark (DNK) and Switzerland (CHE)—are the so-called “currency non-appreciators,” that is, their currencies should be valued even higher than is, but exchange rate pegs/ceilings have kept the currencies from appreciating further. Also, there is a clear shift of the fitted-line to the top-right between 1995 and 2011, which illustrates a general growth in income across all countries in the sample and thus a real appreciation of the exchange rate. Time-series plots of the residuals from this estimation are available for each country in Appendix A.

Finally, I test for the presence of a unit root in both time series using an Augmented Dickey-Fuller t-statistic test. The reported p-values at the 10 per cent level suggests the data is stationary and does not require any further transformations. Besides the inclusion of Taiwan and the EA12, the use of this Balassa-Samuelson measure of currency misalignment as a robustness check is further warranted given the weak correlation between this measure and that from the BEER approach: 0.43.

3.2 Measuring Global Value Chain Linkages

The main explanatory variable, global value chain participation, derives from the OECD-WTO Trade in Value Added (TiVA) database. Recall from Chapter 1 that GVCs include the design, manufacturing, and marketing involved in bringing a product to market, and thus, many sectors—and consequently, many political interests—may be involved along the value chain. This is distinct from global supply chains, which include exclusively the manufacturing and distribution-related processes. Along with my GVC measures, I also calculate country-level participation in global supply chains, using the same equations as below but limiting

the sector to manufacturing only. This proves important as some countries may rank high on the GVC participation index but low on the supply chain index, usually due to the country’s service-oriented economy—e.g., Luxembourg. For ease of exposition, below I explain the calculations for GVCs only, but provide the distribution of global supply chains across countries where necessary.

I construct three measures of a country’s GVC participation, which capture a country’s *position*—i.e., upstream or downstream—and its *reliance* on GVCs. Following convention (see Koopman et al. 2010), I first calculate a country’s position in the value chain via backward and forward linkages and use these measures to calculate its reliance via a participation index. I exploit the richness of this data by measuring GVC position and participation across three units of observation: country-year, country-partner-year, and country-sector-year.

The OECD-WTO TiVA database provides measures of the value added involved in the production of goods and services across 62 countries between 1995 and 2011.⁵ Standard measures of gross exports often double-count the inputs used in production, whereas value added measures provide the “net” exports. Baldwin (2016, p. 93) presents an illustrative example between China and the United States:

In standard export terms, China exported about \$2 billion of iPhones to the United States in 2009, but most of this \$2 billion represents value that had been added outside of China. When one nets out the value of goods and services that China imported in order to make iPhones, it turns out that Chinese value-added exports of iPhones was only about \$0.2 billion. In this case, the \$2 billion is the gross export; the \$0.2 billion is the value-added export.

In order to get a more precise estimate of where exports are actually produced, I decompose gross exports into its constituent parts of domestic value

⁵The database has updates to the measures for 2012-2014, but the variables are not consistent with the pre-2012 data, thus limiting my time period to the 16 years between 1995 and 2011.

added (DVA) and foreign value added (FVA) (again, see Koopman et al. 2010). DVA is the sum of its parts: (i) DVA exported in final goods, (ii) DVA exported in intermediate inputs absorbed by direct importers, (iii) DVA exported in intermediate inputs that return to the domestic economy, and (iv) DVA exported in intermediate inputs re-exported to third countries. The first and second components measure direct value-added exports, the third component is the measure often double-counted in gross export calculations, and the fourth component measures indirect value-added exports. I use this measure of indirect value-added as the main component of a country's *forward linkage*, that is, the upstream element of a country's GVC participation index (Equation 3.5 below). This represents the domestic value added found in intermediate inputs, exported to a foreign country, who then adds value to the input—either via adding to the input or utilizing the input in the production of a final good—, and re-exports this altered good or service to a third country—not the country of origin. Using the Boeing example from Chapter 2, the Rolls-Royce engine exported from the United Kingdom to the United States would be considered in this forward linkage calculation if the engine is utilized in a Boeing jet exported to a third country—e.g., Qatar Airways (State of Qatar)—but not if it is re-exported back to the United Kingdom—e.g., if British Airways bought a new Boeing Dreamliner. Aggregating this measure over all sectors gives the total forward linkages within an economy (or the forward linkage in a supply chain if limited to the manufacturing sector).

Moving down the value chain, a country's *backward linkage* measures the share of a country-sector's foreign inputs—in technical terms, the foreign value added (FVA)—used in domestic gross exports (Equation 3.6 below). Using the Boeing example again, the Dreamliner jet exported to Qatar, the United Kingdom, or any foreign market contains the foreign value added from Rolls-Royce in the United Kingdom—as well as the many other foreign suppliers in the value chain as detailed in Chapter 2. Using Equation 3.6 as a guide, the numerator contains

the foreign value added from the Rolls-Royce engine (from the perspective of the U.S.-based Boeing Company) and the denominator the gross value of the exported Dreamliner. Aggregating this measure over all sectors gives the total backward linkages within an economy (or the backward linkage in a supply chain if limited to the manufacturing sector).

The *GVC participation index* is merely the sum of these two linkages (Equation 3.7) and the *GVC position* is the log ratio of a country-sector's forward linkages to its backward linkages (Equation 3.8). A negative value for the GVC position denotes a country that is more upstream in the value chain—i.e., stronger forward linkages—whereas a positive value denotes a downstream country—i.e., stronger backward linkages. Summing over all sectors with the world as the partner gives the country-year unit of observation:

1. *Forward linkages*: the indirect (domestic) value added embodied in foreign exports (DVA.FX) for sector i in country k 's gross exports (EXP) to the world or partner country:

$$\text{FWD_LINK}_{i,k} = \frac{\text{DVA.FX}_{i,k}}{\text{EXP}_{i,k}} \quad (3.5)$$

2. *Backward linkages*: the foreign value added embodied in domestic exports (FVA.X) for sector i in country k as a share of total gross exports (EXP) to the world or partner country:

$$\text{BWD_LINK}_{i,k} = \frac{\text{FVA.X}_{i,k}}{\text{EXP}_{i,k}} \quad (3.6)$$

3. *GVC participation index*: this value summarizes the importance of the value chain for sector i in country k :

$$\text{PARTICIPATION}_{i,k} = \text{FWD_LINK}_{i,k} + \text{BWD_LINK}_{i,k} \quad (3.7)$$

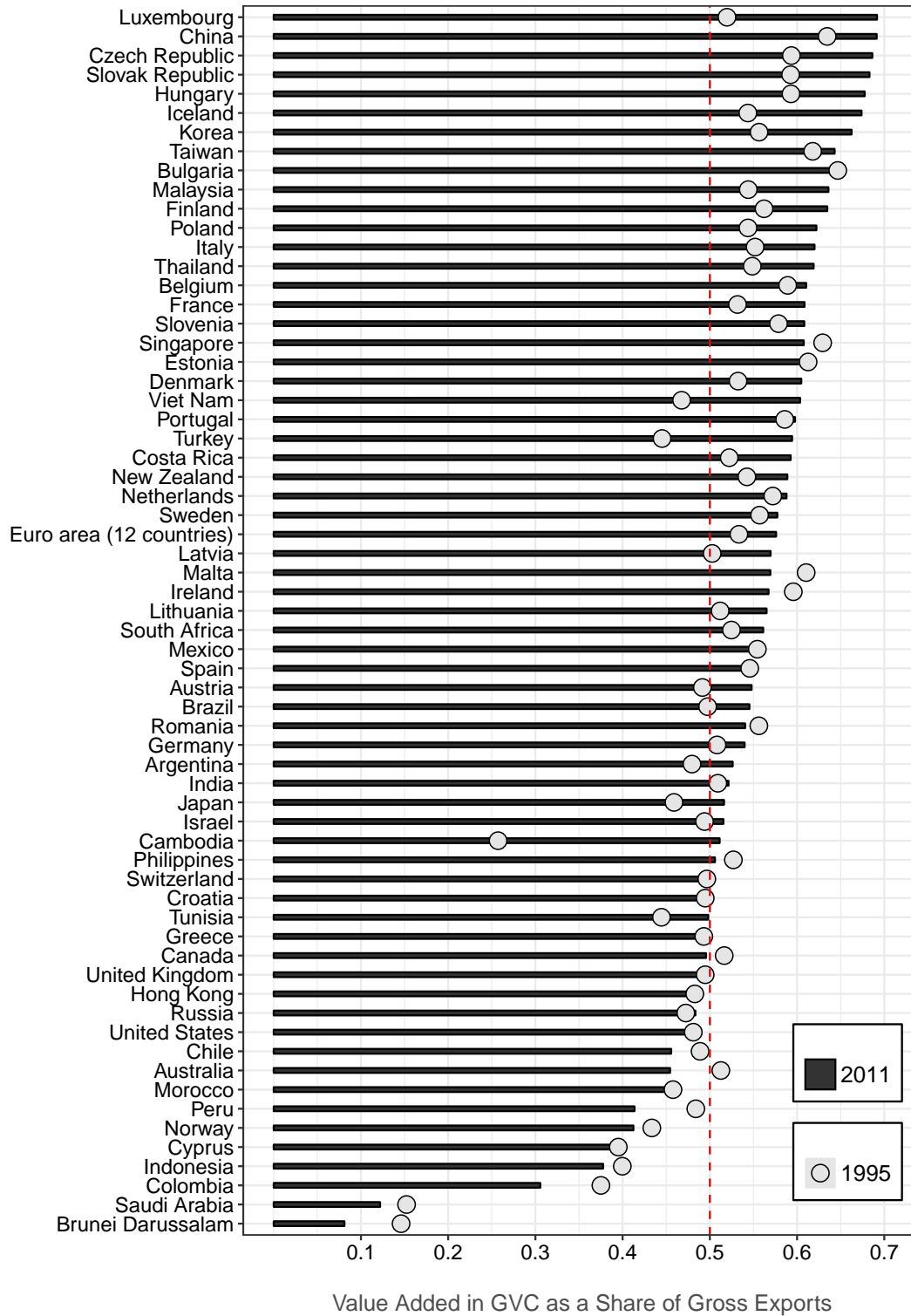
4. *GVC position*: this value summarizes the value chain position of sector i in country k . A negative value indicates that the sector-country pair are downstream in the value chain—i.e., they are reliant on foreign value added to produce a final good. A positive value indicates that the sector-country pair are upstream in the value chain—i.e., they produce intermediate inputs that are used in foreign countries’ exported goods:

$$\text{POSITION}_{i,k} = \ln(1 + \text{FWD_LINK}_{i,k}) - \ln(1 + \text{BWD_LINK}_{i,k}) \quad (3.8)$$

Figure 3.3 illustrates the evolution of GVC integration across all countries in the sample between 1995 and 2011. There is clear growth in GVC participation across most countries in the upper half of the distribution, but declines for many in the bottom half of the distribution. As stated in Chapter 1, the average participation in GVCs grew from 50% of all exports in 1995 to 54% in 2011, a rather slim increase—more on this below. By 2017, however, GVCs accounted for over 60% of global trade (World Bank Group, 2017). At the upper bounds of the distribution are small, trade-dependent countries from the EU (Luxembourg, Iceland) and East and Southeast Asia (Korea, Taiwan, Malaysia, Thailand, Singapore, Viet Nam), and Central European countries heavily integrated in German GVCs (Czech Republic, Slovak Republic, Hungary, Bulgaria, Poland). The lower bounds include countries with a high percentage of exports devoted to primary goods (Brunei Darussalam, Saudi Arabia, Colombia, Cyprus, Norway).

The aggregated participation index does not tell the full story. When investigating the components of GVC participation—i.e., forward and backward linkages—amongst the so-called currency manipulators, it is abundantly clear why the growth in participation was marginal during the 16 years in my sample. Figure 3.4 illustrates the backward (orange=1995; red=2011) and forward (light green=1995; dark green=2011) linkages of these countries, listed in order of total

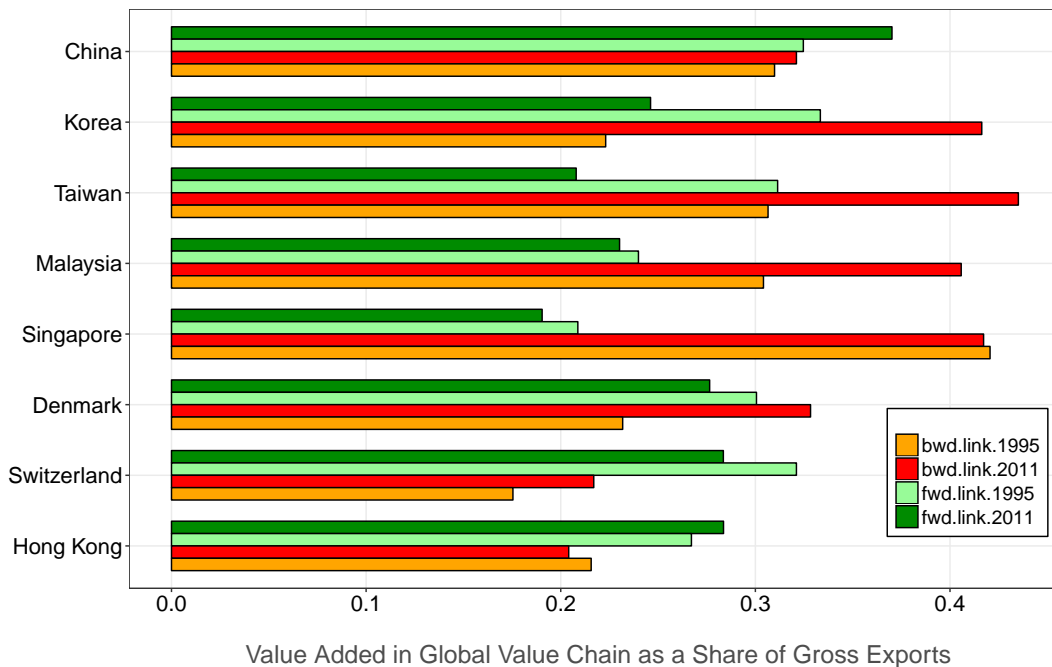
Figure 3.3: Global Value Chain Participation Index, 1995-2011



GVC participation. China, the manipulator most reliant on GVCs—increasing its participation in GVCs from 63% in 1995 to 69% of gross exports in 2011—, is also the only manipulator to increase in both forward and backward linkages. Korea, Taiwan, Malaysia, Denmark, and Switzerland all exhibit a similar pattern in their GVC reliance: a decrease in forward linkages, while increasing in backward linkages. In fact, only Singapore and Hong Kong experience a decrease in their backward linkage during this time period—Singapore also decreased in its forward linkages.

Recall from Chapter 2 that I expect an increase in backward linkages to be the main driver of currency revaluation. Thus, I would expect that as these countries increase their backward linkages, there should also be pressure on their policymakers to cease undervaluing its currency. On the other hand, those countries that increase their forward linkages over this time period should continue to maintain an undervalued exchange rate, *conditional* on the ERPT of these exports: countries

Figure 3.4: Currency Manipulators: Global Value Chain Components, 1995-2011



with high forward linkages and complete pass-through will maintain an undervalued exchange rate, whereas countries with high forward linkages and incomplete pass-through will tend to move towards a SELXR, all else equal. Over the entire sample of 62 countries, backward linkages increased, on average, from 21% of gross exports in 1995 to over 28% in 2011; forward linkages actually decreased from 29% of gross exports in 1995 to 26% in 2011. When comparing manipulators to non-manipulators (see Table 3.1), there is a larger reliance on backward linkages amongst currency manipulators as compared to non-manipulators, and a smaller reliance on forward linkages; on average, manipulators tend to be more reliant on GVCs than non-manipulators—58% versus 52% GVC participation, respectively.

At the outset of the chapter, I reminded the reader that my main focus will be on global value chains, which includes all sectors involved in bringing a product to market. However, it is also critical to evaluate the role of global *supply chains*, which are limited to the physical goods within a value chain—i.e., the manufacturing sector—, especially considering the ongoing populist rhetoric by the Trump administration concerning the U.S. manufacturing base. Moreover, given the sectoral make-up of a country, their GVC participation may differ vastly from their global supply chain participation. Figure 3.5 illustrates the participation in global supply chains in 1995 and 2011, which increased a mere 0.6% during this time period: 34.7% of gross exports (across all sectors) in 1995 to 35.3% in 2011; when only accounting for gross exports in manufacturing, the global supply chain estimates are much higher, increasing from 63.0% to 68.5% during the same time period. The differences between global *value* chains and global *supply* chains is evident when considering Luxembourg. The small, trade-dependent European state is at the top of the GVC participation rankings, with almost 70% of exports involved in GVCs in 2011; however, when considering the manufacturing sector only, Luxembourg falls to the bottom of the distribution, with less than 10% of gross exports involved in supply chains in 2011. When viewing the sec-

Table 3.1: Summary Statistics: Main Explanatory and Outcome Variables

	Manipulators [†]	Non-Manipulators
Currency Valuation (BEER*)		
Mean \pm SD	-0.03 ± 0.14	0.0001 ± 0.16
% change, 1995-2011	268.4	-179.4
Currency Valuation (BS**)		
Mean \pm SD	-0.09 ± 0.32	0.02 ± 0.23
% change, 1995-2011	.45	-156.9
GVC Participation		
Mean \pm SD	0.58 ± 0.07	0.52 ± 0.10
% change, 1995-2011	7.1	4.2
Backward Linkage		
Mean \pm SD	0.31 ± 0.09	0.24 ± 0.11
% change, 1995-2011	22.4	26.3
Forward Linkage		
Mean \pm SD	0.27 ± 0.05	0.28 ± 0.08
% change, 1995-2011	-10.7	-10.1
Exports/GDP		
Mean \pm SD	0.56 ± 0.27	0.39 ± 0.18
% change, 1995-2011	33.5	29.7
GDP (in billion USD)		
Mean \pm SD	$572.9 \pm 1,036$	$781.5 \pm 2,142$
% change, 1995-2011	95.9	114.2

Note: The percent change measures the average of all country-level 16-year percent changes. †: China, Denmark, Hong Kong, Korea, Malaysia, Singapore, Switzerland, Taiwan. *: Currency valuation using the BEER approach. **: Currency valuation using the Balassa-Samuelson adjustment approach.

toral makeup of Luxembourg’s value chains (see Figures A.113(c) and A.113(d) in Appendix A), it is clear that the majority of their value chain is dependent on professional services (real estate, business, and finance)—more on the sectoral composition of global value chains below.

As with the GVC participation index, more is revealed about a country’s dependence on global supply chains when investigating its components. In Figure 3.6, I display the forward and backward linkages of the so-called currency manipulators. A few points to note when comparing these measures to the GVC components in Figure 3.4: First, China has a much larger increase in forward linkages

Figure 3.5: Supply Chain (Manufacturing) Participation Index, 1995-2011

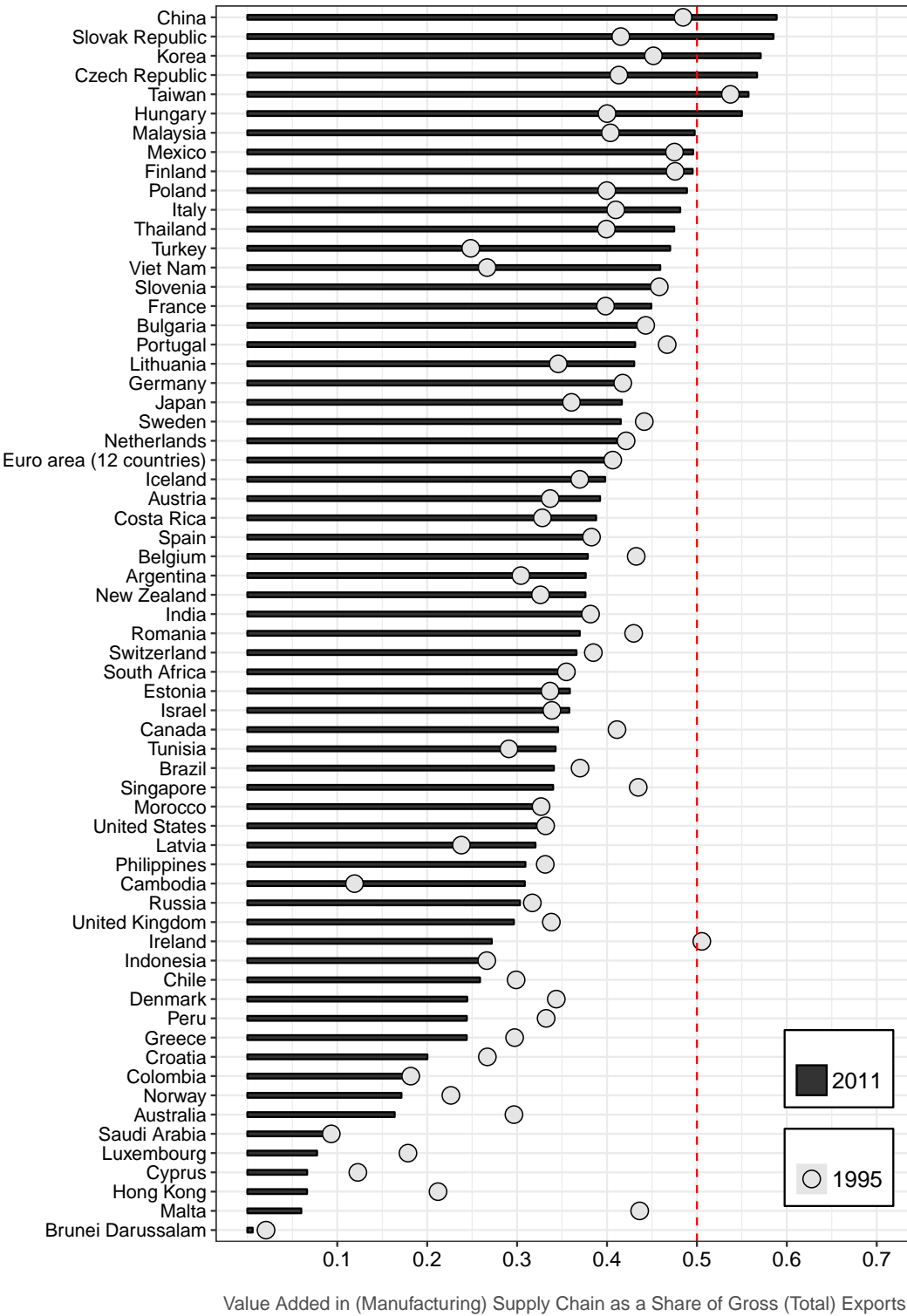
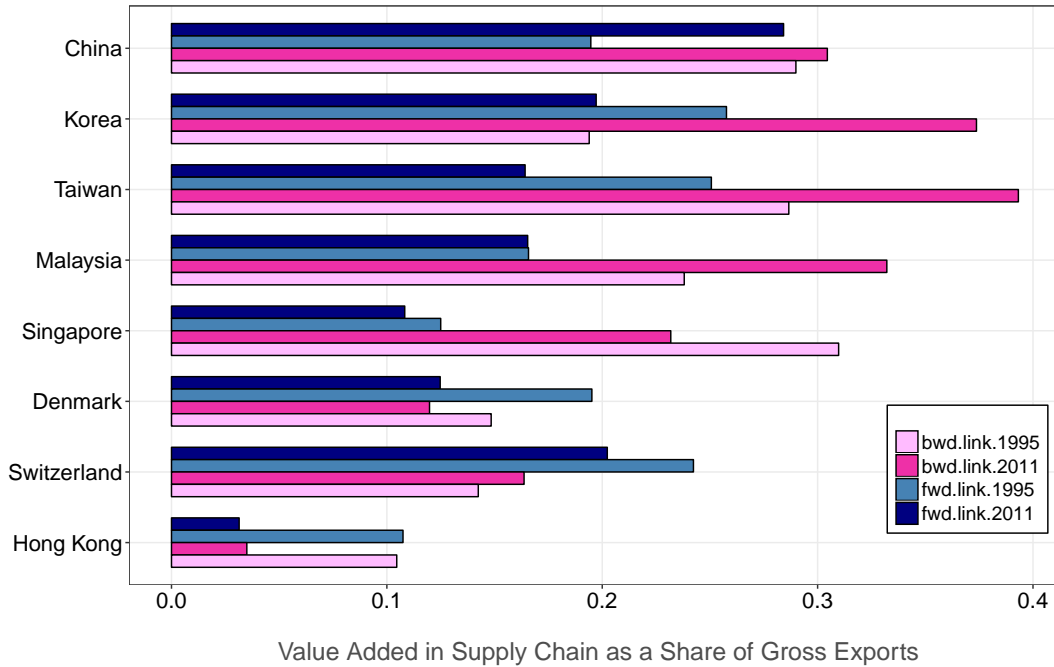


Figure 3.6: Currency Manipulators: Global Supply Chain Components (manufacturing only), 1995-2011



in its supply chains, an increase of 9%, compared to its forward linkages in GVCs, 4%. Second, Korea, Taiwan, Malaysia, and Switzerland display similar supply chain percentages with their GVC measures; this owes to their strong reliance on the manufacturing sector in total intermediate trade (see sectoral breakdowns of GVC linkages by country in Appendix A). Conversely, there is a decline in the value added in supply chains as a share of gross exports for Denmark and Hong Kong, two countries with sizable backward linkages in telecommunication and transportation.

Clearly, the sectoral composition is also a crucial aspect of a value chain, especially if considering the ERPT across sectors. Recall that exchange-rate pass-through will tend to be more incomplete the higher the amount (or value) of inputs. Campa and Goldberg (2005) estimate the ERPT for the major sectors—food, energy, raw materials, manufacturing, and non-manufactured—across 23 OECD countries between 1975 and 2003 and find that pass-through tends to be

the most incomplete for the manufacturing sector in the short-run. There is also evidence that the food sector (C01–C05) has limited pass-through in the short-run, but the estimates vary wildly across the sample, with Poland exhibiting complete pass-through (0.974), and Belgium very incomplete pass-through (0.052). The sectors that tend to exhibit the most complete pass-through include energy and raw materials (C10–C14) and services (C50–C95). Table 3.2 displays the average backward and forward linkages by sector (with the standard deviation in parentheses) and separated again by currency manipulators versus non-manipulators. Clearly, manufacturing tends to be the most reliant on GVCs with an average of 35–40% of gross exports involved in GVCs. The next most important sector is transportation, post, and telecommunications, with between 4.9% and 8.3% of gross exports involved in GVCs. Due to the importance of manufacturing in total GVC reliance, I will conduct all analyses using global value chain *and* global supply chain data separately in order to isolate the effects of the manufacturing sector. However, to test the role of ERPT on exchange rate valuations, I will also analyze the compositional sectoral data.

Finally, I am interested in the impact of regional trade agreements on GVC integration between RTA-partner countries (see Chapter 5). This part of the analysis requires GVC data at the level of country-partner-year. Here, I provide a snapshot of the data, saving a deeper examination for the empirical analysis. Figure 3.7 displays the share of value added in GVCs with a country’s top-five GVC-trading partners. I include six important economies—China, Germany, Korea, Singapore, United Kingdom, and the United States—due to their importance in currency conflicts (China, Korea, Singapore), integration in GVCs with non-eurozone members (Germany), interest in supply chains following Brexit (U.K.), and size of economy (U.S.). First, focusing on China, there is a clear increase in GVC integration with Cambodia following its full membership in the Association of Southeast Asian Nations (ASEAN) in 1999—China joined the ASEAN

Table 3.2: Backward and Forward Linkages, Sector Level

	Manipulators [†]		Non-Manipulators	
	BWD_LINK	FWD_LINK	BWD_LINK	FWD_LINK
Primary Products	0.002	0.002	0.004	0.007
C01–C05	(0.002)	(0.003)	(0.005)	(0.008)
Mining; Quarrying	0.002	0.001	0.006	0.010
C10–C14	(0.003)	(0.002)	(0.009)	(0.019)
Manufacturing	0.235	0.167	0.177	0.173
C15–C37	(0.110)	(0.061)	(0.093)	(0.070)
Retail Services	0.017	0.035	0.016	0.035
C50–C55	(0.008)	(0.014)	(0.010)	(0.014)
Transport; Post; Telecom	0.044	0.039	0.022	0.027
C60–C64	(0.042)	(0.043)	(0.020)	(0.017)
Professional Services	0.012	0.016	0.016	0.016
C65–C74	(0.015)	(0.010)	(0.051)	(0.015)
Public Services	0.002	0.004	0.003	0.004
C75–C95	(0.001)	(0.003)	(0.006)	(0.003)

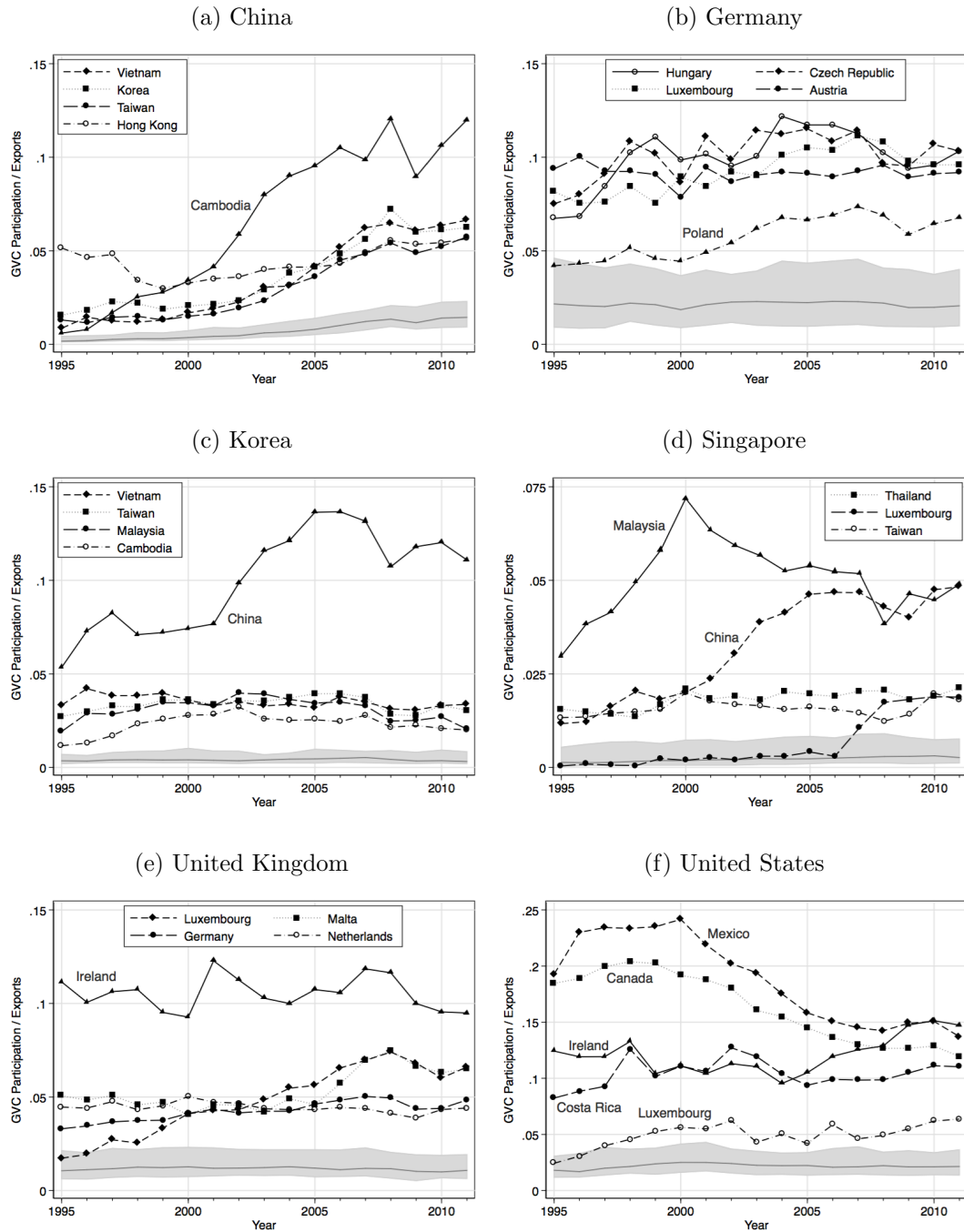
Note: Standard Deviation listed under the mean (bounded between 0 and 1) in parentheses. ISIC Rev. 3 codes listed under sector descriptions. BWD_LINK is the measure of foreign value added in sector i as a share of gross exports. FWD_LINK is the measure of indirect domestic value added in sector i as a share of gross exports. †: China, Denmark, Hong Kong, Korea, Malaysia, Singapore, Switzerland, Taiwan.

Plus Three in 1997, along with Korea and Japan, which increased integration with the ASEAN member states. China is also heavily integrated in Korea’s and Singapore’s GVCs, as illustrated in Figures 3.7(c) and 3.7(d). Focusing on the Western states, Germany is most tightly-integrated with former Eastern bloc countries—Hungary, Czech Republic, and Poland—all of whom are not members of the eurozone, as well as neighboring Luxembourg and Austria, which share a similar language with Germany. Hungary is the most intriguing of the non-eurozone member states as they allowed their exchange rate to float in 2008, but have not engaged in the competitive exchange rate policies that would follow such a move, especially given the rhetoric of the populist Prime Minister Victor Orban. The United Kingdom is also heavily integrated with its closest neighbor (Ireland), but may struggle with further integration pending the completion of Brexit—or, a

potential reversal of GVC integration due to increased barriers to trade. Finally, the United States is most heavily integrated with its neighbors and North American Free Trade Agreement (NAFTA) partners, Canada and Mexico, but also with Ireland due to its low corporate tax rate, and Costa Rica due notably to the semiconductor business initiated by Intel in 1997. I investigate these trends further in Chapter 5, but the trends tend to show that the main determinants of GVC integration are proximity to the trading partner and the presence of a regional trade agreement between the two—e.g., ASEAN, European Union Customs Union (EUCU), and NAFTA.

Next I turn to other covariates, economic and political, that may affect exchange rate values.

Figure 3.7: GVC Linkages with Top-Five GVC-Trading Partners, Select Countries



Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 61 partner countries with the mean denoted by the dark grey line.

3.3 Measuring Other Potential Covariates

Besides my main explanatory variables—GVC participation and its components—I control for various country-level variables that may also affect currency values. Policymakers may choose to affect the exchange rate utilizing various tools—e.g., foreign exchange intervention, capital controls, national savings rate—but there are many external forces that could affect a country’s exchange rate as well—e.g., the appreciation of many emerging market economy’s exchange rates following the unorthodox monetary policies of the United States, United Kingdom, and Japan following the 2007-2008 financial crisis. By controlling for time-varying state-level covariates that can affect exchange rates, I can more accurately measure purposeful exchange rate movements rather than only market-determined movements. Moreover, there are many political factors outside of firm-level exchange rate preferences that may affect the direction of currency policy. By adding these variables to the empirical models, I will have a stronger case to make for the role of GVCs in currency valuations.

First, a central bank’s foreign exchange (FOREX) intervention is measured as the amount of foreign exchange reserves (including gold) as a share of GDP.⁶ I use the share in order to control for the size of an economy. For example, China’s foreign exchange reserves will be much greater than Malaysia’s, but when controlling for the relative size of their economies, they will be more aligned. I am concerned with the ability of domestic policymakers to control the level of the exchange rate within their economy, and thus the relative share gives the best estimate across countries. Foreign exchange reserves are the main policy tool a government will use to influence the level of the exchange rate. As a country’s foreign exchange reserves as a share of GDP increases, there should be downward pressure on the exchange rate value, all else equal.

⁶Source: International Monetary Fund.

Next, I control for two domestic policies that affect the level of the exchange rate indirectly: capital account openness (CKOPEN)⁷ and the savings rate. With regards to capital openness, the less open a country's capital flows, the greater leverage it has to control the level of the exchange rate. Thus, the predicted sign on the CKOPEN coefficient is positive: the lower the capital openness, the lower the exchange rate. A country's savings rate, which can be directed by policymakers to force citizens to save rather than borrow—e.g., China—is often associated with an undervalued exchange rate. This measure comes from the World Bank and is the share of gross national savings—i.e., gross national income less total consumption, plus net transfers—to GDP.

The role of GVC participation may be conflating with the role of firms who have investments in foreign countries. In other words, firms may be involved in GVCs, but this may be highly correlated with direct investments in foreign economies, whether for outsourcing production or to serve a foreign market. Thus, I also control for the outward stock of foreign direct investment as a share of GDP (FDI/GDP).⁸ Recall that we should expect holders of foreign debt to prefer a relatively stable exchange rate, given that a domestic currency devaluation will decrease the value of their investment. Thus, I expect a positive coefficient on this variable: as the share of outward FDI/GDP increases in an economy, there should be upwards pressure on the level of the exchange rate.

During the sample period, 1995-2011 (and including through 2015), there were various financial and banking crises that affected individual countries, regions, and the entire globe. I control for each of these as they may also affect an exchange

⁷Source: Karcher and Steinberg 2013. Note that I use the average capital account openness estimate across all of the 12 Eurozone countries for the Euro Area 12 (EA12) estimate. Moreover, the data is only through 2010, and thus I use this observation for the year 2011 as well. The capital openness index is quite stable over time, so the assumption that there was not a drastic change within a country between 2010 and 2011 is not far off. However, I also run all regressions through 2010 and the results hold.

⁸Source: United Nations Conference on Trade and Development (UNCTAD) database.

rate's value without any internal policy changes. For example, as discussed earlier, the global financial crisis of 2008-2009 led to unorthodox monetary policy adoption by advanced economies, which had the indirect effect of depreciating their domestic currencies, but, more importantly, appreciating the exchange rates of many emerging market economies—e.g., Brazil, India, and Turkey. In the empirical models, this exchange rate movement will bias the estimates on the GVC variables as it was not a purposeful appreciation of the currency. Thus, I include a dummy variable for the global financial crisis that equals one in the years 2008 and 2009, and zero otherwise. Likewise, there were regional and country-specific financial and/or banking crises that had similar effects, usually occurring due to a pegged exchange rate that could no longer be defended. I include a separate financial crisis dummy variable for these countries in the specific year of their crises and zero otherwise: Mexico (1994), Malaysia and Thailand (1997), Russia (1998), Brazil (2000), Argentina and Turkey (2001).

Finally, there is a vast literature on the political determinants of exchange rate policy.⁹ I utilize the Database of Political Institutions¹⁰ to derive many of these political variables—note, that estimates for Euro Area 12 countries are unavailable for these controls. Bearce (2003) argues a “party-as-agent” framework where rightist parties will tend to favor the global firms who prefer monetary stability, while leftist parties will tend to favor monetary autonomy that favors domestically-oriented groups. Here, as with the subsequent variables, I focus on the party of the chief executive who will tend to exert the most influence on monetary policy. I include a control variable for the executive's party affiliation, where EXEC_RIGHT is equal to one if the chief executive is from a right-leaning

⁹Simmons, Hainmueller et al. (2005) argue that the results on the political determinants of exchange rate policy are biased when using a state's declaratory exchange rate policies rather than their actual policy. This finding should not affect my analysis as I also use the actual exchange rate policy as explained at the beginning of this chapter.

¹⁰Beck et al. 2001.

Table 3.3: Summary Statistics: Main Control Variables

	Manipulators [†]	Non-Manipulators
FOREX Reserves (in billion USD)		
Mean \pm SD	223.0 \pm 470.0	49.5 \pm 128.0
% change, 1995-2011	194.3	152.8
Savings Rate		
Mean \pm SD	37.4 \pm 7.9	22.8 \pm 8.0
% change, 1995-2011	7.1	8.8
Capital Openness		
Mean \pm SD	.89 \pm 1.6	.85 \pm 1.5
% change, 1995-2011 [‡]	—	—
FDI/GDP		
Mean \pm SD	71.4 \pm 95.5	25.3 \pm 87.8
% change, 1995-2011	147	190
Leftist Executive*		
Mean \pm SD	0.43 \pm 0.5	0.56 \pm 0.5
% change, 1995-2011 [‡]	—	—
Polity IV**		
Mean \pm SD	4.5 \pm 6.3	7.2 \pm 4.5
% change, 1995-2011	25.2	12.3

Note: The percent change measures the average of all country-level 16-year percent changes.
[†]: China, Denmark, Hong Kong, Korea, Malaysia, Singapore, Switzerland, Taiwan. [‡]: Not enough data points or variation to calculate per cent change. *: = 1 if executive is leftist, 0 if rightist, NA otherwise. **: ranges from -10 (authoritarian) to +10 (democratic).

party and zero otherwise. I expect the coefficient on this variable to be positive as rightist parties will tend to align with the preferences of global firms.

While party type may matter, a chief executive from either a left or a right party could change course on a dime if there is an election on the horizon (see Bernhard and Leblang 1999). In an election year, a chief executive may choose to temporarily appreciate the currency in order to increase consumer purchasing power. The same may also occur in an legislative election year. Thus, I control for election timing by including two dummies for if there was a legislative (LEG-ELEC) or an executive (EXELEC) election in a given year. I expect the coefficient on these variables to be positive (appreciation), with a stronger magnitude and significance for the executive election year.

Finally, the type of governing regime (democratic versus autocratic) may also affect exchange rate choice. Bearce and Hallerberg (2011) argue that democratic regimes tend to support floating regimes, while autocratic regimes a more fixed exchange rate. I use the Polity IV¹¹ measure of a regime's authority spectrum, ranging from strict autocracies (-10) to full democracies (+10).¹² The coefficient estimate on this variable is unclear as many of the so-called currency manipulators maintained an undervalued exchange rate, albeit fixed. Moreover, some of the manipulators are established, Western democracies—e.g., Denmark and Switzerland.

Summary statistics of all control variables are provided in Table 3.3, split, as before, by currency manipulators versus non-manipulators.

¹¹Source: Center for Systemic Peace.

¹²Missing Polity IV scores for Brunei Darussalam, Iceland, and Malta.

CHAPTER 4

The Chains That Bind: Empirical Results

In this chapter I test the theoretical argument presented in Chapter 2 that increased integration in global value chains leads to currency revaluation for so-called currency manipulators. I begin by investigating the role that GVCs have on currency values over time, controlling for time-invariant differences between countries as well as time-varying factors that may affect exchange rate values. I then focus on the manufacturing industry, testing the role of global supply chains in particular, using the same empirical specification as with GVCs. These results differ, which I explain by exploring the sector-level effects on currency values. Finally, I test if GVCs or global supply chains have a convergence effect, that is, whether there is a convergence of exchange rates towards the stable equilibrium-level exchange rate (SELXR) conditional on GVC (or supply chain) integration, or if the effect is only in one direction, that is, an appreciation of undervalued exchange rates. I include an appendix to this chapter that includes robustness checks for the various empirical tests.

4.1 Testing the Argument: Production Networks and Currency Misalignment

How does global value chain integration affect exchange rate preferences as measured by aggregate outcomes? Recall that the exchange rate preferences of firms are unobservable—at least in this study—and thus I rely on the outcomes

of exchange rate policy as an approximation of exchange rate preferences. If undervaluation is a costly enterprise by policymakers that favors a particular group (or groups), then as the benefits of this policy decrease—holding the costs constant—we should see a change in policy. Recounting the theoretical predictions from Chapter 2, I expect the following, all else equal:

H1: The greater an economy's exports as a share of GDP, the stronger the preference for an undervalued exchange rate (predicted coefficient: negative).

H2: The greater an economy's participation in GVCs, the weaker the preference for an undervalued exchange rate (predicted coefficient: positive) and the smaller the deviation of the exchange rate from its equilibrium level (predicted coefficient: negative).

H2(a): The greater an economy's participation in backward linkages, the weaker the preference for an undervalued exchange rate (predicted coefficient: positive) and the smaller the deviation of the exchange rate from its equilibrium level (predicted coefficient: negative).

H2(b): The greater an economy's participation in forward linkages, the stronger the preference for an undervalued exchange rate (predicted coefficient: negative) and the larger the deviation of the exchange rate from its equilibrium level (predicted coefficient: positive).

H3: The greater an economy's share of exports involved in GVCs with incomplete exchange-rate pass-through, the weaker the preference for an undervalued exchange rate (predicted coefficient: positive).

I test each of these hypotheses in the following subsections.

4.1.1 International Exposure and Currency Misalignment

To test my first hypothesis (*H1*), which stems from the theoretical predictions of the Frieden model on international exposure, I estimate a linear model with (i) country fixed effects and (ii) clustered standard errors by country:

$$REER - \widehat{ER}ER_{it} = \alpha + \beta_1 \ln\left(\frac{\text{EXPORTS}_{i,t-1}}{\text{GDP}_{i,t-1}}\right) + \beta X_{i,t-1} + u_{it}, \quad (4.1)$$

where $X_{i,t-1}$ is a vector of lagged (and log-transformed) control variables as described earlier. I do not report the coefficients on all control variables as they have statistically little effect on the outcome. The main coefficient of interest is β_1 , which shows the effect of international exposure, measured by exports as a share of GDP, on exchange rate under/overvaluation. The measure of exchange rate values used in this empirical specification is from the BEER approach; however, I include results using the Balassa-Samuelson approach in the appendix to this chapter as robustness checks. I do not include a lagged dependent variable due to the stationarity and persistence of the data. When I include a lagged dependent variable, it absorbs all of the variation from the other variables and has a highly significant coefficient close to one.¹

The results for *H1* are reported in Table 4.1 columns (1) and (4). As predicted by the theoretical model, an increase in a country's dependence on exports as a share of GDP leads to a depreciation, or undervaluation, of the exchange rate. Specifically, a 1% increase in gross exports as a share of GDP results in a 0.48% decrease in the exchange rate—see column (4) which includes all control variables. Figure 4.1 illustrates this effect of export dependence on currency misalignment, where each mark on the plot is a country-year observation. Countries

¹See Achen 2000 for a review of why including a lagged dependent variable when your outcome variable is stationary and persistent absorbs all variation in the model.

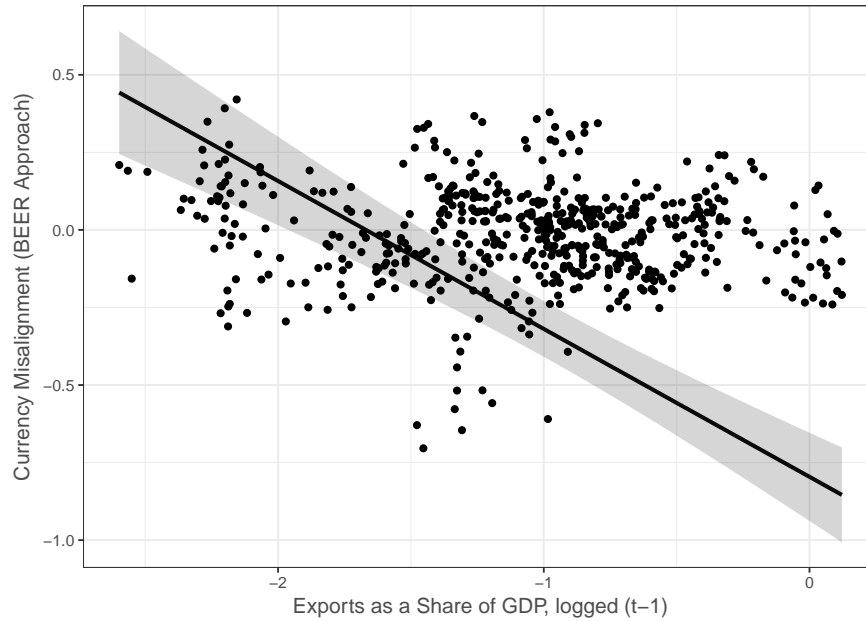
Table 4.1: GVCs and Currency Valuations, BEER Approach, Restricted Sample[†]

	Dependent Variable: $REER - \widehat{ERER}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(\text{EXPORTS}/\text{GDP})_{t-1}$	-0.37** (0.14)	-0.06 (0.30)	-0.06 (0.47)	-0.48** (0.15)	-0.16 (0.30)	-0.25 (0.50)
$\ln(\text{IMPORTS}/\text{GDP})_{t-1}$	0.20 (0.11)	0.04 (0.14)	0.04 (0.14)	0.23* (0.11)	0.09 (0.13)	0.14 (0.15)
$\ln(\text{PART.})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}$		0.43 (0.42)			0.45 (0.42)	
$\ln(\text{PARTICIPATION})_{t-1}$		1.10* (0.51)			1.06* (0.50)	
$\ln(\text{BWD_LINK})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}$			0.19 (0.12)			0.17 (0.13)
$\ln(\text{BWD_LINK})_{t-1}$			0.43 (0.25)			0.34 (0.26)
$\ln(\text{FWD_LINK})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}$			-0.05 (0.28)			-0.11 (0.28)
$\ln(\text{FWD_LINK})_{t-1}$			0.10 (0.24)			0.08 (0.25)
$\ln(\text{FDI}/\text{GDP})_{t-1}$				0.04* (0.02)	0.03* (0.01)	0.04* (0.02)
Country F.E.?	Yes	Yes	Yes	Yes	Yes	Yes
CSE(country)?	Yes	Yes	Yes	Yes	Yes	Yes
Controls? [‡]	No	No	No	Yes	Yes	Yes
R ²	0.45	0.49	0.49	0.49	0.52	0.52
Adj. R ²	0.41	0.45	0.45	0.44	0.47	0.47
Observations	588	588	588	560	560	560
Countries	37	37	37	37	37	37

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. All independent and control variables log-transformed and lagged one year, except dummy variables for the 2008-2009 financial crisis, country-specific financial or banking crises, and chief executive election year, as well as the Polity IV measure. † – Sample limited to 37 countries due to missing data for multiple control variables for the following countries: Brunei Darussalam, Cambodia, Costa Rica, Hong Kong, Iceland, Malta, Morocco, Peru, Romania, Slovakia, and Tunisia. ‡ – Control variables included in this analysis, besides FDI/GDP which is reported due to its statistical significance across all models, include the two financial crisis dummies explained above, foreign exchange reserves as a share of GDP, savings rate, capital account openness, Polity IV, and a dummy for if there was an election for the chief executive. Not included here is the party regime type (left or right), which has too many missing observations; the results hold when included and the sample size is reduced.

in the bottom quartile of export dependence—7.5% to 26.7% of GDP comes from exports—tend to maintain a relatively appreciated exchange rate (+0.47 to -0.14), on average. Whereas countries in the top quartile of export dependence—50.7% to 113% of GDP comes from exports—tend to maintain a depreciated exchange rate (-0.44 to -0.82). These results for EXPORTS/GDP support Frieden’s prediction

Figure 4.1: Predicted Effects of Exports/GDP on Currency Misalignment



Note: Predicted effects calculated from Table 4.1 column (4).

that countries with high international exposure will tend to prefer a depreciated exchange rate. Note that these results hold when including the entire sample of 49 countries (without controls due to data availability)—see Table 4.8 at the end of this chapter.

4.1.2 GVC Participation and Currency Misalignment

Now I turn to testing the main argument of this dissertation, that adding nuance to the above model of currency politics will explain more about currency valuations than if we were to solely rely on international exposure as our key predictor. To do this, I test the role of GVC participation ($H2$)—and its components, backward and forward linkages ($H2(a)$ and $H2(b)$, respectively)—on currency misalignment, moderating the effect by international exposure (EXPORTS/GDP). Again, I estimate a linear model with (i) country fixed effects and (ii) clustered standard errors by country:

$$REER - \widehat{ER}_{it} = \alpha + \beta_1 \ln(\text{PARTICIPATION}_{i,t-1}) \times \ln\left(\frac{\text{EXPORTS}_{i,t-1}}{\text{GDP}_{i,t-1}}\right) + \beta X_{i,t-1} + u_{it}, \quad (4.2)$$

but here include the interaction of the main predictor GVC PARTICIPATION with the moderating variable EXPORTS/GDP, both log-transformed and lagged one year. The rationale for an interaction term in this model specification stems from the 2×2 matrix that laid out my theoretical predictions for the effect of GVCs on currency misalignment (refer to Figure 2.2 in Chapter 2). Recall that a country with high GVC participation will prefer a SELXR regardless of its international exposure, whereas a country with low GVC reliance and low international exposure will prefer an appreciated exchange rate. Clearly there is a moderating effect of EXPORTS/GDP, which calls for the interaction term in the model specification.

Columns (2) and (5) of Table 4.1 report the results from this model. The first noteworthy result is that the inclusion of PARTICIPATION×EXPORTS/GDP in the model absorbs all of the direct effect of EXPORTS/GDP from the previous specification—see column (1). Against the theoretical predictions, however, there is not a statistically significant effect on the interaction term, only a statistically significant indirect effect on the interaction component, PARTICIPATION.

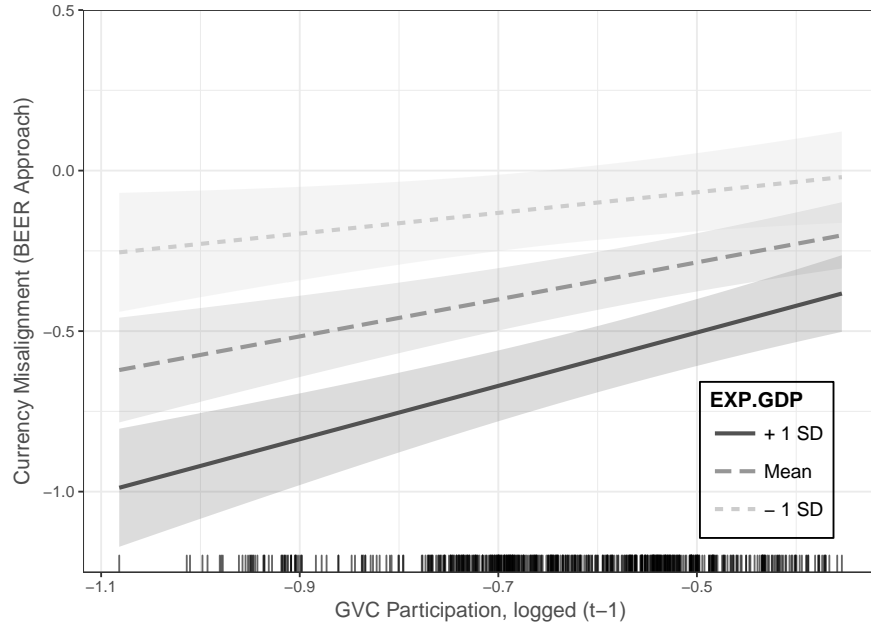
In Figure 4.2 I plot the predicted effects of GVC PARTICIPATION on currency misalignment, moderated by EXPORTS/GDP. Here it is clear how an increase in GVC participation has an appreciating effect on a currency’s value, with this effect varying by a country’s international exposure. For countries with low international exposure—one standard deviation below the mean, or 21.4% of GDP from exports (lightest grey, dashed line)—the effect of GVC participation is minimal. Although the exchange rate approaches the SELXR, it remains undervalued across almost all values of GVC participation, except in the upper quartile where the confidence interval crosses into positive territory. This rejects the hypothesis

that countries with low GVC PARTICIPATION and low international exposure will prefer an appreciated exchange rate. Note, however, that when plotting the predicted effects of international exposure as the predictor and GVC participation as the moderating variable, the hypothesis holds. Clearly the model's predictions are sensitive to the choice of predictor and moderator.

Turning to countries that are heavily reliant on exports as a source of GDP—one standard deviation above the mean, or 62.1% of GDP from exports (darkest grey, solid line)—the predicted effects of GVC participation are more pronounced as a country increases its reliance on these production networks. Holding EXPORTS/GDP at its mean, if a country moves from the 50th percentile of GVC participation (53.9%) to the 75th percentile (62.1%), their currency value increases by 0.15. While the currency values tend to remain undervalued, they are increasing towards the SELXR as predicted by the theoretical model. These results are robust to using the Balassa-Samuelson approach for measuring currency misalignment; results are available in the appendix to this chapter (see Table 4.9).

Finally, in columns (3) and (6) of Table 4.1, I test the effects of the GVC components, BWD_LINK and FWD_LINK. Recall from $H2(a)$ and $H2(b)$, that I expect BWD_LINK to have an appreciating effect on currency values and the opposite for FWD_LINK. Neither hypothesis is validated by the results; while the direction of the coefficients matches the theoretical predictions, neither of the interaction terms or its components were statistically significant. However, note that there is a strong positive effect of outward foreign direct investment as a share of GDP in all model specifications with controls—columns (4)–(6). This follows from the prediction that holders of foreign debt tend to prefer a relatively stable exchange rate given that a domestic currency devaluation will decrease the value of their foreign investment.

Figure 4.2: Predicted Effect of GVC Participation on Currency Misalignment, Moderated by Exports/GDP



Note: Predicted effects calculated from Table 4.1 column (5). “Rug” plot of the distribution of the predictor variable, GVC PARTICIPATION, along the bottom of the figure.

4.1.3 Global Supply Chain Participation and Currency Misalignment

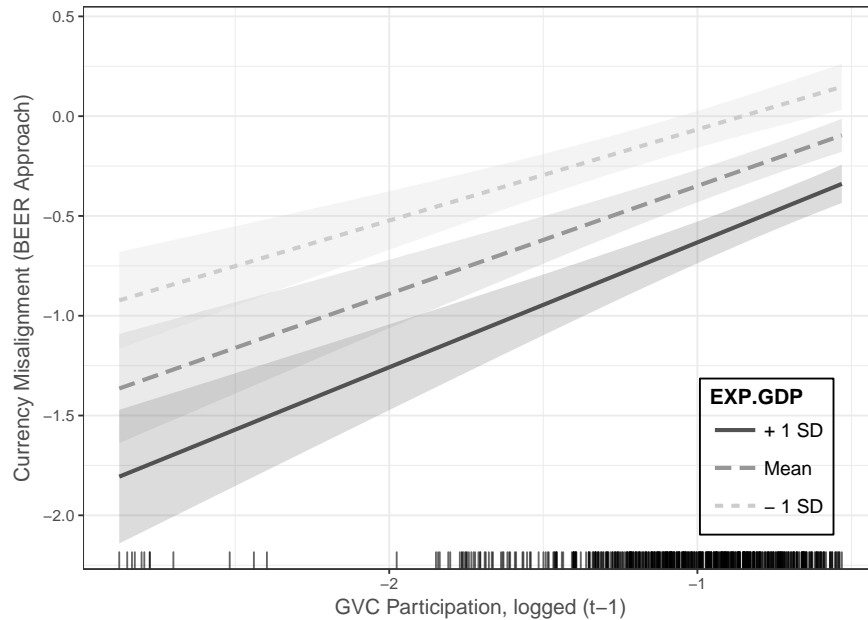
Overall, the results from the first series of hypotheses are relatively weak, which begs the question: does the sector in which a country most heavily relies on GVCs matter, and thus the aggregation across sectors is weakening the results? As a first step towards addressing this question, I estimate the same models (Equations 4.1 and 5.1), however, I restrict the sample to the manufacturing sector, i.e., I focus on global supply chains instead of the aggregated global value chains (GVCs). In the estimation of the main explanatory variables, I use the measure of value added involved in global supply chains—i.e., the manufacturing sector—but continue to take this as a share of gross exports across all sectors: e.g., $BWD_LINK = FVA.EXP_{mfg} / \sum EXPORTS_j$, where j denotes the sector. Recall from the previous chapter that the manufacturing sector tends to be the most reliant on production networks and currency manipulators tend to be more reliant than

non-manipulators, in particular regarding backward linkages. Thus, we may see stronger results when limiting the analysis to the sector that relies most heavily on GVCs.

Table 4.2 presents the results for the manufacturing sector. First, focusing on columns (1) and (4), there is still support for *H1* that increased international exposure leads to a depreciated exchange rate, although the magnitude of the effect has diminished by almost half. Here, however, we find in addition a strong positive effect of manufacturing imports as a share of total GDP on a currency’s value. This also follows from Frieden’s model that a country dependent on imports will tend to prefer a relatively appreciated exchange rate, all else equal.

In columns (2) and (5) of Table 4.2 we see that there is a strong positive effect of global supply chain participation on a currency’s value, but the interaction with the moderating variable EXPORTS/GDP is only significant without the in-

Figure 4.3: Predicted Effect of Global Supply Chain Participation on Currency Misalignment, Moderated by Exports/GDP



Note: Predicted effects calculated from Table 4.2 column (5). “Rug” plot of the distribution of the predictor variable, global supply chain PARTICIPATION, along the bottom of the figure.

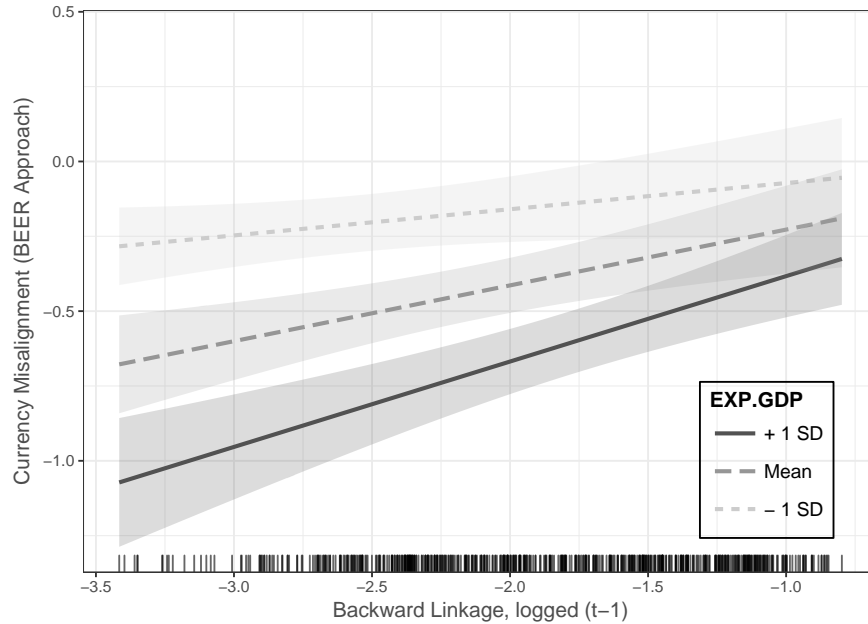
Table 4.2: Global Supply Chains and Currency Valuations, BEER Approach, Restricted Sample[†]

	Dependent Variable: $REER - \widehat{ERER}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(\text{EXPORTS}/\text{GDP})_{t-1}^*$	-0.21*	-0.15	-0.07	-0.26*	-0.29*	-0.28
	(0.10)	(0.13)	(0.16)	(0.11)	(0.14)	(0.18)
$\ln(\text{IMPORTS}/\text{GDP})_{t-1}^*$	0.12*	0.03	0.01	0.16**	0.08	0.10
	(0.05)	(0.06)	(0.06)	(0.05)	(0.06)	(0.07)
$\ln(\text{PART.})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}^*$		0.18*			0.12	
		(0.08)			(0.08)	
$\ln(\text{PARTICIPATION})_{t-1}^*$		0.83**			0.75**	
		(0.27)			(0.27)	
$\ln(\text{BWD_LINK})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}^*$			0.16*			0.14*
			(0.06)			(0.06)
$\ln(\text{BWD_LINK})_{t-1}^*$			0.52**			0.43*
			(0.18)			(0.18)
$\ln(\text{FWD_LINK})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}^*$			-0.04			-0.11
			(0.07)			(0.08)
$\ln(\text{FWD_LINK})_{t-1}^*$			0.10			0.02
			(0.12)			(0.13)
$\ln(\text{FDI}/\text{GDP})_{t-1}$				0.03	0.03	0.03*
				(0.02)	(0.02)	(0.02)
Country F.E.?	Yes	Yes	Yes	Yes	Yes	Yes
CSE(country)?	Yes	Yes	Yes	Yes	Yes	Yes
Controls? [‡]	No	No	No	Yes	Yes	Yes
R ²	0.43	0.51	0.51	0.46	0.53	0.54
Adj. R ²	0.39	0.47	0.47	0.41	0.48	0.49
Observations	588	588	588	560	560	560
Countries	37	37	37	37	37	37

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. All independent and control variables log-transformed and lagged one year, except dummy variables for the 2008-2009 financial crisis, country-specific financial or banking crises, and chief executive election year, as well as the Polity IV measure. † – Sample limited to 37 countries due to missing data for multiple control variables for the following countries: Brunei Darussalam, Cambodia, Costa Rica, Hong Kong, Iceland, Malta, Morocco, Peru, Romania, Slovakia, and Tunisia. * – Data limited to the manufacturing sector, but taken as a share of total GDP across all sectors (for Imports and Exports) or as a share of total gross exports across all sectors (for participation, backward linkage, and forward linkage). ‡ – Control variables included in this analysis, besides FDI/GDP which is reported due to its statistical significance across all models, include the two financial crisis dummies explained above, foreign exchange reserves as a share of GDP, savings rate, capital account openness, Polity IV, and a dummy for if there was an election for the chief executive. Not included here is the party regime type (left or right), which has too many missing observations; the results hold when included and the sample size is reduced.

clusion of control variables. However, as is visually apparent in Figure 4.3, when plotting the effect of global supply chain participation on currency value, moderated by international exposure—Table 4.2, column (5)—, the effect is statistically

Figure 4.4: Predicted Effect of Global Supply Chain Backward Linkages on Currency Misalignment, Moderated by Exports/GDP



Note: Predicted effects calculated from Table 4.2 column (6). “Rug” plot of the distribution of the predictor variable, global supply chain PARTICIPATION, along the bottom of the figure.

significant for high levels of global supply chain participation—as illustrated by the separation between the three levels of the moderating variable. Moreover, the appreciation effect as countries integrate further in these global supply chains is stronger for global supply chains than it is for global value chains. By limiting the sample to the manufacturing sector, moving from the 50th percentile of supply chain participation (37.0%) to the 75th percentile (64.0%)—while holding EXPORTS/GDP at its mean—, increases the currency value by 0.41. This is a far greater appreciation of the exchange rate than the predicted increase of 0.15 from the GVC estimation. This provides strong support for $H2$ that the greater an economy’s participation in global supply chains (instead of GVCs), the weaker the preference for an undervalued exchange rate.

Finally, in columns (3) and (6) of Table 4.2 I test $H2(a)$ and $H2(b)$ that the components of the supply chain have competing effects. The sign on FWD_LINK

\times EXPORTS/GDP is correct, but statistically insignificant, thus rejecting $H2(b)$. However, the interaction of BWD_LINK with EXPORTS/GDP is positive and statistically significant, as predicted by $H2(a)$. Figure 4.4 plots the predicted effects of global supply chain backward linkages on currency misalignment, moderated by manufacturing exports as a share of total GDP. As before, moving from the mean value of backward linkage (16.3% of total exports involve foreign value added in the manufacturing sector) to the 75th percentile (29.4% of total exports include foreign value added), and holding manufacturing exports as a share of total GDP at its mean, a country's exchange rate appreciates by 0.25. All of these results hold when using the Balassa-Samuelson approach to measuring currency valuation; results reported in Table 4.10 at the end of this chapter.

4.1.4 Sectoral GVC Participation and Currency Misalignment

Next, I investigate the role of sectoral GVCs on influencing currency valuation. Recall from $H3$, I predict that the greater an economy's share of exports involved in GVCs with incomplete exchange-rate pass-through, the weaker the preference for an undervalued exchange rate. The sectors that exhibit incomplete pass-through tend to be the food sector (C01-C05) and the manufacturing sector (C15-C37), which I predict will have a positive coefficient—I have already shown that this holds for the manufacturing sector. On the other hand, energy and raw materials (C10-C14) and services (C50-C95) tend to exhibit the most complete pass-through. The direction of the effect on currency value of these GVCs is less clear. For these sectors with complete pass-through, if they are upstream and relatively unspecialized—e.g., sand quarrying—, they should prefer a depreciated exchange rate, all else equal (negative coefficient). However, for those sectors with complete pass-through that are downstream, they will not prefer an undervalued exchange rate (positive coefficient) due to the increased price of foreign inputs.

Table 4.3 presents the results for $H1$ exclusively. I only display the coefficients

Table 4.3: Sectoral Trade and Currency Valuations, BEER Approach, Restricted Sample[†]

		Dependent Variable: $REER - \widehat{ERER}$						
$i =$		(1)	(2)	(3)	(4)	(5)	(6)	(7)
		C01T05	C10T14	C15T37	C50T55	C60T64	C65T74	C75T95
$\ln\left(\frac{\text{EXPORTS}_{i,t-1}}{\text{GDP}_{t-1}}\right)^*$		-0.09 (0.06)	-0.03 (0.02)	-0.26* (0.11)	-0.37*** (0.11)	-0.12 (0.12)	-0.09 (0.07)	-0.02 (0.04)
$\ln\left(\frac{\text{IMPORTS}_{i,t-1}}{\text{GDP}_{t-1}}\right)^*$		0.00 (0.04)	-0.05* (0.02)	0.16** (0.05)	0.10 (0.09)	-0.07 (0.09)	-0.03 (0.05)	-0.08 (0.06)
Country F.E.?		Yes	Yes	Yes	Yes	Yes	Yes	Yes
CSE(country)?		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls? [‡]		Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²		0.42	0.44	0.46	0.46	0.43	0.42	0.42
Adj. R ²		0.37	0.38	0.41	0.42	0.38	0.37	0.36
Observations		560	560	560	560	560	560	560
Countries		37	37	37	37	37	37	37

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. All independent and control variables log-transformed and lagged one year, except dummy variables for the 2008-2009 financial crisis, country-specific financial or banking crises, and chief executive election year, as well as the Polity IV measure. † – Sample limited to 37 countries due to missing data for multiple control variables for the following countries: Brunei Darussalam, Cambodia, Costa Rica, Hong Kong, Iceland, Malta, Morocco, Peru, Romania, Slovakia, and Tunisia. * – $i =$ the sector in each column heading. C01T05: food products; C10T14: mining and quarrying; C15T37: manufacturing; C50T55: retail services; C60T64: transport, post, and telecommunications; C65T74: professional services; C75T95: public services. ‡ – Control variables in this analysis include the two financial crisis dummies explained above, foreign exchange reserves as a share of GDP, FDI as a share of GDP, savings rate, capital account openness, Polity IV, and a year-dummy for if there was an election for the chief executive. Not included here is the party regime type (left or right), which has too many missing observations; the results hold when included and the sample size is reduced.

for $\text{EXPORTS}_i/\text{GDP}$ and $\text{IMPORTS}_i/\text{GDP}$, where sector i is delineated in the column heading; all control variables are statistically insignificant. The results in columns (3) and (4) follow the traditional predictions that exporters in the manufacturing and retail sectors will tend to support a depreciated exchange rate, while importers will tend to prefer a relatively appreciated exchange rate. Interestingly, in column (2), importers from the mining and quarrying sector will tend to prefer a relatively depreciated exchange rate. This finding is perplexing as many firms in this sector will invoice in a foreign currency, usually USD, and thus a depreciated exchange rate will decrease their income. However, the countries in the top 25th percentile of mining and quarrying imports include many of the so-called currency

Table 4.4: Sectoral GVCs and Currency Valuations, BEER Approach, Restricted Sample[†]

		Dependent Variable: $REER - \widehat{ERER}$						
$i =$		(1)	(2)	(3)	(4)	(5)	(6)	(7)
		C01T05	C10T14	C15T37	C50T55	C60T64	C65T74	C75T95
$\left(\frac{EXP_i}{GDP}\right) \times PART_i^*$		-0.01 (0.01)	-0.00 (0.01)	0.12 (0.08)	0.02 (0.09)	-0.04 (0.04)	0.00 (0.02)	0.01 (0.02)
$PARTICIPATION_i^*$		0.16 (0.10)	0.14 (0.12)	0.75** (0.26)	0.21 (0.30)	-0.01 (0.16)	0.30 (0.16)	0.21 (0.17)
$\left(\frac{EXPORTS_i}{GDP}\right)^*$		-0.34* (0.16)	-0.20* (0.09)	-0.29* (0.15)	-0.39 (0.38)	-0.36 (0.27)	-0.35** (0.13)	-0.12 (0.19)
$\left(\frac{IMPORTS_i}{GDP}\right)^*$		0.01 (0.03)	-0.03* (0.01)	0.08 (0.06)	0.17 (0.11)	-0.04 (0.09)	-0.02 (0.05)	-0.09 (0.07)
Country F.E.?		Yes	Yes	Yes	Yes	Yes	Yes	Yes
CSE(country)?		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls? [‡]		Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²		0.48	0.47	0.53	0.47	0.44	0.49	0.44
Adj. R ²		0.43	0.42	0.48	0.42	0.39	0.44	0.38
Observations		560	560	560	560	560	560	560
Countries		37	37	37	37	37	37	37

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. * All independent and control variables log-transformed and lagged one year, except dummy variables for the 2008-2009 financial crisis, country-specific financial or banking crises, and chief executive election year, as well as the Polity IV measure. i = the sector in each column heading. C01T05: food products; C10T14: mining and quarrying; C15T37: manufacturing; C50T55: retail services; C60T64: transport, post, and telecommunications; C65T74: professional services; C75T95: public services. † – Sample limited to 37 countries due to missing data for multiple control variables for the following countries: Brunei Darussalam, Cambodia, Costa Rica, Hong Kong, Iceland, Malta, Morocco, Peru, Romania, Slovakia, and Tunisia. ‡ – Control variables in this analysis include the two financial crisis dummies explained above, foreign exchange reserves as a share of GDP, FDI as a share of GDP, savings rate, capital account openness, Polity IV, and a year-dummy for if there was an election for the chief executive. Not included here is the party regime type (left or right), which has too many missing observations; the results hold when included and the sample size is reduced.

manipulators: Korea, Malaysia, Singapore, and Taiwan (although Taiwan is not included in these particular results); this could be a possible explanation given that many of these countries maintained a relatively undervalued exchange rate during the sample period.

Next I turn to the role that sectoral GVCs play in currency valuation. Table 4.4 presents the results for $H3$ exclusively. The first row of the table exhibits that the interaction of sectoral GVC participation and sectoral international exposure

does not influence currency valuations. In fact, the only sector where the main effect of GVC participation matters is in manufacturing. This is also true for the components of GVC participation, backward and forward linkages: only the manufacturing sector has a statistically significant effect on currency valuation. I do not report the results for backward and forward linkages for all sectors, but point the reader back to Table 4.2 for the effects of these linkages in the manufacturing sector.

The takeaway from this brief analysis is that most sectors do not matter for currency valuation due to their small reliance on global value chains. International exposure matters for the sectors with the most incomplete pass-through: manufacturing and retail sales. But beyond these effects, there is little to add to the theory of currency politics by exploiting sectoral differences. The manufacturing sector tends to be the most important player in global value chains as evidenced by these results.

4.1.5 GVC Participation and Exchange Rate Convergence

Finally, I investigate whether GVC participation has a convergence effect on the exchange rate towards its equilibrium level, or whether the effect is a one-way appreciation as evidenced in the previous sections. Recalling my theoretical predictions from earlier in the chapter, the greater a country's participation in GVCs (or global supply chains), and, more specifically, the greater a country's reliance on backward linkages, the weaker the preference for an undervalued exchange rate and the stronger the preference for a stable, equilibrium-level exchange rate (SELXR). This latter prediction suggests a convergence effect as the exchange rate can approach the SELXR from either direction. To test this prediction, I run the same model specifications as before (from the right-hand side), but change the dependent variable to the absolute value of the currency valuation variable. This measure then gives the deviation from the equilibrium value, with no bias

for under- or overvaluation. A negative coefficient will denote convergence towards the SELXR as predicted by the theoretical model. Note that the model also predicts divergence (a positive coefficient) for forward linkages. I complete this analysis using both GVC and global supply chain (manufacturing) measures of the predictor variables; I only report the results for the GVC measures as the point estimates do not change drastically in magnitude or direction.

Table 4.5 reports the results from the analysis. First, and most importantly, the first eight rows exhibit a full rejection of the hypothesis that there is a convergence effect from GVC participation. None of the predictors or moderators are statistically significant, although most of them have a negative coefficient. Perhaps with more annual data points in the future, a convergence effect will appear in the analysis.

Second, and most interesting, is that all of the control variables have a statistically significant effect, albeit not in the direction that theory would predict. Both FDI as a share of GDP and the Polity IV measure have positive and statistically significant coefficients. Based upon my earlier rationale for including outward FDI as a share of GDP, we would expect that as this form of investment increased, there would be a preference for a stable exchange rate; however, this shows an opposite effect. Same for the measure of a country's democracy versus autocracy: a high Polity IV measure should mean relative exchange rate stability—i.e., a negative coefficient—, but instead we see a strong divergence effect—i.e., a positive coefficient. Finally, the three leading mechanisms for controlling a country's exchange rate—foreign exchange reserves, savings rate, and capital account openness—should provide a divergence effect as each increases; again, however, we see the opposite. The reason for these perplexing results is that the currency manipulators maintained a relatively devalued exchange rate through much of the sample, but there is an appreciation of the currency towards the later years. These covariates, however, show little variation over time—except

foreign exchange reserves and foreign direct investment, which increases for all manipulators. Thus, the convergence effect of the currency manipulation covariates and the divergence effect of FDI and Polity IV stem from the power of these covariates amongst the so-called manipulators. While the analysis points to no convergence effect due to global value chain integration, there does seem to be such an effect from the currency manipulator covariates, something worthy of future research.

Table 4.5: GVCs and Currency Convergence, BEER Approach, Restricted Sample[†]

	DV: Absolute Value($REER - \widehat{EREER}$)					
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(\text{EXPORTS}/\text{GDP})_{t-1}$	0.28 (0.24)	-0.45 (0.58)	-0.85 (0.86)	0.47 (0.27)	-0.42 (0.66)	-1.08 (1.09)
$\ln(\text{IMPORTS}/\text{GDP})_{t-1}$	-0.24 (0.22)	-0.12 (0.26)	-0.13 (0.33)	-0.32 (0.23)	-0.10 (0.30)	-0.02 (0.38)
$\ln(\text{PART.})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}$		-0.45 (0.40)			-0.60 (0.47)	
$\ln(\text{PARTICIPATION})_{t-1}$		-0.35 (0.83)			-0.85 (1.00)	
$\ln(\text{BWD_LINK})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}$			0.02 (0.18)			-0.09 (0.22)
$\ln(\text{BWD_LINK})_{t-1}$			0.08 (0.56)			-0.33 (0.69)
$\ln(\text{FWD_LINK})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}$			-0.59 (0.37)			-0.71 (0.44)
$\ln(\text{FWD_LINK})_{t-1}$			-0.75 (0.64)			-0.97 (0.74)
$\ln(\text{FDI}/\text{GDP})_{t-1}$				0.08 (0.06)	0.12* (0.06)	0.14* (0.07)
$\ln(\text{FOREX})_{t-1}$				-0.18* (0.07)	-0.18* (0.07)	-0.16* (0.07)
$\ln(\text{SAVING_RATE})_{t-1}$				-0.71** (0.25)	-0.72** (0.26)	-0.72** (0.23)
$\ln(\text{CKAOPEN})_{t-1}$				-0.12*** (0.02)	-0.11*** (0.02)	-0.11*** (0.02)
POLITY IV				0.04*** (0.01)	0.04*** (0.01)	0.05*** (0.01)
Country F.E.?	Yes	Yes	Yes	Yes	Yes	Yes
CSE(country)?	Yes	Yes	Yes	Yes	Yes	Yes
Controls? [‡]	No	No	No	Yes	Yes	Yes
R ²	0.39	0.39	0.39	0.40	0.40	0.41
Adj. R ²	0.34	0.34	0.34	0.34	0.35	0.35
Observations	588	588	588	560	560	560
Countries	37	37	37	37	37	37

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. All independent and control variables log-transformed and lagged one year, except dummy variables for the 2008-2009 financial crisis, country-specific financial or banking crises, and chief executive election year, as well as the Polity IV measure. † – Sample limited to 37 countries due to missing data for multiple control variables for the following countries: Brunei Darussalam, Cambodia, Costa Rica, Hong Kong, Iceland, Malta, Morocco, Peru, Romania, Slovakia, and Tunisia. ‡ – Control variables included in this analysis, besides those reported, include the two financial crisis dummies explained above, and a dummy for if there was an election for the chief executive. Not included here is the party regime type (left or right), which has too many missing observations; the results hold when included and the sample size is reduced.

4.2 Appendix: Supplementary Results

Table 4.6: Sector Codes

CODE	ONE-DIGIT ISIC REV. 3 SECTORS INCLUDED
C01T05	Agriculture, hunting, forestry, and fishing
C10T14	Mining and quarrying
C15T37	Manufacturing (see Table 4.7 for breakdown)
C40T41	Electricity, gas, and water supply
C45	Construction
C50T74	(50-52) Wholesale and retail trade; repairs; (55) hotels and restaurants; (60-63) transport and storage; (64) post and telecommunications; (65-67) finance and insurance; (70) real estate activities; (71) renting of machinery and equipment; (72) computer and related activities; (73) research and development; (74) other business activities.
C75T95	(75) Public administration and defense; compulsory social security; (80) education; (85) health and social work; (90-93) other community, social, and personal services; (95) private households with employed persons.

Table 4.7: Manufacturing Codes

CODE	ONE-DIGIT ISIC REV. 3 MANUFACTURING SECTORS INCLUDED
C15T16	Food products, beverages, and tobacco
C17T19	Textiles, textile products, leather and footwear
C20T22	(20) Wood and products of wood and cork; (21-22) pulp, paper, paper products, printing and publishing
C23T26	(23) Coke, refined petroleum products and nuclear fuel; (24) chemicals and chemical products; (25) rubber and plastics products; (26) other non-metallic mineral products
C27T28	(27) Basic metals; (28) fabricated metal products except machinery and equipment
C29	Machinery and equipment n.e.c.
C30T33	Computer, electronic, and optical products
C34T35	(34) Motor vehicles, trailers, and semi-trailers; (35) other transport equipment n.e.c.
C36T37	Manufacturing n.e.c.; recycling

Table 4.8: GVCs and Currency Valuations, BEER Approach, Full Sample[†]

	DV: $REER - \widehat{ERER}$		
	(1)	(2)	(3)
$\ln(\text{EXPORTS}/\text{GDP})_{t-1}$	-0.36*** (0.11)	-0.12 (0.25)	-0.13 (0.27)
$\ln(\text{IMPORTS}/\text{GDP})_{t-1}$	0.22** (0.08)	0.06 (0.10)	0.00 (0.11)
$\ln(\text{PART.})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}$		0.29 (0.33)	
$\ln(\text{PARTICIPATION})_{t-1}$		0.71* (0.32)	
$\ln(\text{BWD_LINK})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}$			0.18 (0.09)
$\ln(\text{BWD_LINK})_{t-1}$			0.42* (0.16)
$\ln(\text{FWD_LINK})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}$			-0.09 (0.14)
$\ln(\text{FWD_LINK})_{t-1}$			-0.07 (0.10)
Country F.E.?	Yes	Yes	Yes
CSE(country)?	Yes	Yes	Yes
Crisis Dummies? [‡]	Yes	Yes	Yes
R ²	0.45	0.47	0.49
Adj. R ²	0.41	0.43	0.45
Observations	748	748	748
Countries	49	49	49

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. All independent variables log-transformed and lagged one year, except dummy variables for the 2008-2009 financial crisis and country-specific financial or banking crises. † – Full sample includes all countries, except the Euro Area 12 and Taiwan. No control variables included except the two financial crisis dummies as explained above; the coefficient on the dummies is not reported due to its lack of significance. When control variables are included, the sample size is reduced and the estimates are equivalent to those in Table 4.1.

Table 4.9: GVCs and Currency Valuations, Balassa-Samuelson Approach, Restricted Sample[†]

	Dependent Variable: $RER - \widehat{ERER}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(\text{EXPORTS}/\text{GDP})_{t-1}$	-0.29*	-0.07	-0.06	-0.42**	-0.09	-0.05
	(0.13)	(0.26)	(0.55)	(0.13)	(0.27)	(0.62)
$\ln(\text{IMPORTS}/\text{GDP})_{t-1}$	0.08	-0.09	-0.01	0.17	0.01	0.08
	(0.14)	(0.14)	(0.18)	(0.15)	(0.15)	(0.16)
$\ln(\text{PART.})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}$		0.33			0.49	
		(0.36)			(0.36)	
$\ln(\text{PARTICIPATION})_{t-1}$		1.13*			1.28*	
		(0.52)			(0.54)	
$\ln(\text{BWD_LINK})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}$			0.17			0.21
			(0.13)			(0.14)
$\ln(\text{BWD_LINK})_{t-1}$			0.40			0.44
			(0.25)			(0.27)
$\ln(\text{FWD_LINK})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}$			-0.09			-0.03
			(0.29)			(0.33)
$\ln(\text{FWD_LINK})_{t-1}$			0.27			0.32
			(0.39)			(0.43)
$\ln(\text{CKAOPEN})_{t-1}$				0.02	0.03*	0.03*
				(0.01)	(0.01)	(0.01)
Polity _{t-1}				0.01**	0.01**	0.01**
				(0.00)	(0.00)	(0.00)
Country F.E.?	Yes	Yes	Yes	Yes	Yes	Yes
CSE(country)?	Yes	Yes	Yes	Yes	Yes	Yes
Controls? [‡]	No	No	No	Yes	Yes	Yes
R ²	0.68	0.70	0.70	0.71	0.73	0.73
Adj. R ²	0.66	0.68	0.68	0.68	0.70	0.70
Observations	640	640	640	588	588	588
Countries/EA12	39	39	39	38	38	38

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. All independent and control variables log-transformed and lagged one year, except dummy variables for the 2008-2009 financial crisis, country-specific financial or banking crises, and chief executive election year, as well as the Polity IV measure. † – Sample limited to 37 countries due to missing data for multiple control variables for the following countries: Brunei Darussalam, Cambodia, Costa Rica, Hong Kong, Iceland, Malta, Morocco, Peru, Romania, Slovakia, and Tunisia. ‡ – Control variables included in this analysis, besides CKAOPEN and Polity IV which are reported due to their statistical significance across all models, include the two financial crisis dummies explained above, foreign exchange reserves as a share of GDP, FDI as a share of GDP, savings rate, and a dummy for if there was an election for the chief executive. Not included here is the party regime type (left or right), which has too many missing observations; the results hold when included and the sample size is reduced.

Table 4.10: Global Supply Chains and Currency Valuations, Balassa-Samuelson Approach, Restricted Sample[†]

	Dependent Variable: $REER - \widehat{ERER}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(\text{EXPORTS}/\text{GDP})_{t-1}^*$	-0.18 (0.10)	-0.16 (0.13)	0.01 (0.17)	-0.23* (0.10)	-0.26* (0.13)	-0.15 (0.18)
$\ln(\text{IMPORTS}/\text{GDP})_{t-1}^*$	0.11 (0.19)	0.02 (0.15)	0.05 (0.18)	0.20 (0.19)	0.11 (0.14)	0.16 (0.16)
$\ln(\text{PART.})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}^*$		0.19** (0.07)			0.18* (0.08)	
$\ln(\text{PARTICIPATION})_{t-1}^*$		0.96*** (0.24)			0.99*** (0.25)	
$\ln(\text{BWD_LINK})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}^*$			0.17** (0.05)			0.17** (0.05)
$\ln(\text{BWD_LINK})_{t-1}^*$			0.49*** (0.14)			0.50*** (0.13)
$\ln(\text{FWD_LINK})_{t-1} \times \ln(\text{EXP}/\text{GDP})_{t-1}^*$			-0.02 (0.05)			-0.07 (0.06)
$\ln(\text{FWD_LINK})_{t-1}^*$			0.24 (0.14)			0.20 (0.15)
$\ln(\text{CKAOPEN})_{t-1}$				0.02 (0.01)	0.02* (0.01)	0.03* (0.01)
Polity _{t-1}				0.01 (0.00)	0.01*** (0.00)	0.01** (0.00)
Country F.E.?	Yes	Yes	Yes	Yes	Yes	Yes
CSE(country)?	Yes	Yes	Yes	Yes	Yes	Yes
Controls? [‡]	No	No	No	Yes	Yes	Yes
R ²	0.67	0.72	0.72	0.70	0.75	0.75
Adj. R ²	0.65	0.70	0.70	0.67	0.72	0.72
Observations	640	640	640	588	588	588
Countries	39	39	39	38	38	38

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. All independent and control variables log-transformed and lagged one year, except dummy variables for the 2008-2009 financial crisis, country-specific financial or banking crises, and chief executive election year, as well as the Polity IV measure. † – Sample limited to 37 countries due to missing data for multiple control variables for the following countries: Brunei Darussalam, Cambodia, Costa Rica, Hong Kong, Iceland, Malta, Morocco, Peru, Romania, Slovakia, and Tunisia. * – Data limited to the manufacturing sector, but taken as a share of total GDP across all sectors (for Imports and Exports) or as a share of total gross exports across all sectors (for participation, backward linkage, and forward linkage). ‡ – Control variables included in this analysis, besides CKAOPEN and Polity IV which are reported due to their statistical significance across most models, include the two financial crisis dummies explained above, foreign exchange reserves as a share of GDP, FDI as a share of GDP, savings rate, and a dummy for if there was an election for the chief executive. Not included here is the party regime type (left or right), which has too many missing observations; the results hold when included and the sample size is reduced.

CHAPTER 5

Building These Chains of Love¹

How can governments build these “chains of love” that bind currency manipulators from engaging in competitive exchange rate policy? In this chapter I propose an inclusive, Pareto-improving policy solution to deal with currency manipulators. If, as the previous chapter illustrated, global value chains have an appreciating effect on exchange rates, then policies that promote value chain integration should have the unintended consequence of also addressing currency manipulation. In the following chapter, I will explore the determinants of global value chain integration and argue that regional trade agreements, a strong predictor of GVC integration, are the globalist’s magic elixir for addressing unfair currency practices while continuing to promote free and open trade.

Regional Trade Agreements (RTAs) surged in the 1990s, doubling within a decade, and reaching over 450 agreements by 2017. RTAs are reciprocal trade agreements between two countries or more. They often take the form of free trade agreements in which the partner countries reduce barriers to trade via the reciprocal removal of tariffs, harmonization of standards, and protections for domestic firms operating in the partner country (or countries). RTAs may also involve blocs of countries who form a customs union or economic union, which are similar to a free trade agreement, but also set a common tariff for any third party outside of the union—e.g., the European Union Customs Union consists of the European

¹Chapter title derived from the 1988 hit, “Chains of Love” by the British synthpop duo *Erasure*.

Union (an economic and political union) and several non-EU states who share a common tariff on goods entering the EUCU. Preferential trade agreements (PTAs) involve unilateral reductions in barriers to trade, but often become RTAs as the reductions are reciprocated.²

Why a country decides to form RTAs with other countries is the subject of much research in the fields of economics and political science. From the economics literature, the ubiquitous “gravity model” of international trade tends to lead all other explanations. The gravity model predicts that trade between two countries will increase as the distance between them decreases and the similarities between them increase (Baier and Bergstrand, 2004). This predicts much of the North-North trade explained by new trade theory in the 1970s and 1980s: while we would assume wealthier countries would import goods for poorer countries as predicted by Ricardo’s theory of comparative advantage, the data actually exhibits a large flow of trade between wealthy countries as explained by these geographical and economy size effects (as well as the “love-of-variety” effects included in later models). Countries not wanting to be left out from the increased trade created by these RTAs would often push to join the agreement—whether *ex post* and *ex ante*—creating a “domino effect” of countries joining or creating RTAs in the 1990s and into the 2000s (Baldwin, 1993).

The economic determinants explanation does not predict all RTAs, however. Some trade negotiations can be used as a tool for internal reform or external policy, which is the focus of much of the political science literature on RTAs.³ For example, a RTA may be signed due to domestic institutions (Mansfield, Milner and Pevehouse, 2008), regime type (Mansfield, Milner and Rosendorff, 2002; Baccini, 2012), or interest groups (Chase, 2009). The explanation that most closely

²The term preferential trade agreement is used very loosely in the trade literature and often refers to any type of trade agreement between partner countries. I use the definition from the World Trade Organization, which takes the word “preferential” literally.

³See Dür, Baccini and Elsig 2014 for a great survey of this literature.

parallels the argument I pose in this chapter is that RTAs are endogenous to firm strategies for building global value chains (Egger, Egger and Greenaway, 2008; Fontagné and Santoni, 2018). Fontagné and Santoni (2018) argues that economic geography changes over time and countries that may not be “natural” trading partners at the outset—according to the gravity model—, after signing a RTA the increased integration between the unnatural trading partners increases “naturalness” of the trading arrangement, and thus the probability of the countries signing an agreement in the first place. The explanation raised for why such countries would engage in the negotiations is due to firms prepared to or already engaging in the fragmentation of the production process into global value chains. The findings from Fontagné and Santoni (2018) suggest that firm-level decisions to optimize their value chains are shaping the geography of so-called “natural” trading regions.

Whether RTAs are endogenous to firm-level production decisions *ex ante* is not of concern for the argument made here; however, it does reinforce the results. I argue that an RTA between partner countries is a necessary condition for GVCs to burgeon. The gravity model does not explain the existence of every RTA, but its ability to predict trade between countries is considered one of the most robust empirical findings in economics (Chaney, 2018). Thus, in testing whether RTAs are a necessary condition for the burgeoning of GVCs, I include the components of the standard gravity model. I also employ a marginal structural model with inverse probability weighting (Blackwell and Glynn, 2017), which removes any post-treatment bias in my variable of interest, the existence of a RTA between country-pairs. In the following section I outline in more detail my empirical approach, as well as describe the data utilized in the analyses.

5.1 Building the Chains: Data and Results

The dependent variables used in the following analyses are the same measures of global value chains used in the previous chapters: GVC participation, backward linkages, and forward linkages. As explained in Chapter ??, I exploit the richness of the OECD-TiVA database by utilizing the data at the country-year, country-sector-year, and country-partner-year levels of observation. In determining the effects of RTAs on GVC integration, I utilize the country-partner-year data, giving me 62 country-partner dyads across 16 years, for over 58,000 observations.

The main explanatory variable, the existence of a RTA between the partner countries in the dyad, is derived from the CEPII gravity database (Head, Mayer and Ries, 2010). The data on RTAs originates from the World Trade Organization, which issues a list of all trade agreements and customs unions. $RTA_DUMMY = 1$ for every year a RTA exists between a country-partner dyad, and zero otherwise. As a secondary measure, I use the measures of preferential trade agreements from the Design of Trade Agreements (DESTA) database (Dür, Baccini and Elsig, 2014). The authors code the various PTAs by the type of agreement, including whether it was bilateral, multilateral, region-to-region, or an accession agreement. I run a similar empirical model as I do with the RTA_DUMMY , but using a separate dummy for each type of agreement. This allows me to test if one type of agreement has a stronger affect on GVC integration than another.

Finally, I control for the components of the gravity model, which also derive from the CEPII gravity database. I expect $DISTANCE$ to be inversely correlated with GVC integration, that is, as the distance between two countries decreases, the value chains should increase. The similarity of economy size (GDP_RATIO), measured as the ratio of GDP from the home country to the GDP of the partner country, should be inversely related to GVC integration, as well. The rationale is that similar countries tend to trade with each other, thus, as the ratio between

economy sizes decreases, there should be an increase in the amount of trade via GVCs between them.

Altering slightly the model from previous analyses, I estimate a linear model with (i) country-year fixed effects and (ii) clustered standard errors by country-pair dyad:

$$\ln(\text{GVC}_{ij,t}) = \beta_0 + \beta_1 \text{RTA}_{ij,t} + \beta_2 \ln(\text{DIST}_{ij,t}) + \beta_3 \ln\left(\frac{\text{GDP}_{i,t}}{\text{GDP}_{j,t}}\right) + \alpha_i + \delta_t + u_{it}, \quad (5.1)$$

where i denotes the home country and j the partner country. The dependent variable $\ln(\text{GVC}_{ij,t})$ measures the (i) GVC participation between country i and partner j , (ii) backward linkages between i and j , and (iii) forward linkages between i and j . The column headings of each table will specify which effect is being measured. Note that I also ran all empirical models with lagged independent variables and the results do not change, which should rule out any concerns of reverse causation.⁴ All variables are log-transformed except for the dummy variable for the presence of a RTA between countries.

Table 5.4 presents the results. In the first three columns I exclude the RTA dummy variable in order to show the impact of adding this variable to the model specification. Across all models, $\ln(\text{DISTANCE})$ has the predicted inverse effect on GVC participation. Translating this into predicted effects, the results from column (1), decreasing the distance between countries from the 50th percentile to the 25th percentile, a reduction from 8,000km to 2,250km, increases the GVC participation between these countries by 112%.⁵ There is also an inverse relationship between $\ln(\text{GDP_RATIO})$ and GVC participation. The gravity models

⁴This result is not surprising given that distance between countries is static and the GDP ratio does not change much between years.

⁵Calculation: $-0.89 \times (8.99 - 7.73)$. The values within the parantheses are the $\ln(\text{distance})$ between countries at the 0.50 and 0.25 percentiles, respectively.

Table 5.1: Global Value Chain Determinants

DV: GVC Participation Indices						
	(1)	(2)	(3)	(4)	(5)	(6)
	GVC Index	Backward Linkage	Forward Linkage	GVC Index	Backward Linkage	Forward Linkage
$\ln(\text{DISTANCE})_{ij,t}$	-0.89*** (0.02)	-0.79*** (0.02)	-0.88*** (0.02)	-0.84*** (0.02)	-0.77*** (0.02)	-0.84*** (0.02)
$\ln(\text{GDP_RATIO})_{ij,t}^\dagger$	-0.37*** (0.01)	0.00 (0.01)	-0.71*** (0.01)	-0.36*** (0.01)	0.00 (0.01)	-0.71*** (0.01)
RTA [‡]				0.16*** (0.04)	0.07* (0.03)	0.13*** (0.04)
Country F.E.?	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.?	Yes	Yes	Yes	Yes	Yes	Yes
Clustered S.E.	Dyad	Dyad	Dyad	Dyad	Dyad	Dyad
R ²	0.65	0.77	0.65	0.65	0.77	0.65
Observations	62352	56728	57973	62352	56728	57973
Countries	64	64	64	64	64	64

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. † the ratio of GDP of home country i to partner country j . ‡ Regional trade agreement (RTA) dummy = 1 for every year a RTA exists between home country i and partner country j ; 0 otherwise. Data from the WTO database via the CEPII gravity database.

predicts that similarly sized economies will tend to trade with one another, thus, as the ratio between the two economies decreases, there should be an increase in GVC-related trade. Note that this is driven by forward linkages; there is no effect from backward linkages.

Turning to the coefficient of interest, columns (4)–(6) show that the addition of a RTA dummy variable to the model does not drastically alter the effects of the gravity model covariates. However, the results do suggest a statistically significant positive effect on GVC participation due to a RTA between trading partners. In column (4), the result suggests that having a RTA between partner countries increases GVC participation by 17.4%.⁶ Similarly, the presence of a RTA increases backward linkages by 7.3% and forward linkages by 13.9%. Clearly, there

⁶Calculation: $\exp(0.16) = 1.1735$.

Table 5.2: Global Value Chain Determinants, Marginal Structural Model with Inverse Probability Weights

	DV: GVC Participation Indices		
	(1) GVC Index	(2) Backward Linkage	(3) Forward Linkage
RTA	0.452*** (0.021)	0.294*** (0.021)	0.389*** (0.022)
(Intercept)	-1.589*** (0.013)	-2.267*** (0.014)	-2.397*** (0.014)
Deviance	44,638	42,971	42,495
Dispersion	0.716	0.758	0.733
Num. obs.	62,352	56,728	57,973

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

is a significant impact of these agreements; however, it is difficult to address any causality to this effect.

In order to isolate RTAs as a causal mechanism for GVC participation, I follow the method from Blackwell and Glynn (2017) based on marginal structural models with inverse probability of treatment weighting, or MSMs with IPTWs. This approach removes any post-treatment bias by weighting all time-varying covariates across values of the treatments, and then removes these covariates in the re-weighted data without any omitted variable bias. In this case, the only time-varying covariate is the GDP ratio since distance between countries is time-invariant. This model specification produces even stronger results for the effect of RTAs on GVC integration as reported in Table 5.2. In column (1), the coefficient on RTA translates to a 57% increase in GVC participation due to the presence of an agreement.⁷ The same follows for backward linkages and forward linkages, columns (2) and (3), with the presence of a RTA leading to a 34% in-

⁷Calculation: $\exp(0.452) = 1.571$.

crease in backward linkage trade and a 47.5% increase in forward linkage trade. This provides further evidence that RTAs are a strong predictor of global value chain integration, and support for the argument that they are a causal mechanism of this type of integration.

As a robustness check on these results, I perform the same empirical analysis as reported in Equation 5.1, but use the DESTA measures of PTAs, which includes bilateral, multilateral, regional, and accession-type agreements. I include each of these types in the model, which is reported in column (4) of Table 5.3. All agreements except the region-to-region agreements have a strong positive effect on GVC participation. The overall effect of these PTAs when grouped together is an increase in GVC participation by 25% when there is an agreement between partner countries—calculation from coefficient on PTA in column (1). These results support the analysis that preceded, and suggests that even the bilateral deals that President Trump supports over the multilateral deals negotiated by the previous administration, should have an appreciable effect on increasing GVC links between the U.S. and its partner country.

Finally, there may be some bias from agreements signed prior to the beginning of the sample period in 1995—e.g., NAFTA signed by the United States, Canada, and Mexico in 1993. In order to account for these agreements, as well as those signed in the later years of the sample period—e.g., KORUS-FTA between the United States and Korea in 2007—I run the analysis with a restricted sample: I only include those agreements that were signed between 1998 and 2005 and drop all other countries. This severely drops the number of observations to less than 400 and the number of countries to 12, but shows that the results still hold. There is a strong positive effect of RTAs (1998-2005) on GVC participation, which is driven mostly by the effect on forward linkages.

Taken all together, these results suggest that regional trade agreements can be an inclusive policy approach to dealing with currency manipulators. If the

Table 5.3: Global Value Chain Determinants, DESTA Measures of PTAs

	DV: GVC Participation Indices			
	(1) GVC Index	(2) Backward Linkage	(3) Forward Linkage	(4) GVC Index
$\ln(\text{DISTANCE})_{t-1}$	-0.293*** (0.006)	-0.181*** (0.004)	-0.112*** (0.003)	-0.85*** (0.02)
$\ln(\text{GDP_RATIO})_{t-1}^\dagger$	1.756*** (0.052)	3.543*** (0.037)	-1.788*** (0.026)	-0.37*** (0.01)
$\text{PTA}_{t-1}^\ddagger$	0.220*** (0.014)	0.097*** (0.010)	0.123*** (0.007)	
$\text{BILATERAL PTA}_{t-1}^\ddagger$				0.33*** (0.07)
$\text{MULTILATERAL PTA}_{t-1}^\ddagger$				0.05 (0.03)
$\text{REGIONAL PTA}_{t-1}^\ddagger$				0.36*** (0.08)
$\text{ACCESSION PTA}_{t-1}^\ddagger$				0.26*** (0.04)
$\text{CRISIS_DUMMY}_{08-09}$	0.03*** (0.01)	0.05*** (0.01)	0.07*** (0.01)	0.03*** (0.01)
Clustered S.E. by:	Dyad	Dyad	Dyad	Dyad
R ²	0.65	0.77	0.64	0.65
Adj. R ²	0.65	0.77	0.64	0.65
Observations	58,751	53,531	54,700	58,751
Countries	62	62	62	62

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. † the ratio of domestic GDP to that of the partner country. ‡ PTA data from the DESTA database. PTA = 1 for every year a PTA exists between the countries in the dyad; 0 otherwise. BILATERAL PTA: bilateral agreement between partners in the dyad. MULTILATERAL PTA: plurilateral agreement between the partners in the dyad and one or more countries. REGIONAL PTA: region-to-region agreement, e.g., CARIFORUM EC EPA. ACCESSION PTA: accession to an international organization with a PTA, or accession to an IO that has a PTA with another entity.

presence of a RTA can increase GVC participation by over 17% as predicted by the first model, then these linkages should also put upwards pressure on a country's exchange rate. This follows from the theory of exchange rate preferences I presented in Chapter 2. While the Western democracies are in the midst of a populist backlash against globalization, driven mostly by nativist attitudes but

Table 5.4: Global Value Chain Determinants, RTAs signed 1998-2005

DV: GVC Participation Indices						
	(1)	(2)	(3)	(4)	(5)	(6)
	GVC Index	Backward Linkage	Forward Linkage	GVC Index	Backward Linkage	Forward Linkage
$\ln(\text{DISTANCE})_{ij,t}$	-0.89*** (0.02)	-0.79*** (0.02)	-0.88*** (0.02)	-0.84*** (0.02)	-0.77*** (0.02)	-0.84*** (0.02)
$\ln(\text{GDP_RATIO})_{ij,t}^\dagger$	-0.75*** (0.13)	-0.32* (0.13)	-0.72*** (0.11)	-0.75*** (0.13)	-0.32* (0.13)	-0.72*** (0.11)
RTA [‡]				0.59* (0.30)	0.24 (0.20)	0.67* (0.30)
Country F.E.?	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.?	Yes	Yes	Yes	Yes	Yes	Yes
Clustered S.E.	Dyad	Dyad	Dyad	Dyad	Dyad	Dyad
R ²	0.80	0.89	0.71	0.80	0.89	0.71
Observations	374	358	341	374	358	341
Countries	12	12	12	12	12	12

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. † the ratio of GDP of home country i to partner country j . ‡ Regional trade agreement (RTA) dummy = 1 for every year a RTA exists between home country i and partner country j ; 0 otherwise. The agreements are limited to those signed between 1998 and 2005. Thus, NAFTA between the United States, Canada, and Mexico would not be included in this arrangement. Data from the WTO database via the CEPII gravity database.

also by the unfair monetary practices of the so-called currency manipulators and the resulting loss of domestic jobs—the “China shock”—there is hope for globalists that these issues can be addressed with inclusive policies that maintain the post-war international order.

CHAPTER 6

Conclusion

I began this dissertation with the question, how do global value chains influence currency conflict? This question is particularly relevant today given the populist pushback on globalization across the developed world and animosity towards countries that have maintained an undervalued currency in the past.¹ Since the 2008 global financial crisis there has been an outpouring of populist antitrade rhetoric in the developed world—e.g., French politicians’ outcries (both on the Left and Right) against the Transatlantic Trade and Investment Partnership (TTIP), the Belgian region of Wallonia’s referendum against the negotiated Canada-EU trade agreement, the “pro-Brexit” campaign and subsequent victory, and the victory of Trump in the U.S. presidential election who campaigned on a populist message against NAFTA, trade with China, and the already negotiated Trans-Pacific Partnership (TPP). Much of this disdain towards international trade is the result of the uneven distributional effects felt by many in an increasingly globalized world. From a policy perspective, this paper addresses a central grievance of both the antitrade movement and global capitalists : how can governments constrain currency manipulators?

The conclusions from this analysis are that global value chain integration puts upward pressure on undervalued (or depreciated) exchange rates. The value chain link that drives this effect is the backward linkage as predicted by the theoretical model. As countries import more inputs to produce a final exported good, a

¹Weiss and Wichowsky 2013.

currency undervaluation loses its benefit due to the relative price effects. This effect is the strongest in the manufacturing sector, where there is a physical supply chain of inputs crossing borders.

Besides natural or endogenous factors that may affect the integration of value chains between countries—e.g., distance and economy size—the presence of a regional trade agreement (RTA) also matters significantly. The presence of a RTA leads to a 17% to 57% increase in GVC participation between countries, controlling for the gravity model covariates. This is a significant amount, especially considering that a 10% increase in GVC participation appreciates a currency by 15% closer to the equilibrium exchange rate—recall that China’s exchange rate was undervalued by 5% to 25% during its manipulation years; thus, a 15% appreciation could re-align the RMB to its equilibrium level.

In the foreign policy community, the policy recommendations for dealing with currency manipulators tend to favor punitive measures. For example, the United States Congress would like to tax so-called currency manipulators on their imports, which hits consumers hardest. The most thoughtful recommendation comes from Fred Bergsten and Joseph Gagnon of the Peter Institute for International Economics who suggest a tit-for-tat foreign exchange buildup.² For example, if the Chinese central bank increases its foreign exchange reserves by \$200billion, the U.S. government would respond by increasing its foreign exchange reserves of an equal amount of RMB. This would offset the depreciation effect intended by the foreign exchange buildup. However, this would also come at a cost, requiring the purchase of this foreign exchange. If the policy were coordinated amongst the top central bank as recommended by Bergsten and Gagnon, the costs would be shared. However, unless there is a global shock, central bank coordination is not a likely event.

²See Bergsten and Gagnon 2017.

A major issue with the punitive measures suggested by Congress is that they are consistently fighting last year's battle. Global trade is not what it was when the General Agreement on Tariffs and Trade (GATT) was established in 1947, or its successor the World Trade Organization (WTO) in 1994, or even what it was five years ago. There is a continuing trend for firms to bring the production of simple inputs back to their domestic base—e.g., Adidas in Germany. However, they are not utilizing local labor to produce the inputs that were off-shored to lower-wage countries prior; the processes are being automated. Automated manufacturing is the next battle in global value chains and policymakers are still grappling with how to fight the battle of a decade ago. As these processes continue to be automated, this theory of exchange rate politics will need yet another amendment.

The contributions of this dissertation are a bridging of the gap between the literature on exchange rate politics and global value chain integration. It contributes to the theoretical literature on exchange rate politics, with updates that explicitly consider the role of global value chains, an increasingly important element of global trade. The results help in understanding the future evolution of exchange rates as well as the current effects: if this appreciation effect holds, perhaps further integration in global value chains will mean fewer cases of currency manipulation in the future. A second contribution is the policy-relevant recommendation for dealing with so-called currency manipulators. The empirical results show that governments concerned with currency manipulation can further facilitate a re-appreciation of these currencies by signing RTAs and integrating the so-called manipulators into their value chains. The rules written into these agreements provide the protections that allow value chains to proliferate, thus enveloping manipulators in a “golden straitjacket” that constrains these *beggar-thy-neighbor* policies.

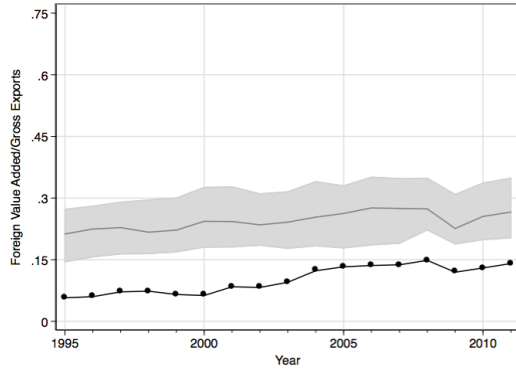
APPENDIX A

Time-Series Plots, By Country

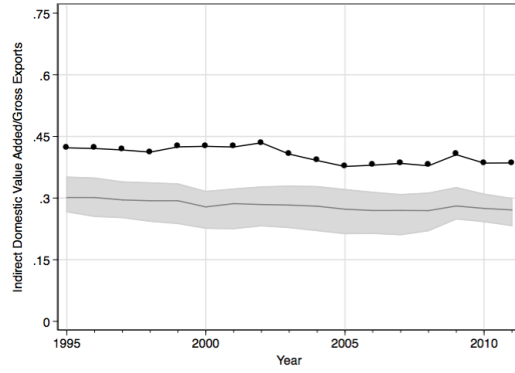
In the following time-series plots, where applicable, I include the 25th to 75th percentiles of the sample of 62 countries (50 countries + Euro Area 12) denoted by the light grey shaded area with the mean denoted by the dark grey line. Euro Area 12 countries only show plots of trade and GVC-related measures at the country level; currency manipulation measures are at the currency area level.

Figure A.1: Argentina: GVC and Trade Variables

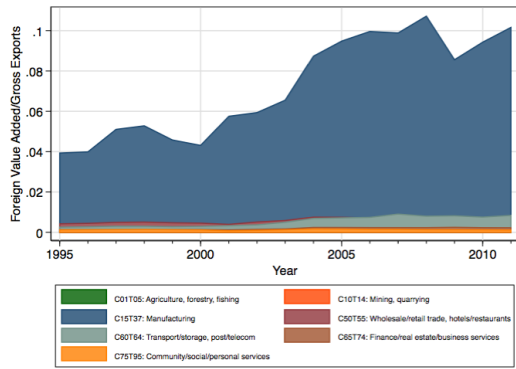
(a) Backward Linkage, all sectors



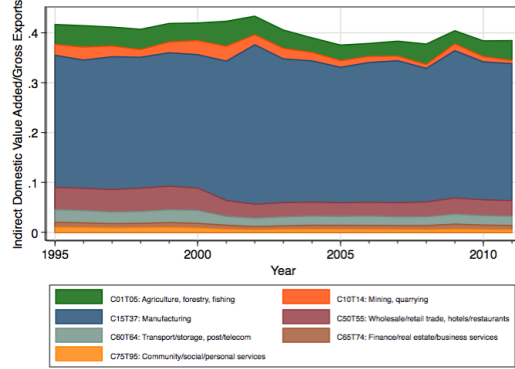
(b) Forward Linkage, all sectors



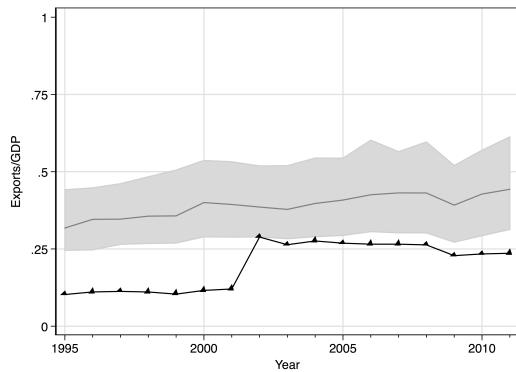
(c) Backward Linkage, by sector



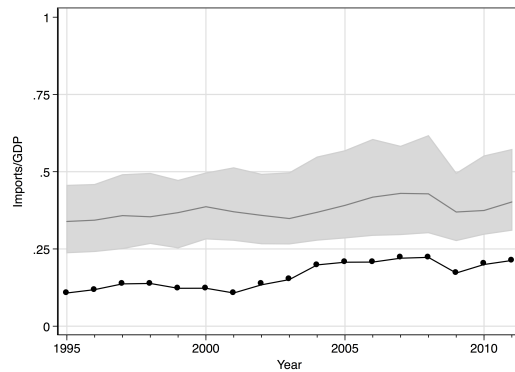
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



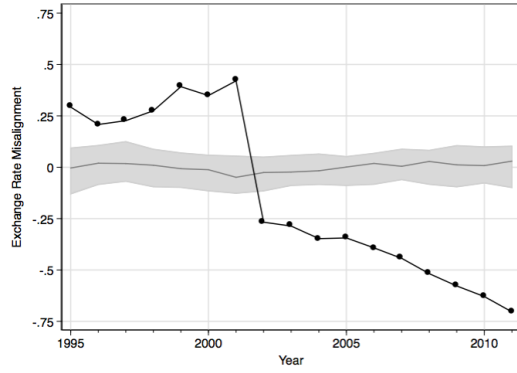
(f) Imports as a share of GDP, all sectors



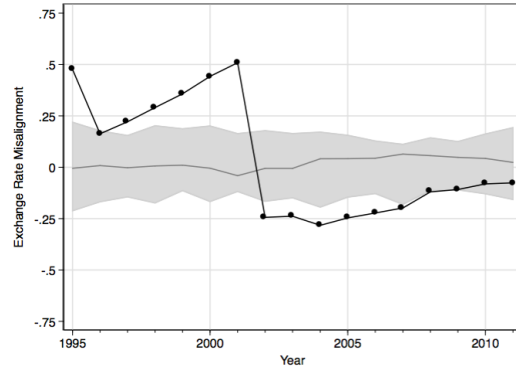
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.2: Argentina (cont.): Currency Manipulation Variables

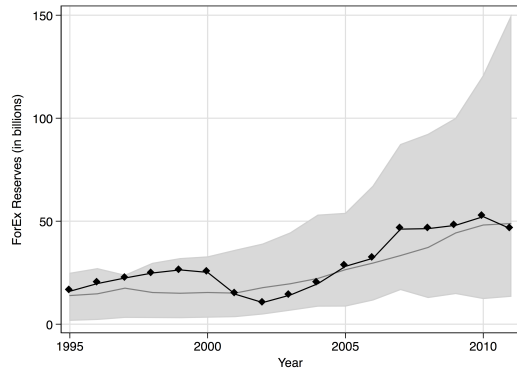
(a) Currency Misalignment, BEER approach



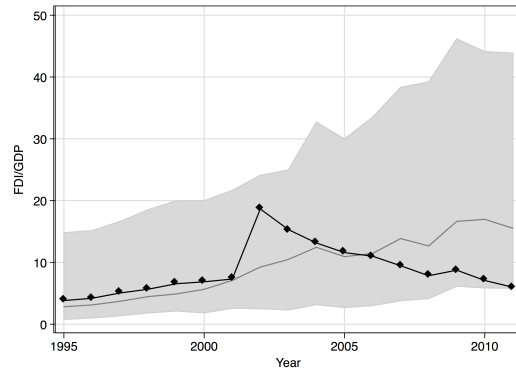
(b) Currency Misalignment, BS approach



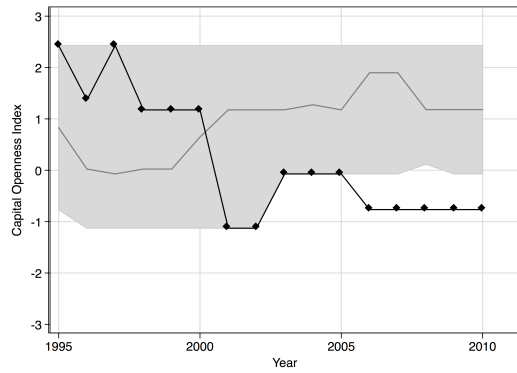
(c) Foreign Exchange Reserves



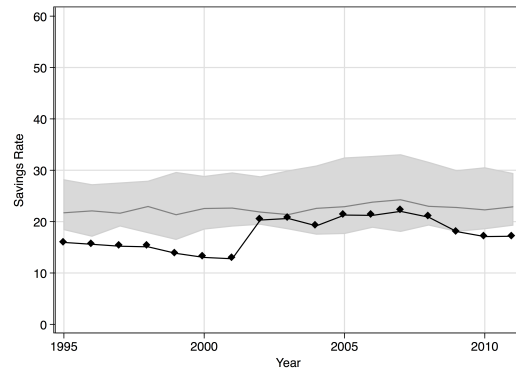
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



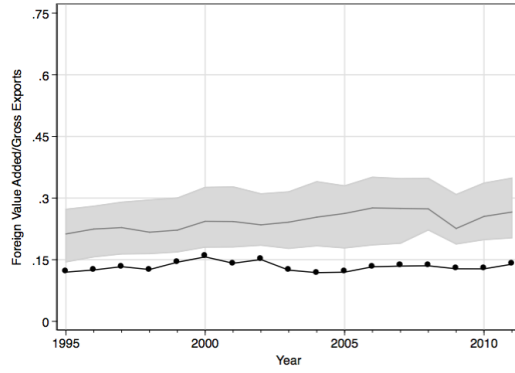
(f) Savings Rate



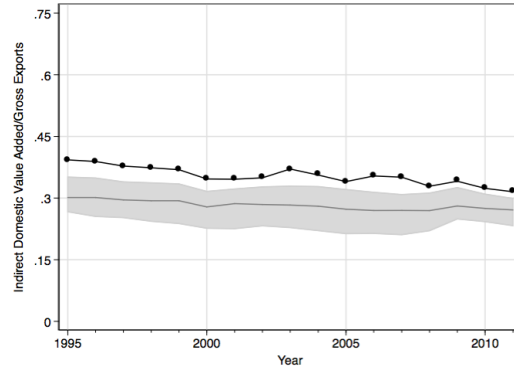
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.3: Australia: GVC and Trade Variables

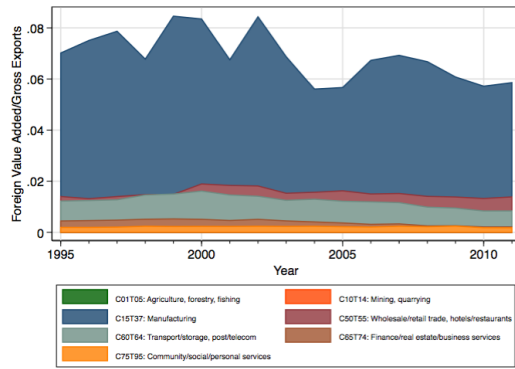
(a) Backward Linkage, all sectors



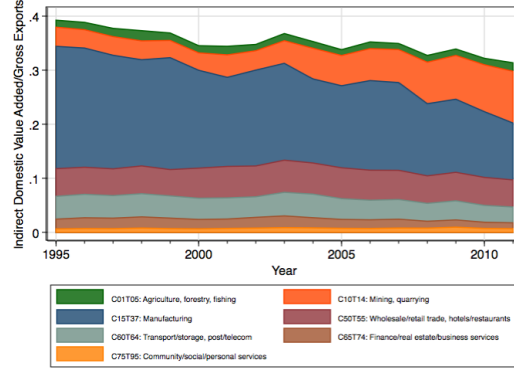
(b) Forward Linkage, all sectors



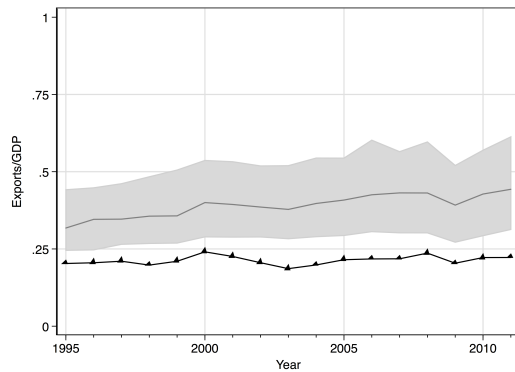
(c) Backward Linkage, by sector



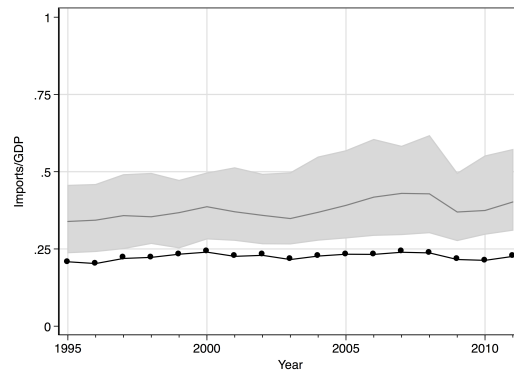
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



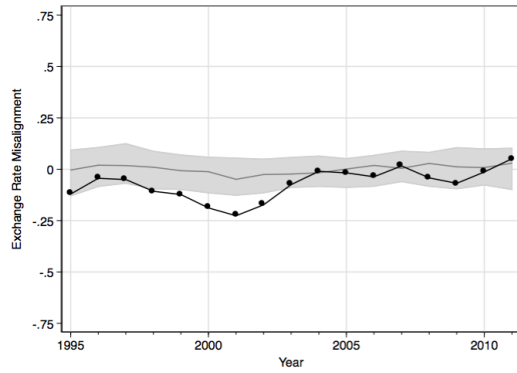
(f) Imports as a share of GDP, all sectors



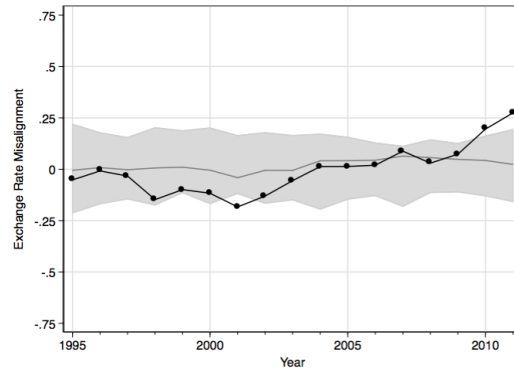
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.4: Australia (cont.): Currency Manipulation Variables

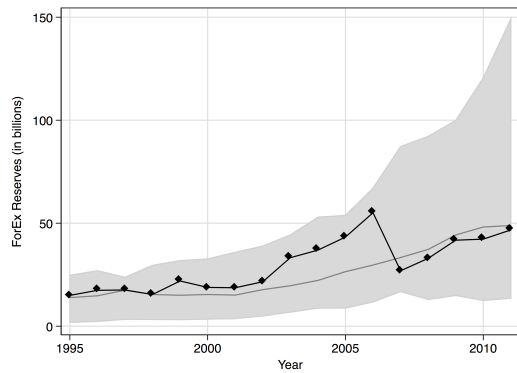
(a) Currency Misalignment, BEER approach



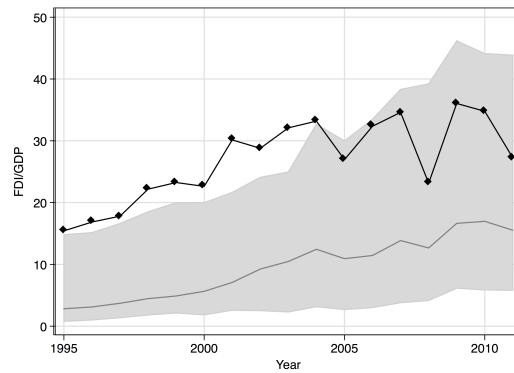
(b) Currency Misalignment, BS approach



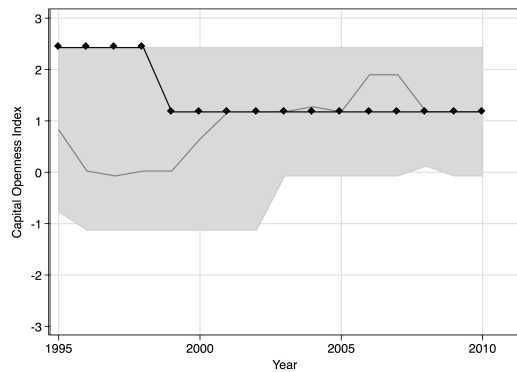
(c) Foreign Exchange Reserves



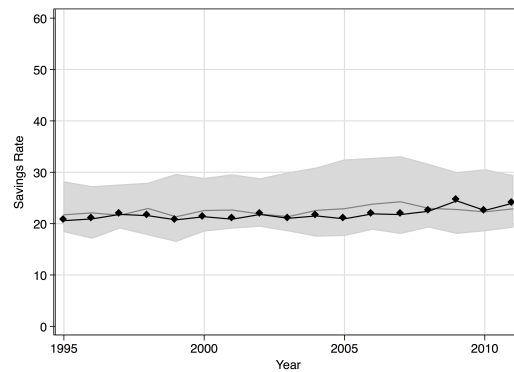
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



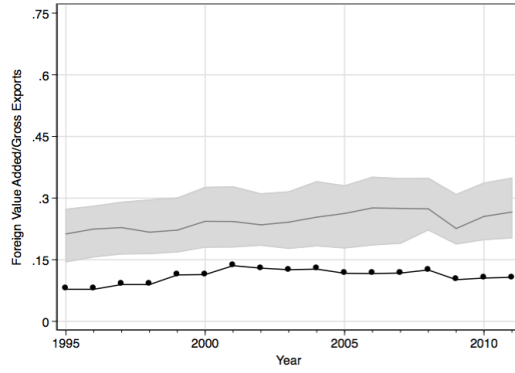
(f) Savings Rate



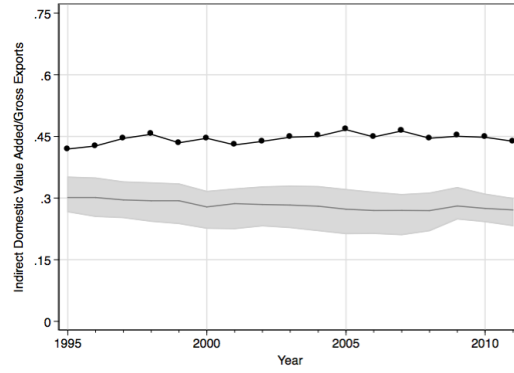
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.5: Brazil: GVC and Trade Variables

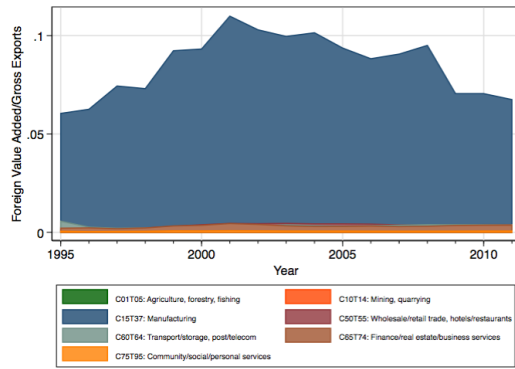
(a) Backward Linkage, all sectors



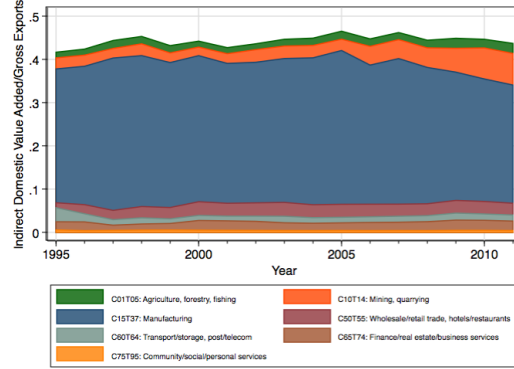
(b) Forward Linkage, all sectors



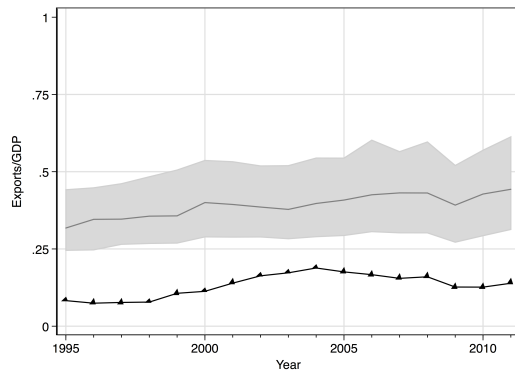
(c) Backward Linkage, by sector



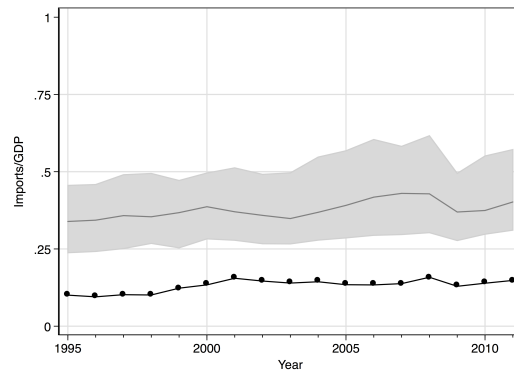
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



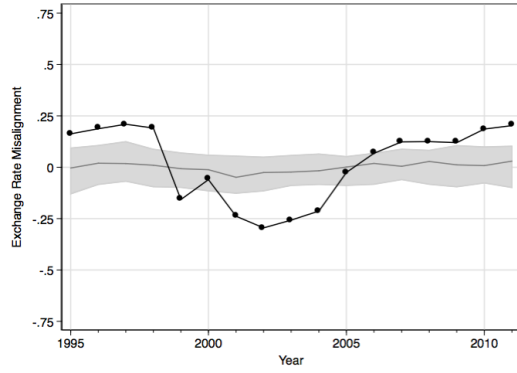
(f) Imports as a share of GDP, all sectors



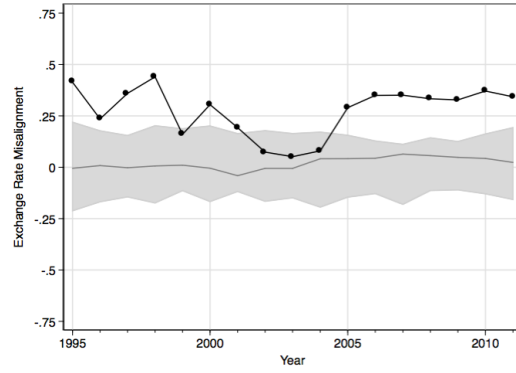
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.6: Brazil (cont.): Currency Manipulation Variables

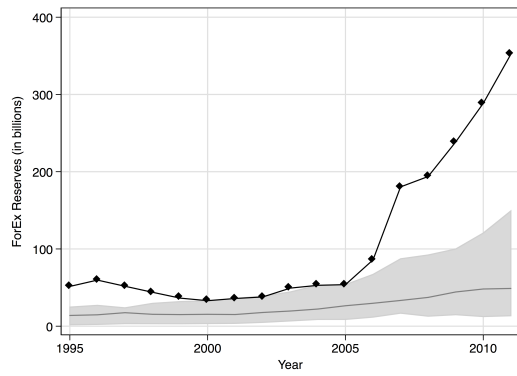
(a) Currency Misalignment, BEER approach



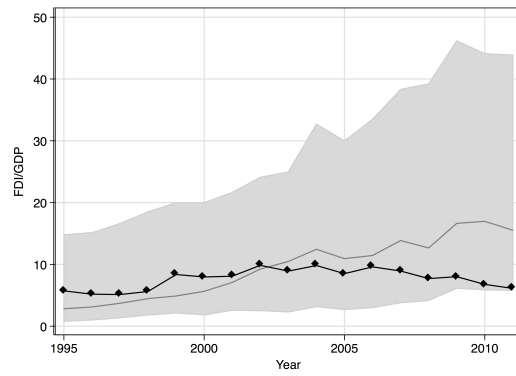
(b) Currency Misalignment, BS approach



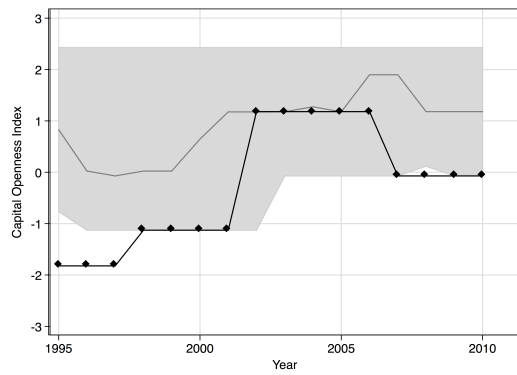
(c) Foreign Exchange Reserves



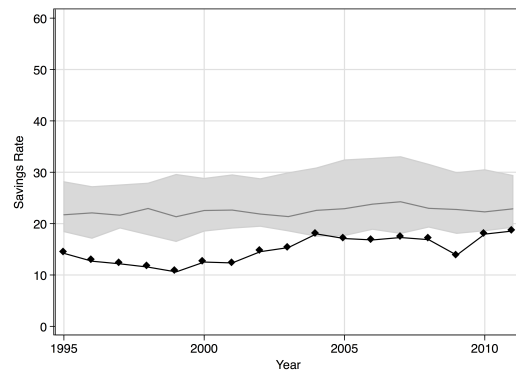
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



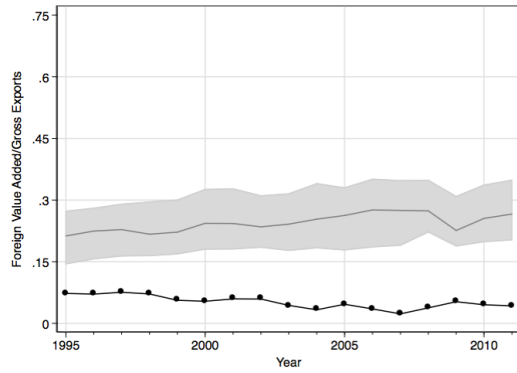
(f) Savings Rate



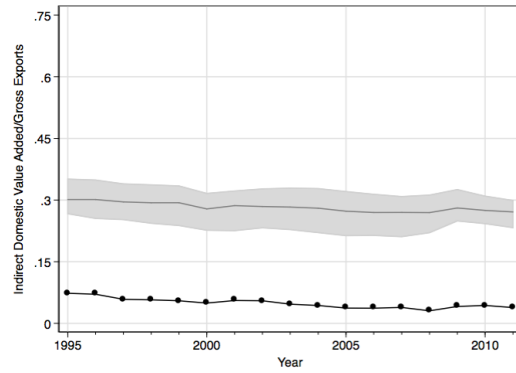
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.7: Brunei Darussalam: GVC and Trade Variables

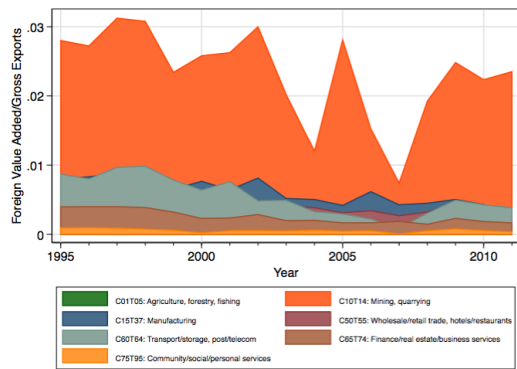
(a) Backward Linkage, all sectors



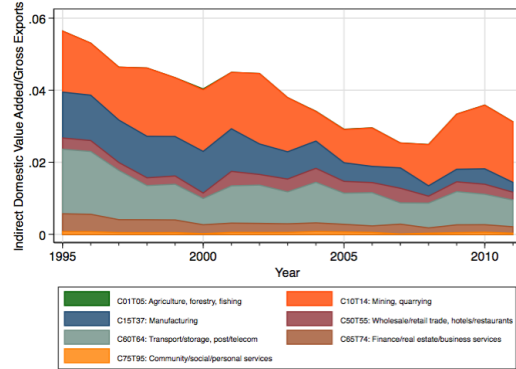
(b) Forward Linkage, all sectors



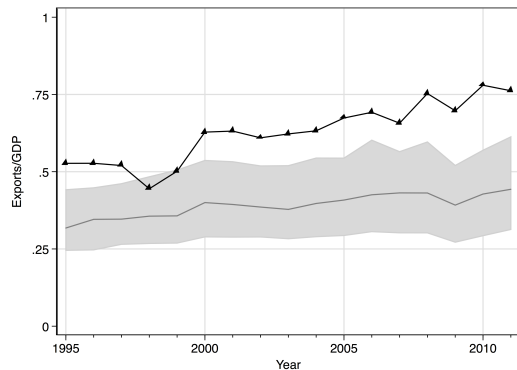
(c) Backward Linkage, by sector



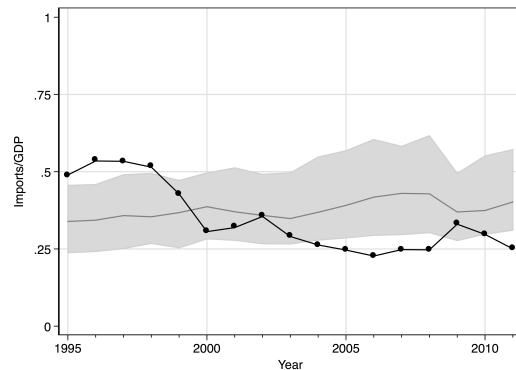
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



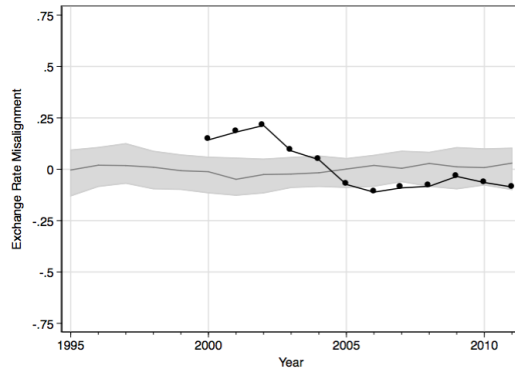
(f) Imports as a share of GDP, all sectors



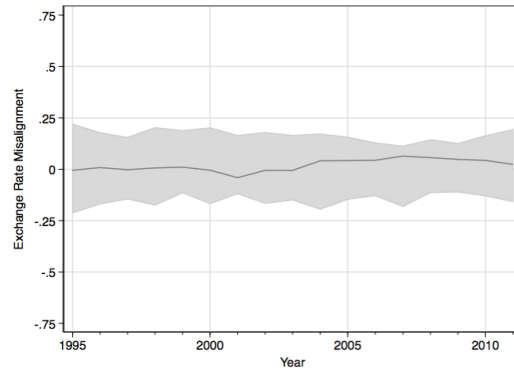
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.8: Brunei Darussalam (cont.): Currency Manipulation Variables

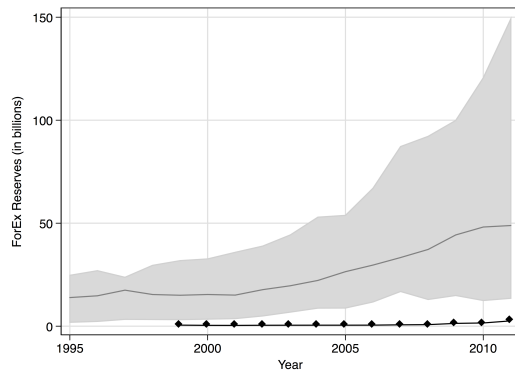
(a) Currency Misalignment, BEER approach



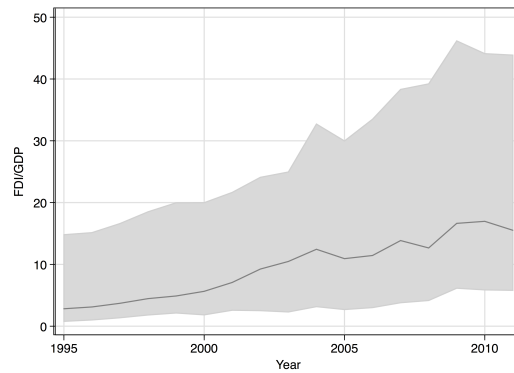
(b) Currency Misalignment, BS approach



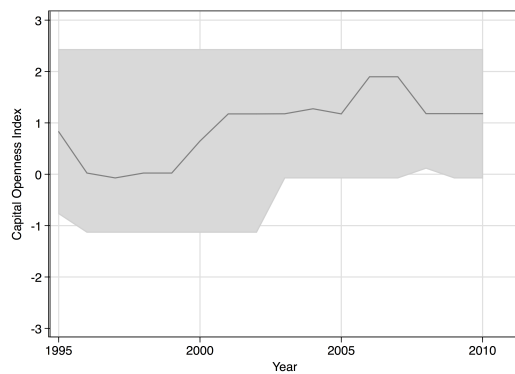
(c) Foreign Exchange Reserves



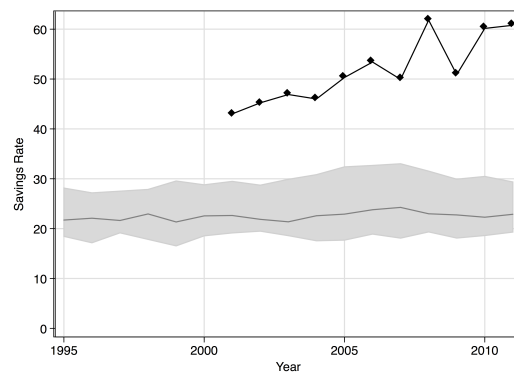
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



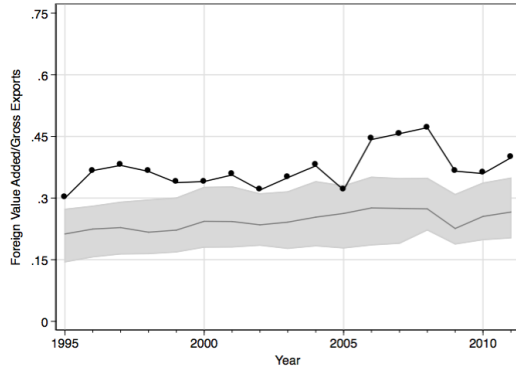
(f) Savings Rate



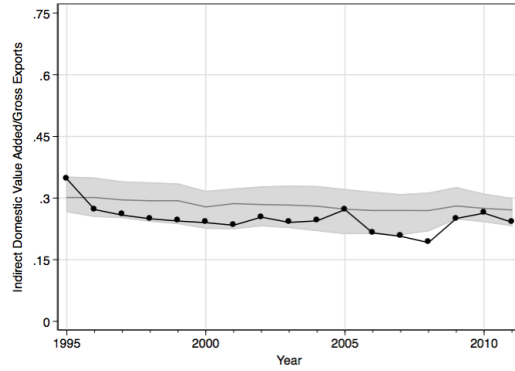
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.9: Bulgaria: GVC and Trade Variables

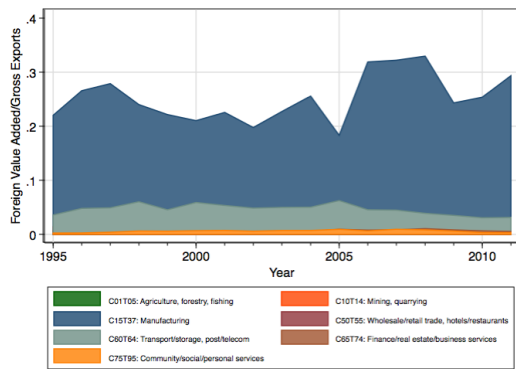
(a) Backward Linkage, all sectors



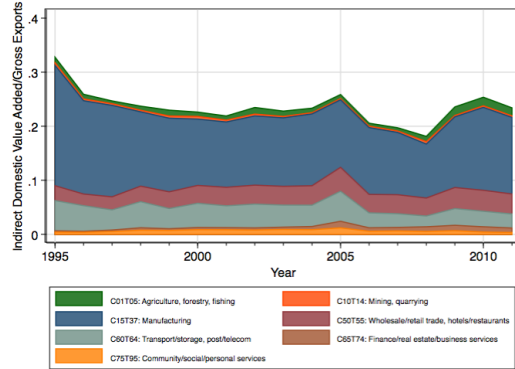
(b) Forward Linkage, all sectors



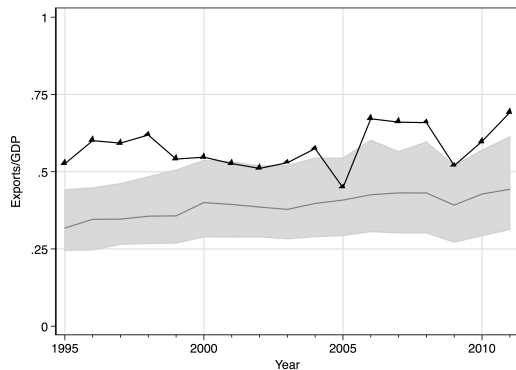
(c) Backward Linkage, by sector



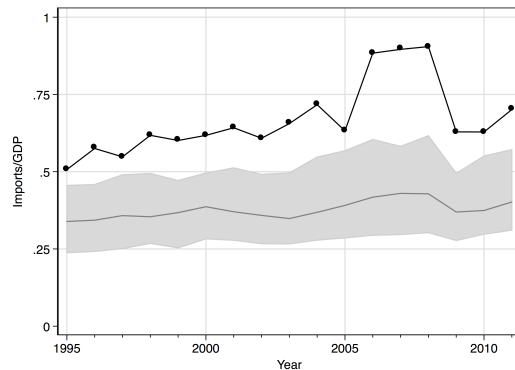
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



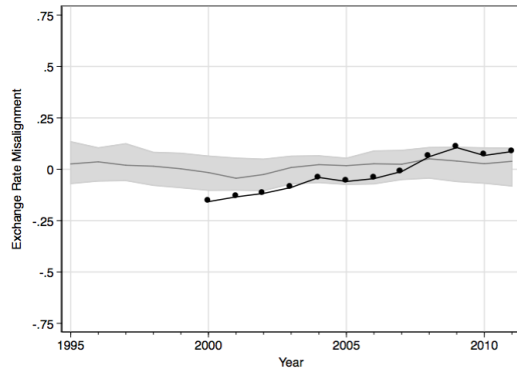
(f) Imports as a share of GDP, all sectors



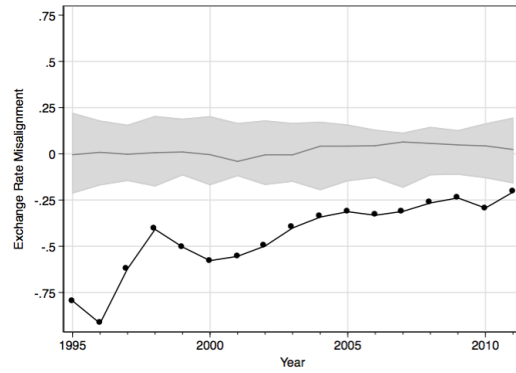
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.10: Bulgaria (cont.): Currency Manipulation Variables

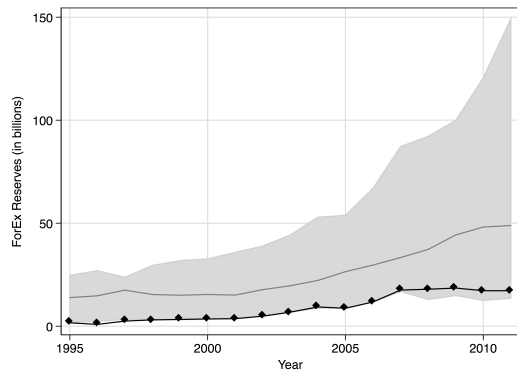
(a) Currency Misalignment, BEER approach



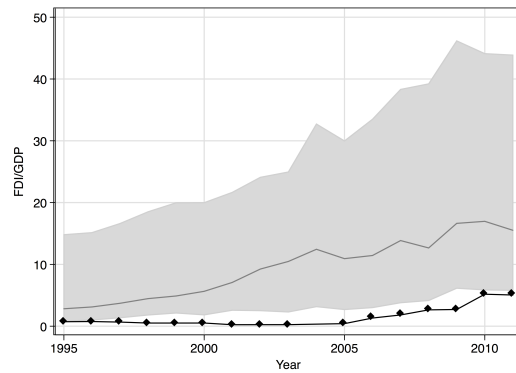
(b) Currency Misalignment, BS approach



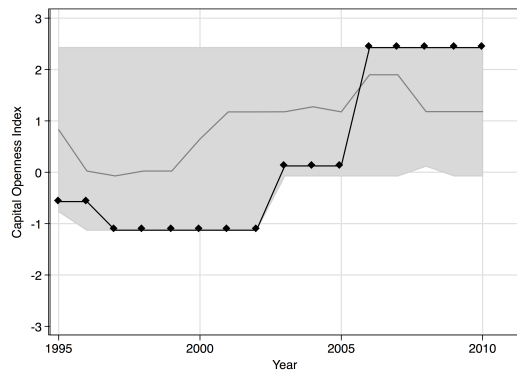
(c) Foreign Exchange Reserves



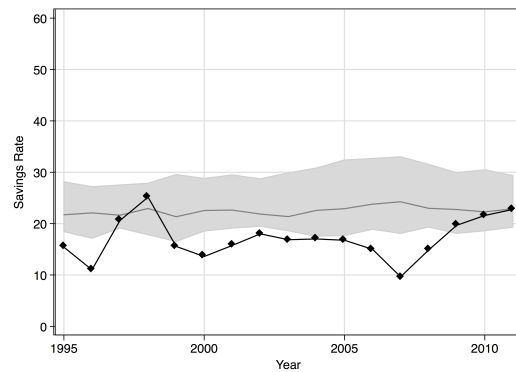
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



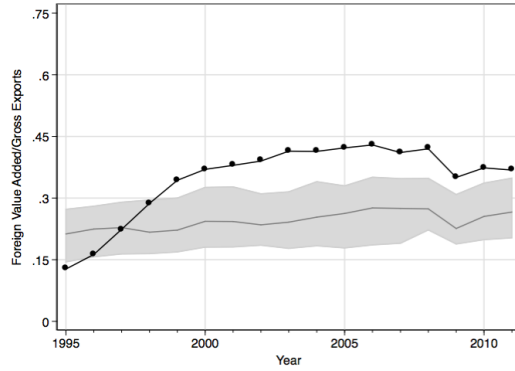
(f) Savings Rate



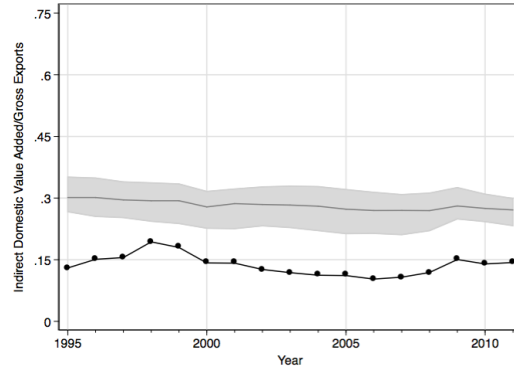
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.11: Cambodia: GVC and Trade Variables

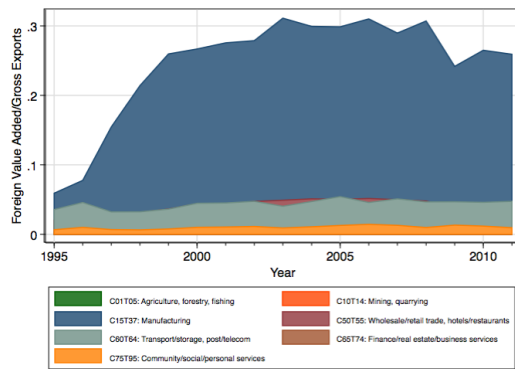
(a) Backward Linkage, all sectors



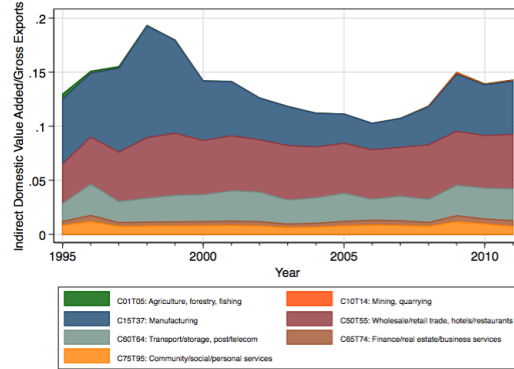
(b) Forward Linkage, all sectors



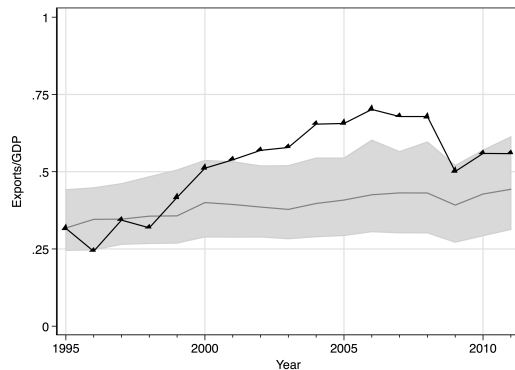
(c) Backward Linkage, by sector



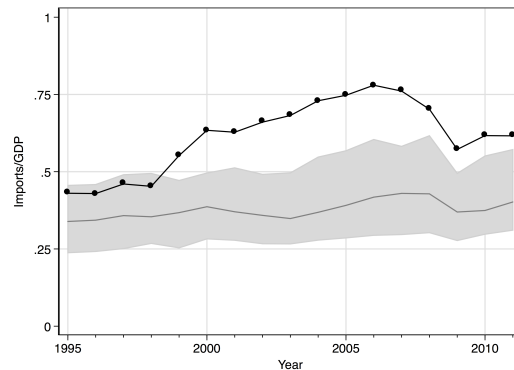
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



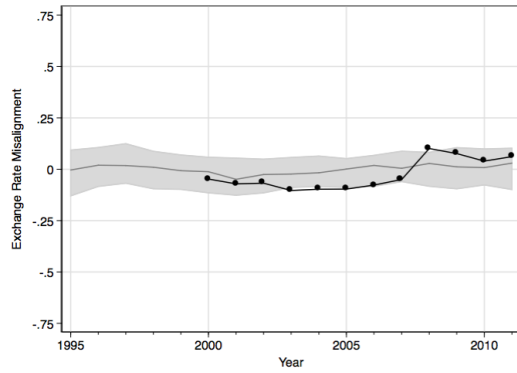
(f) Imports as a share of GDP, all sectors



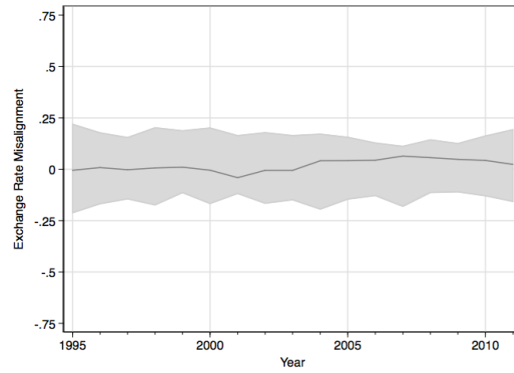
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.12: Cambodia (cont.): Currency Manipulation Variables

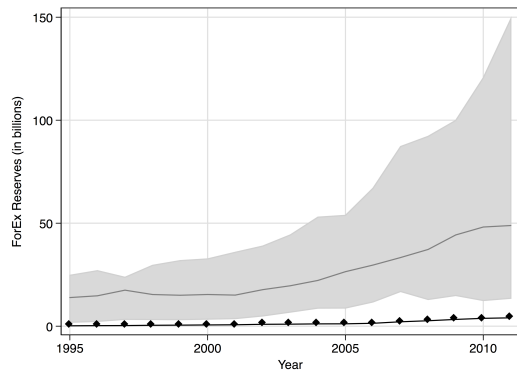
(a) Currency Misalignment, BEER approach



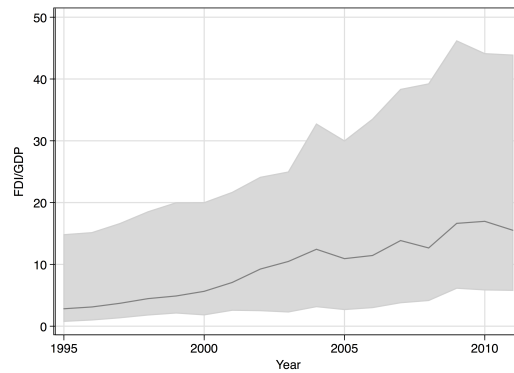
(b) Currency Misalignment, BS approach



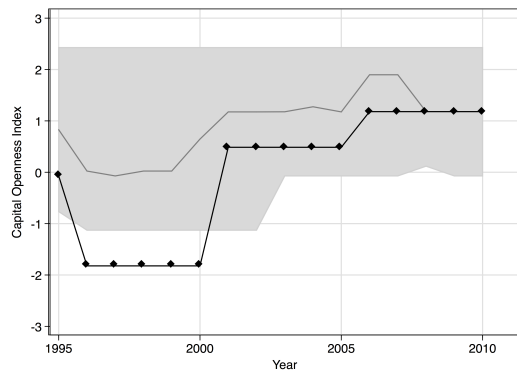
(c) Foreign Exchange Reserves



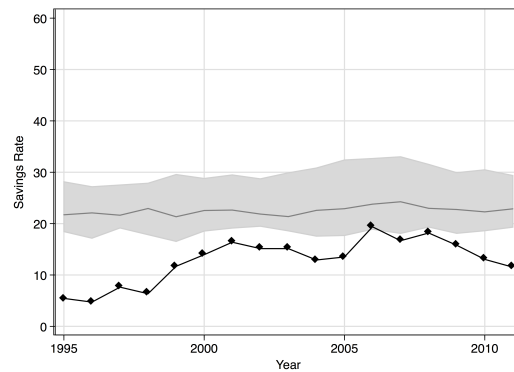
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



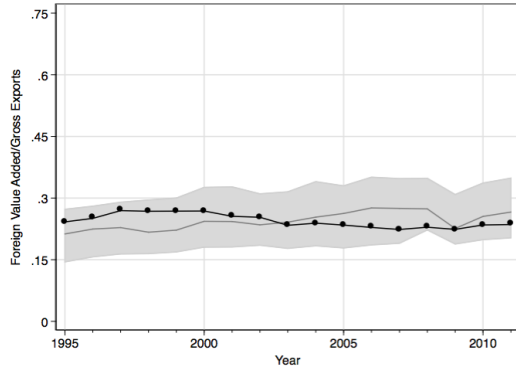
(f) Savings Rate



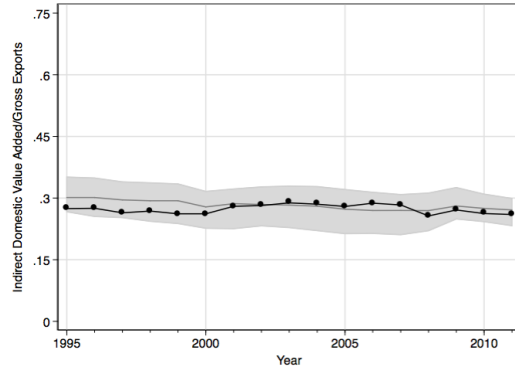
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.13: Canada: GVC and Trade Variables

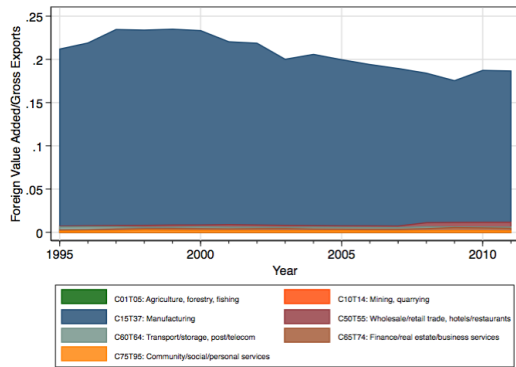
(a) Backward Linkage, all sectors



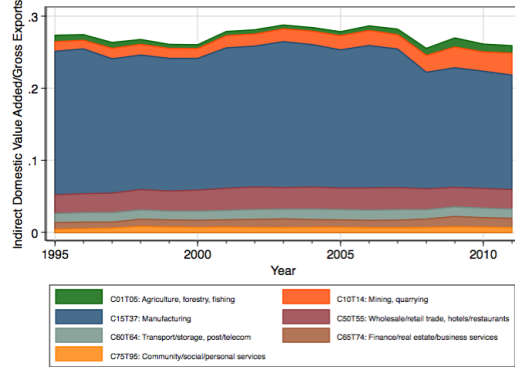
(b) Forward Linkage, all sectors



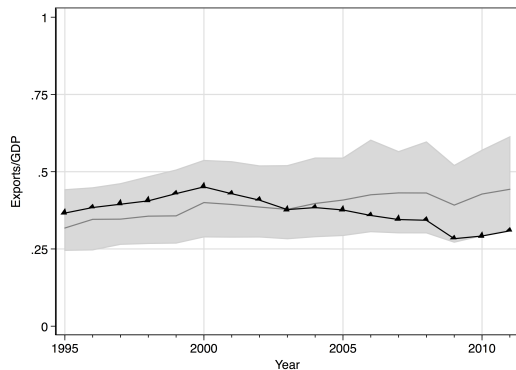
(c) Backward Linkage, by sector



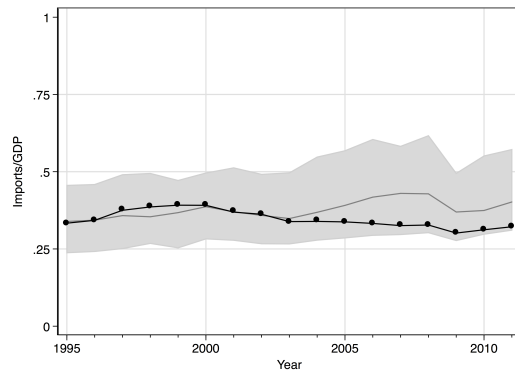
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



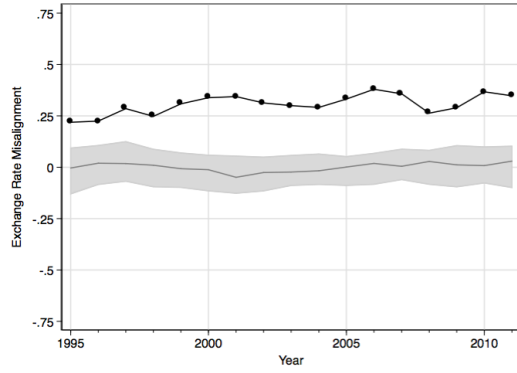
(f) Imports as a share of GDP, all sectors



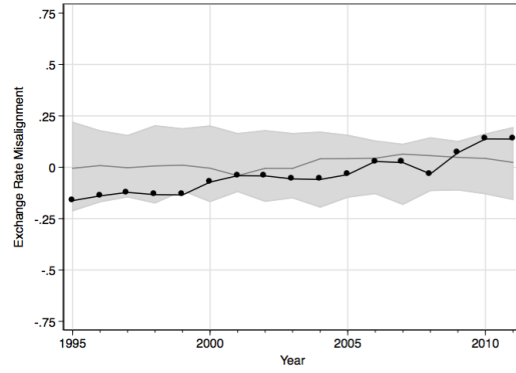
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.14: Canada (cont.): Currency Manipulation Variables

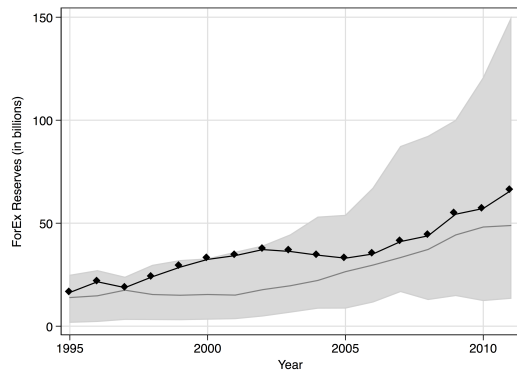
(a) Currency Misalignment, BEER approach



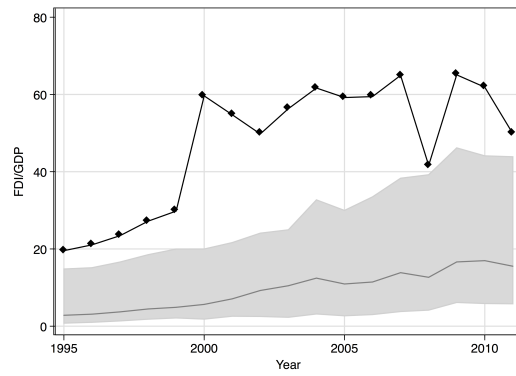
(b) Currency Misalignment, BS approach



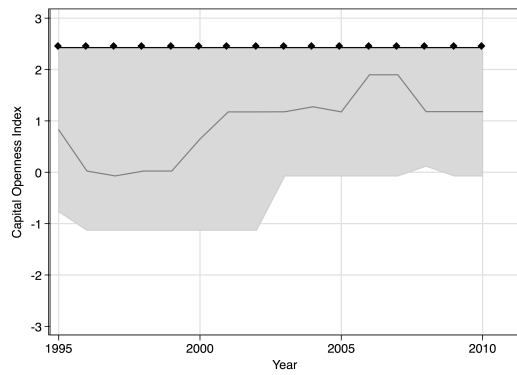
(c) Foreign Exchange Reserves



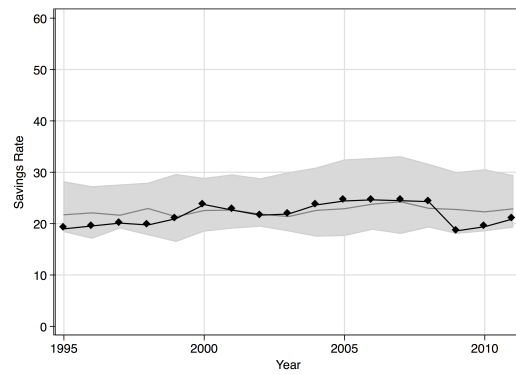
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



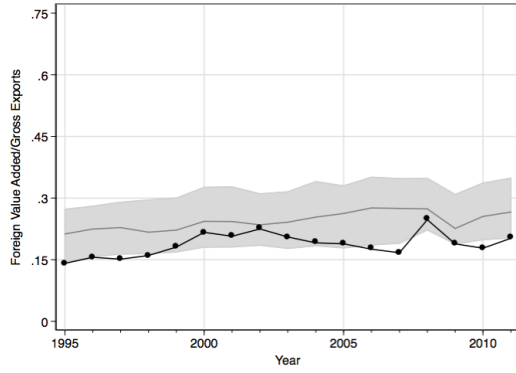
(f) Savings Rate



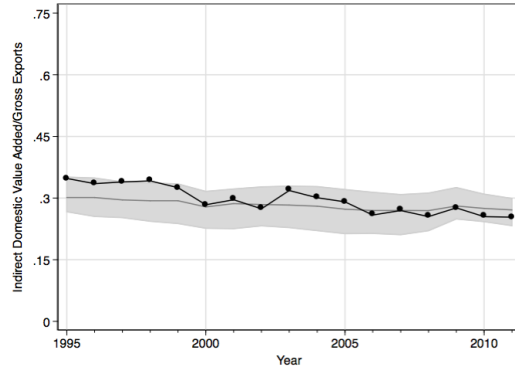
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.15: Chile: GVC and Trade Variables

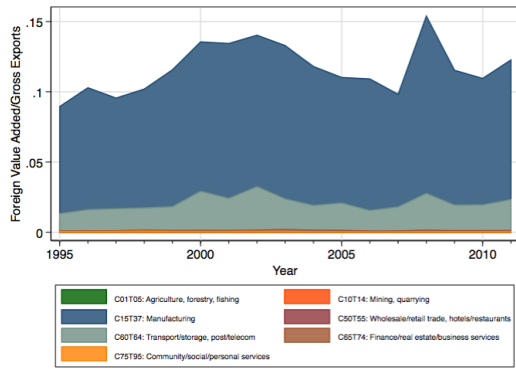
(a) Backward Linkage, all sectors



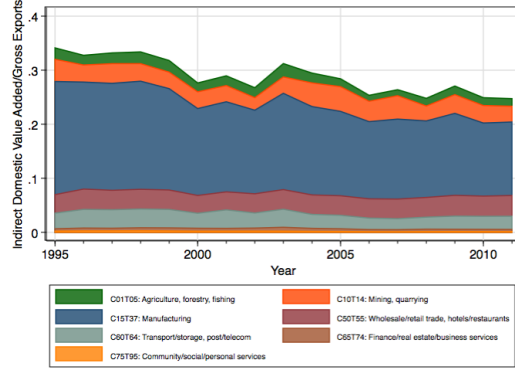
(b) Forward Linkage, all sectors



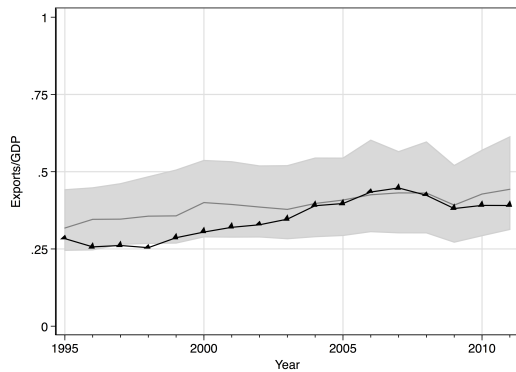
(c) Backward Linkage, by sector



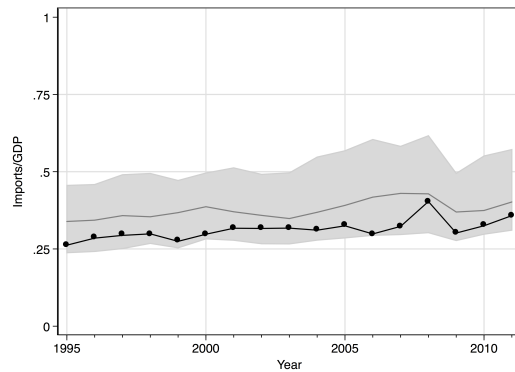
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



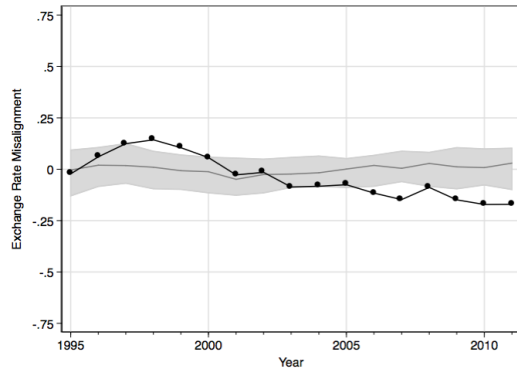
(f) Imports as a share of GDP, all sectors



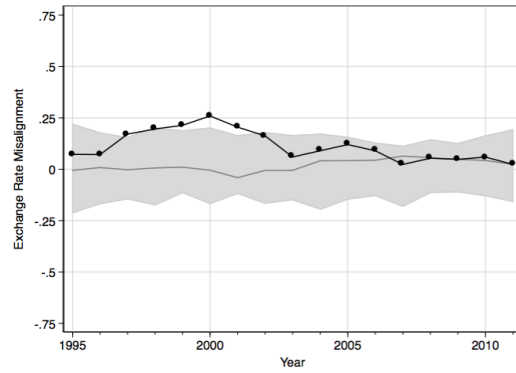
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.16: Chile (cont.): Currency Manipulation Variables

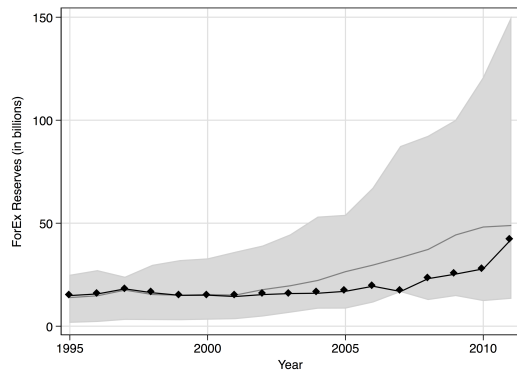
(a) Currency Misalignment, BEER approach



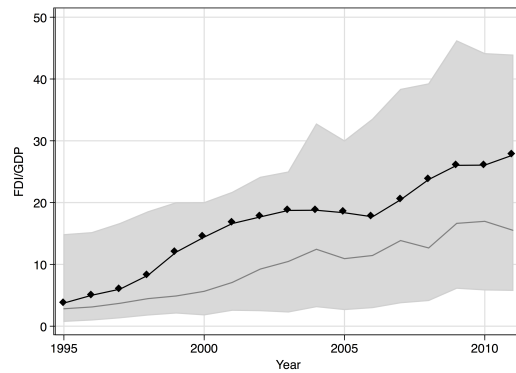
(b) Currency Misalignment, BS approach



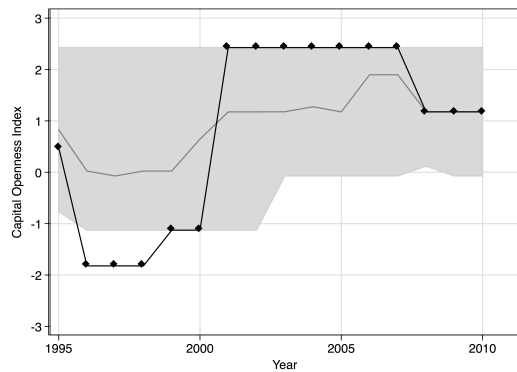
(c) Foreign Exchange Reserves



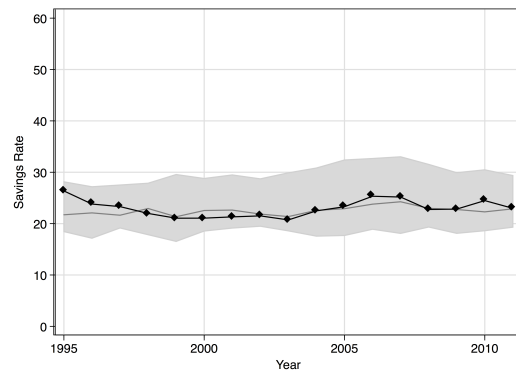
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



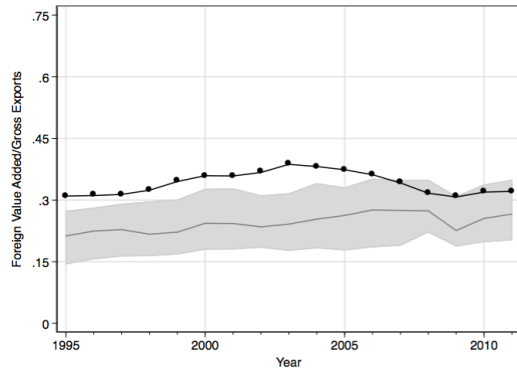
(f) Savings Rate



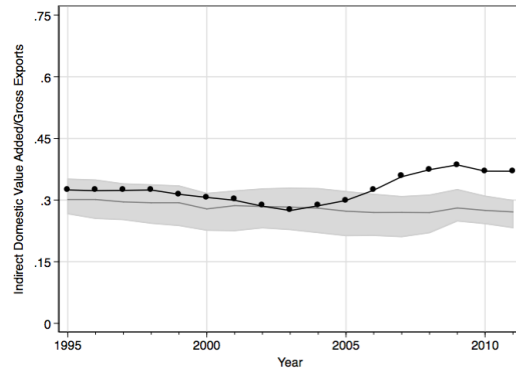
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.17: China: GVC and Trade Variables

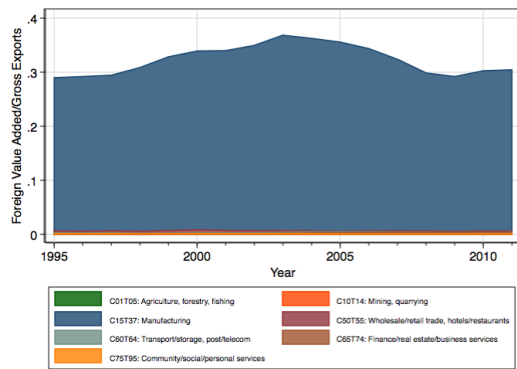
(a) Backward Linkage, all sectors



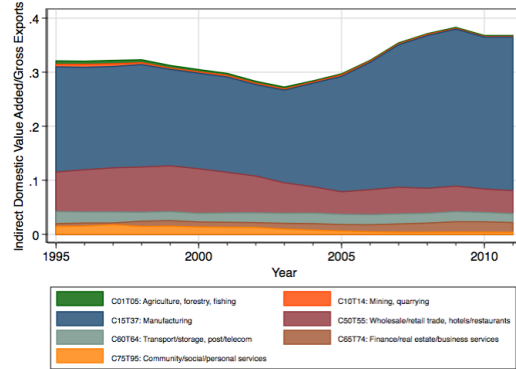
(b) Forward Linkage, all sectors



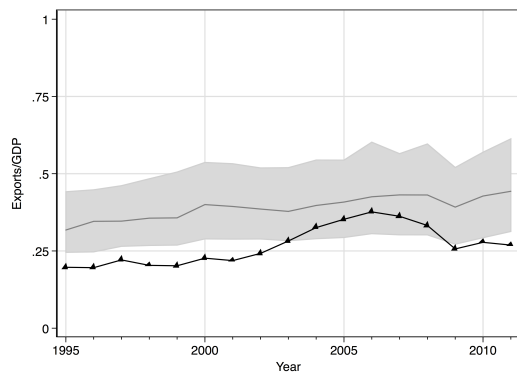
(c) Backward Linkage, by sector



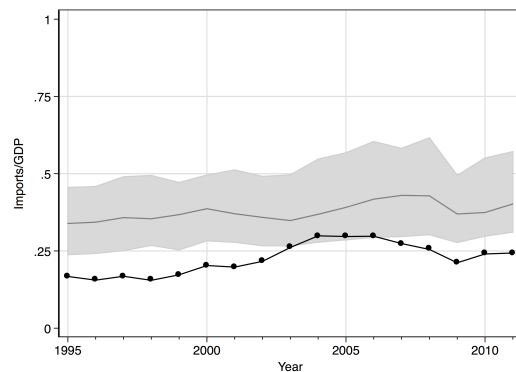
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



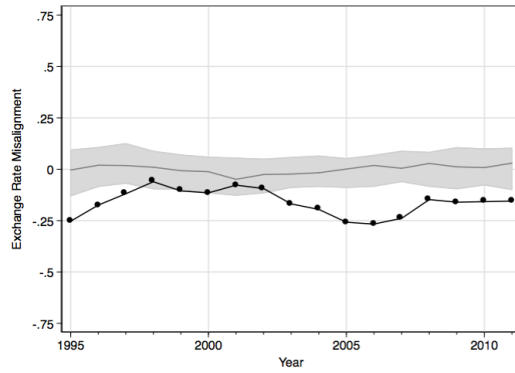
(f) Imports as a share of GDP, all sectors



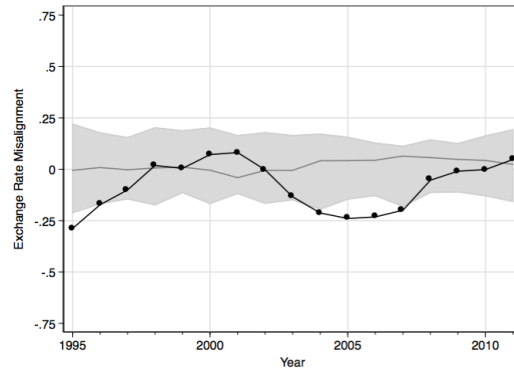
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.18: China (cont.): Currency Manipulation Variables

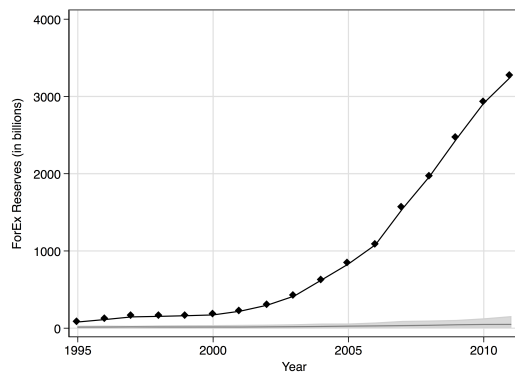
(a) Currency Misalignment, BEER approach



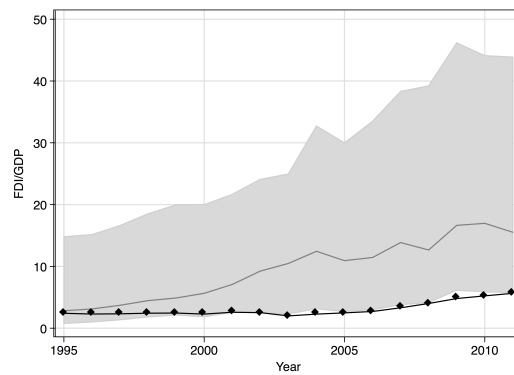
(b) Currency Misalignment, BS approach



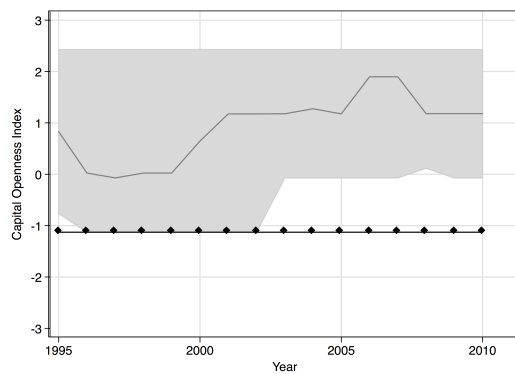
(c) Foreign Exchange Reserves



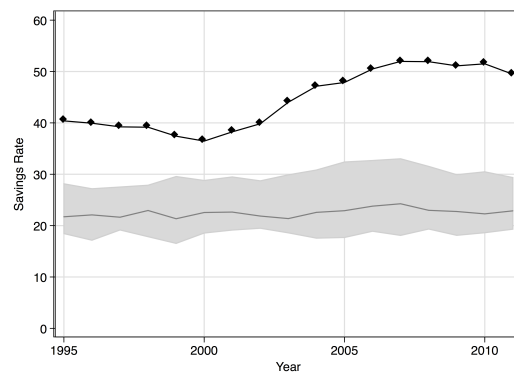
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



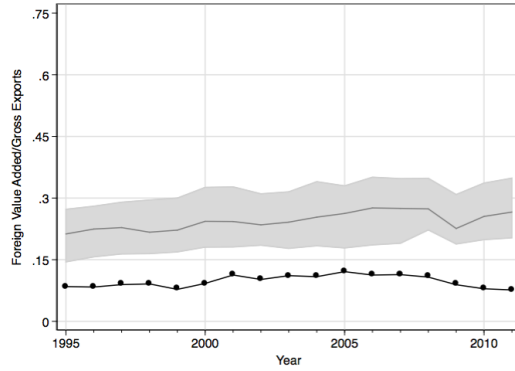
(f) Savings Rate



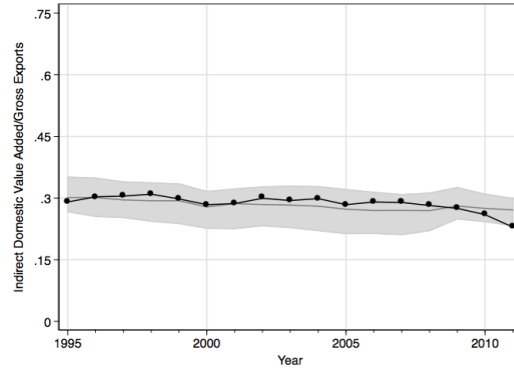
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.19: Colombia: GVC and Trade Variables

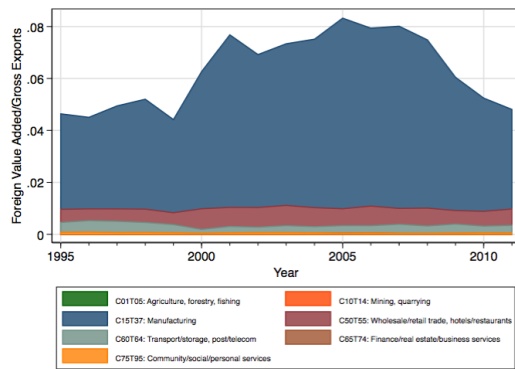
(a) Backward Linkage, all sectors



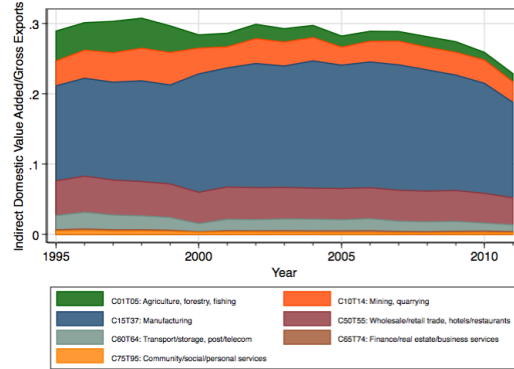
(b) Forward Linkage, all sectors



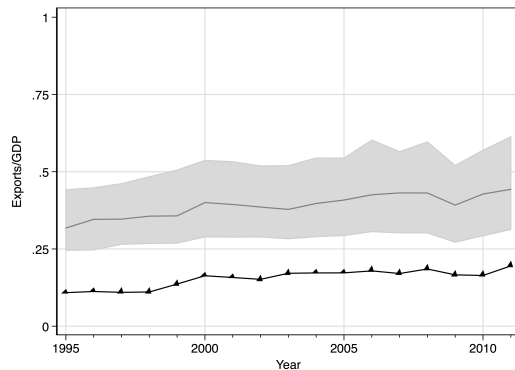
(c) Backward Linkage, by sector



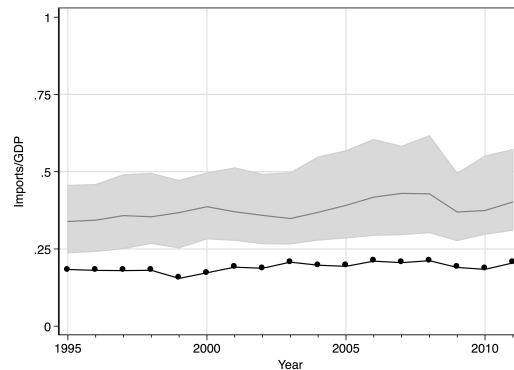
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



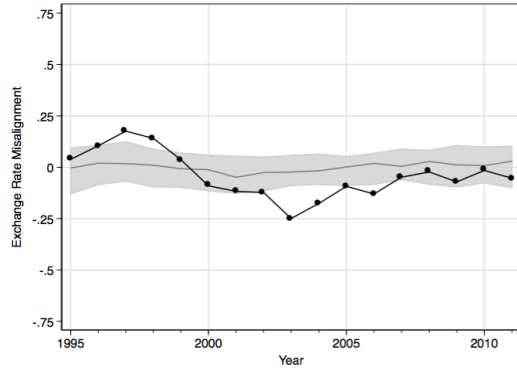
(f) Imports as a share of GDP, all sectors



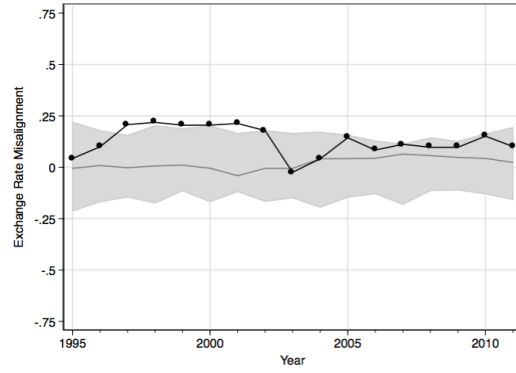
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.20: Colombia (cont.): Currency Manipulation Variables

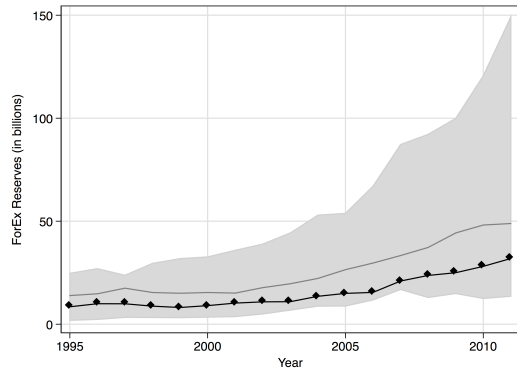
(a) Currency Misalignment, BEER approach



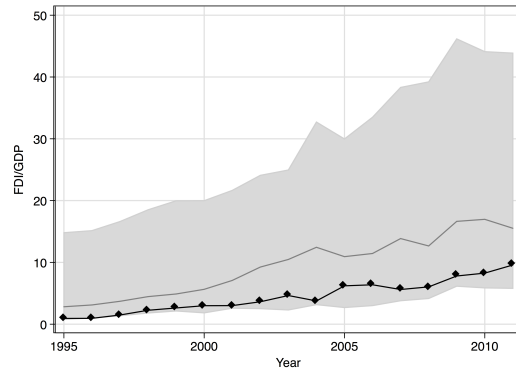
(b) Currency Misalignment, BS approach



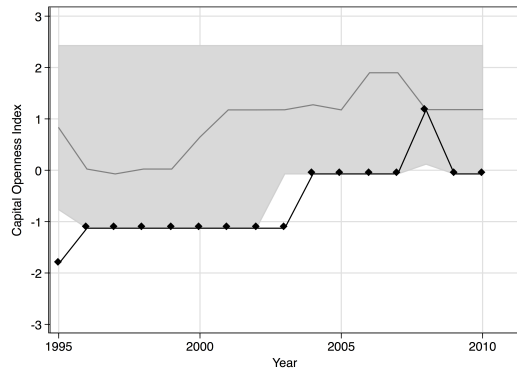
(c) Foreign Exchange Reserves



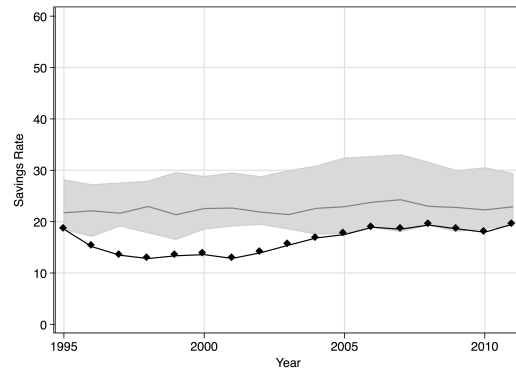
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



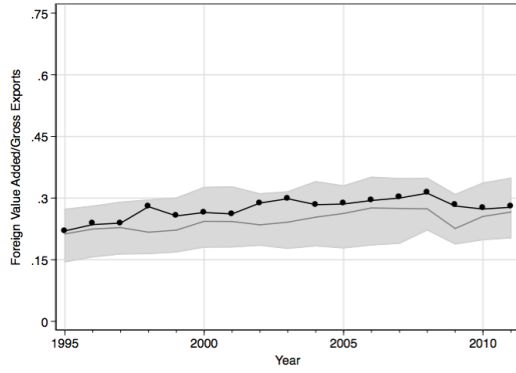
(f) Savings Rate



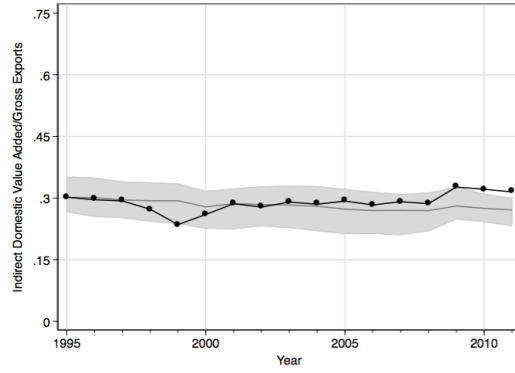
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.21: Costa Rica: GVC and Trade Variables

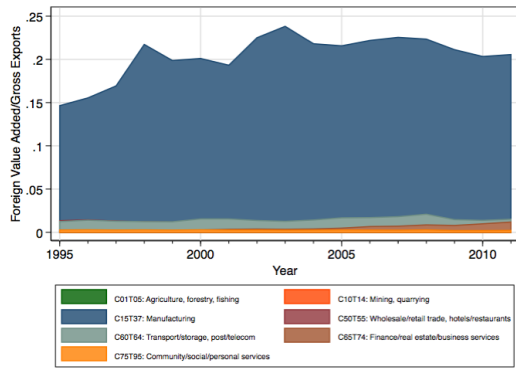
(a) Backward Linkage, all sectors



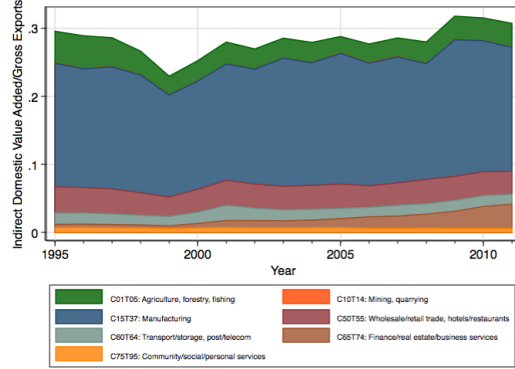
(b) Forward Linkage, all sectors



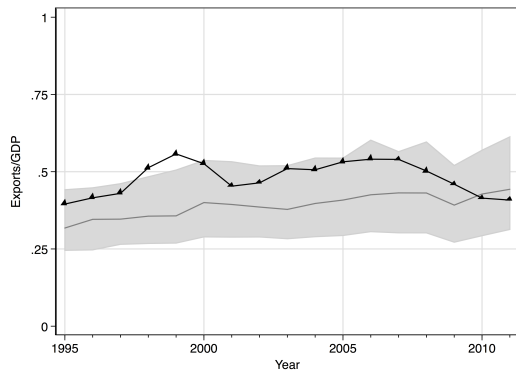
(c) Backward Linkage, by sector



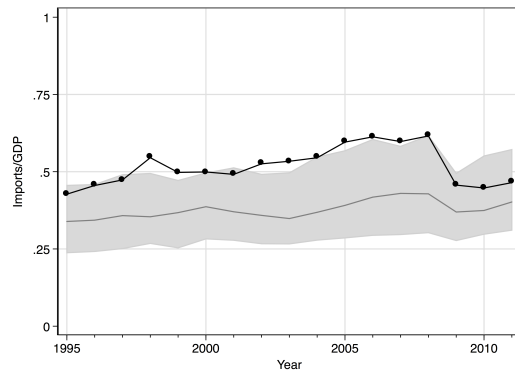
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



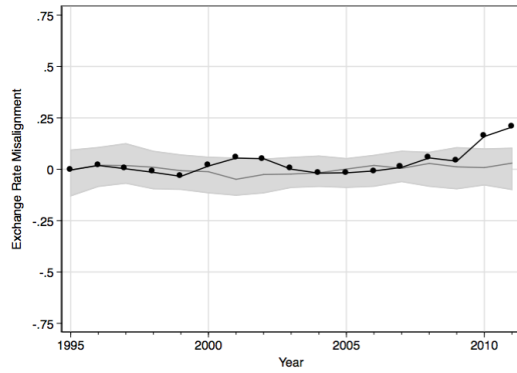
(f) Imports as a share of GDP, all sectors



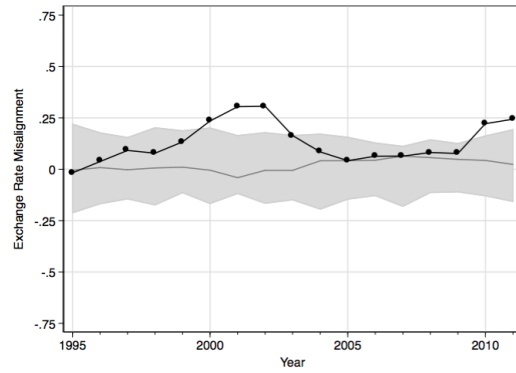
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.22: Costa Rica (cont.): Currency Manipulation Variables

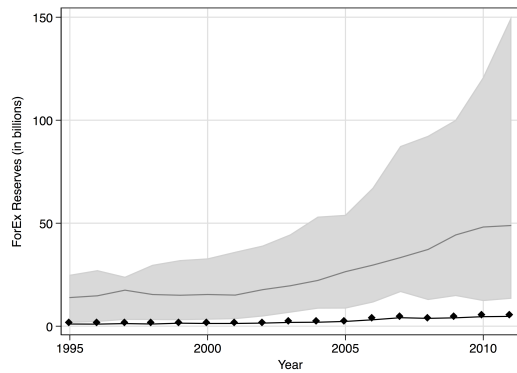
(a) Currency Misalignment, BEER approach



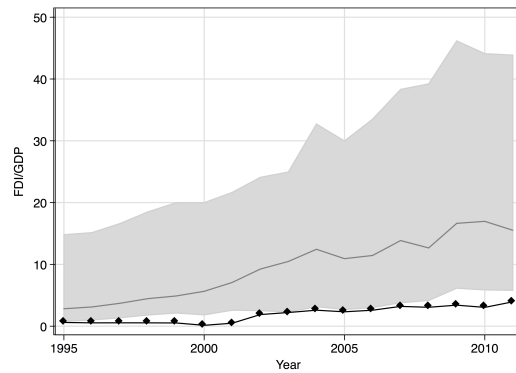
(b) Currency Misalignment, BS approach



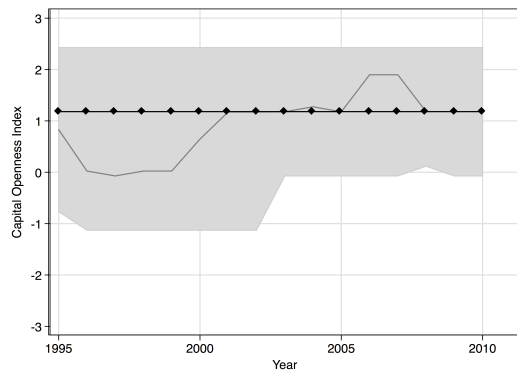
(c) Foreign Exchange Reserves



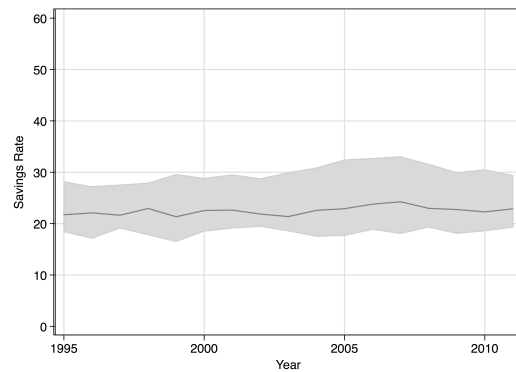
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



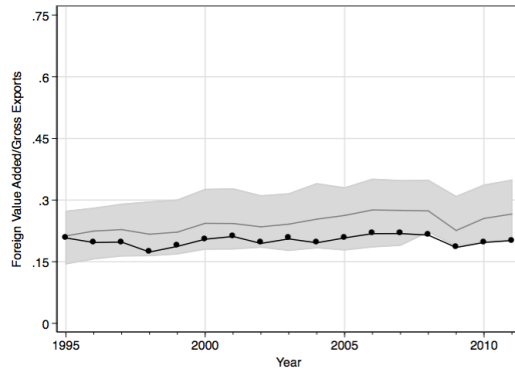
(f) Savings Rate



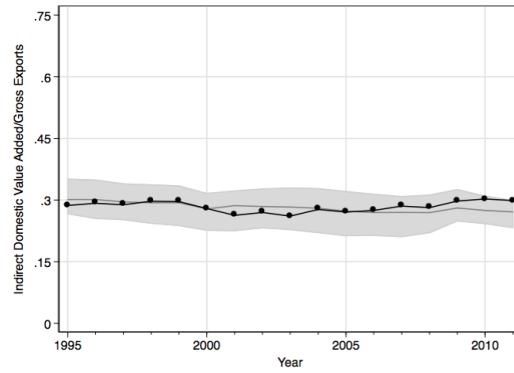
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.23: Croatia: GVC and Trade Variables

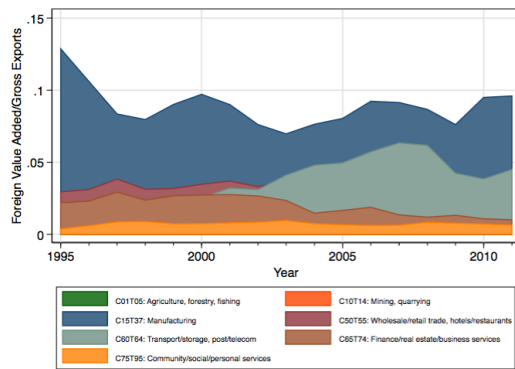
(a) Backward Linkage, all sectors



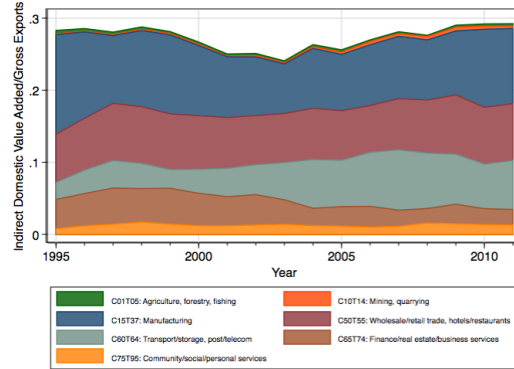
(b) Forward Linkage, all sectors



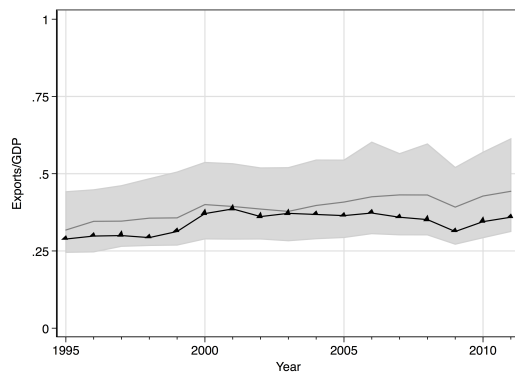
(c) Backward Linkage, by sector



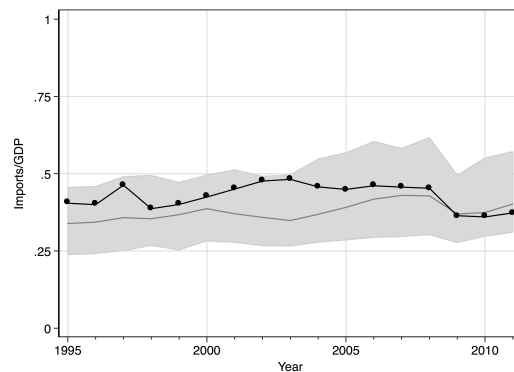
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



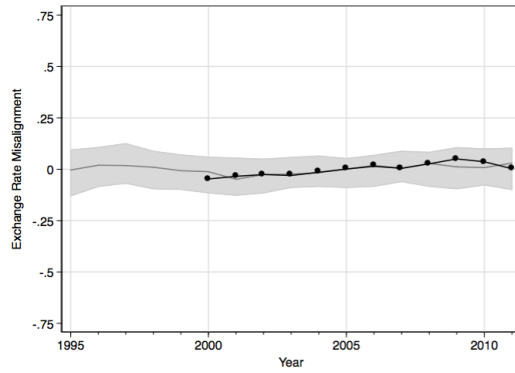
(f) Imports as a share of GDP, all sectors



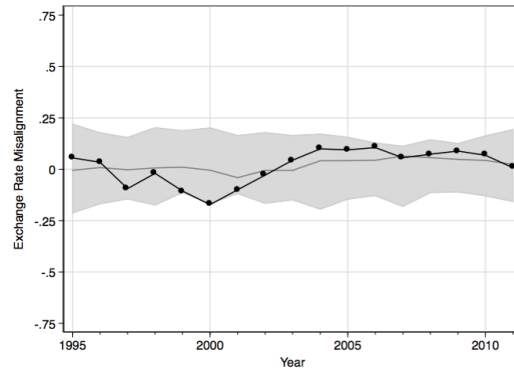
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.24: Croatia (cont.): Currency Manipulation Variables

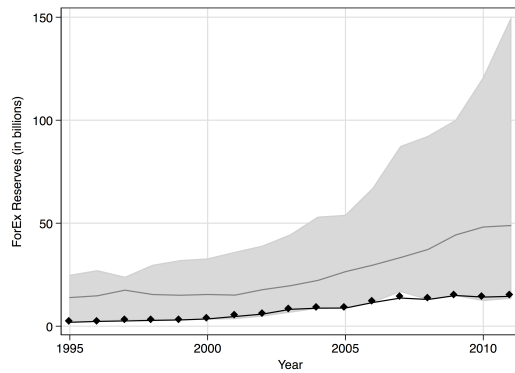
(a) Currency Misalignment, BEER approach



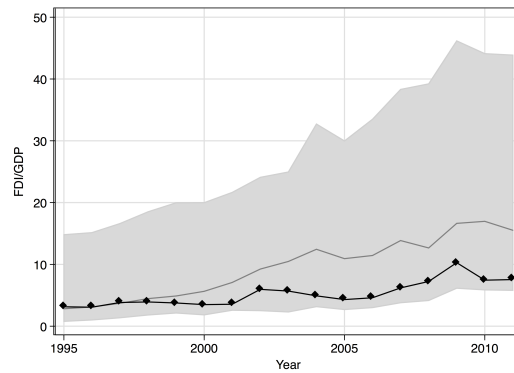
(b) Currency Misalignment, BS approach



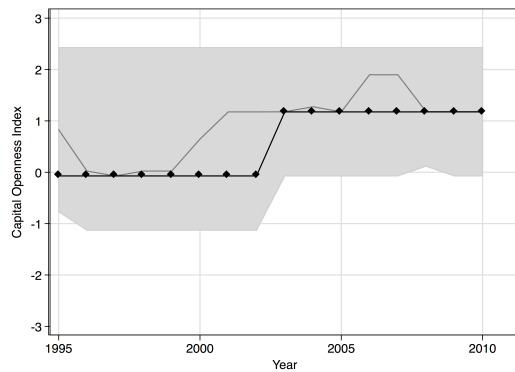
(c) Foreign Exchange Reserves



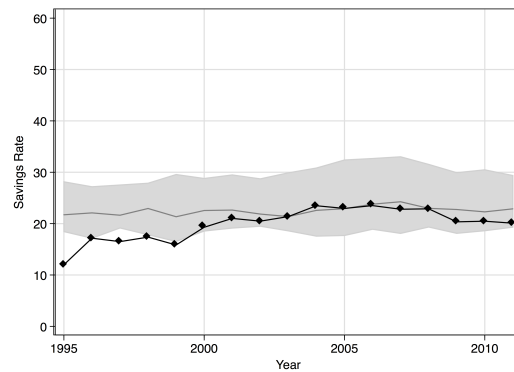
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



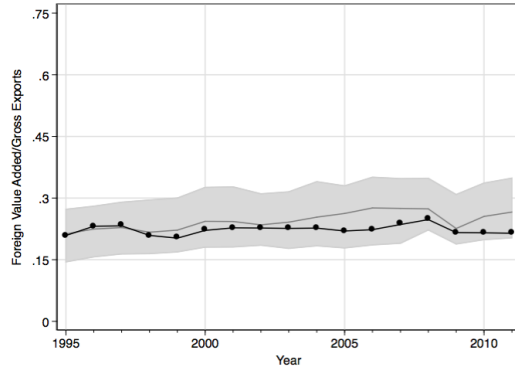
(f) Savings Rate



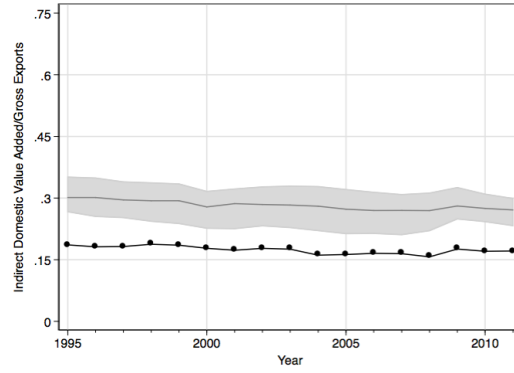
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.25: Cyprus: GVC and Trade Variables

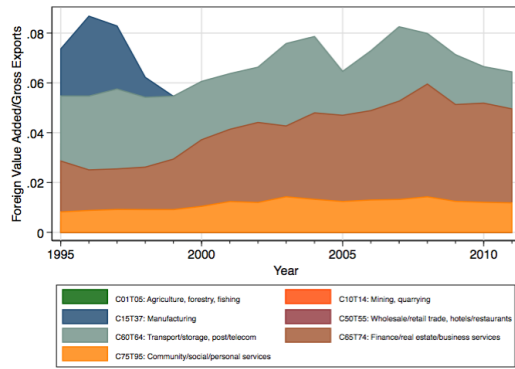
(a) Backward Linkage, all sectors



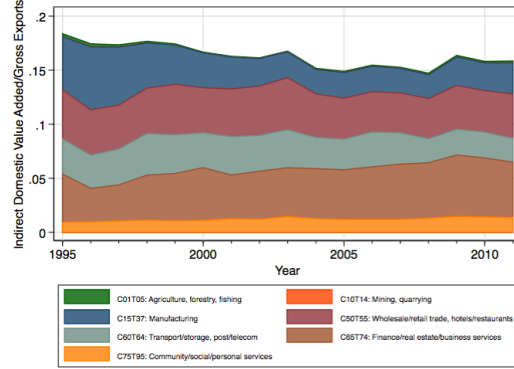
(b) Forward Linkage, all sectors



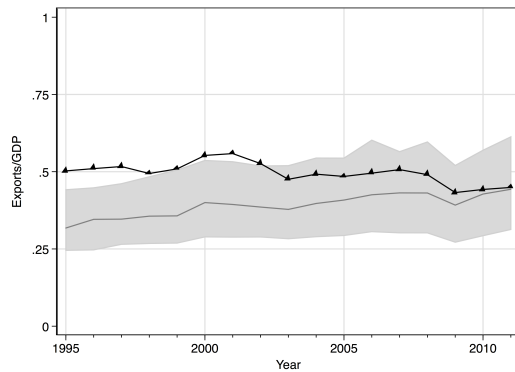
(c) Backward Linkage, by sector



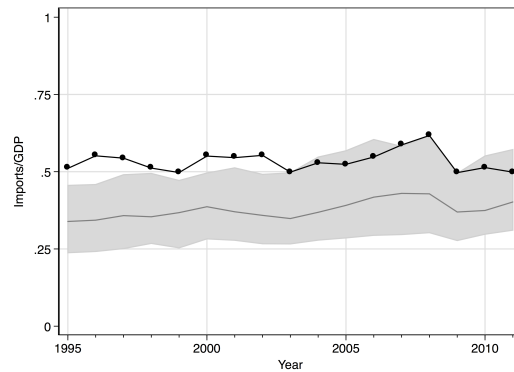
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



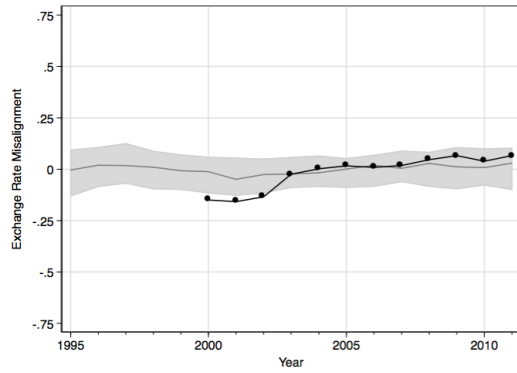
(f) Imports as a share of GDP, all sectors



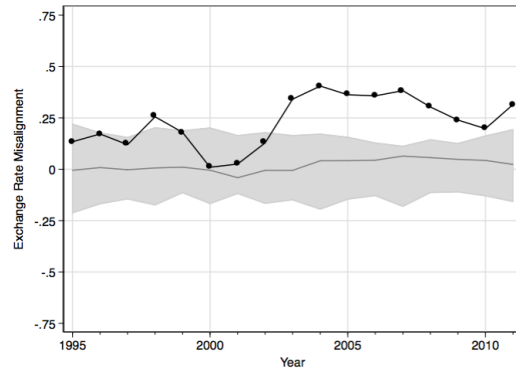
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.26: Cyprus (cont.): Currency Manipulation Variables

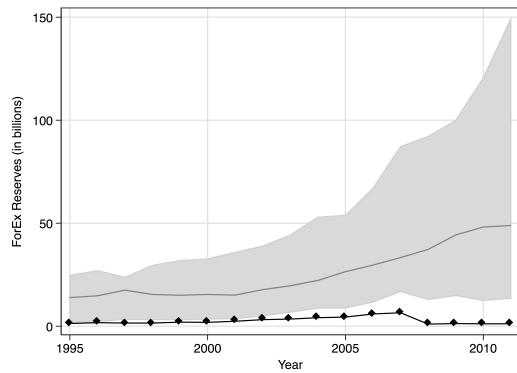
(a) Currency Misalignment, BEER approach



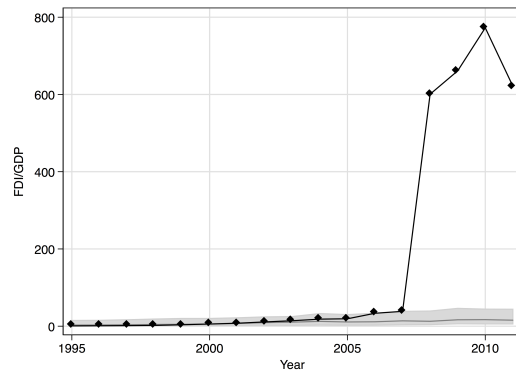
(b) Currency Misalignment, BS approach



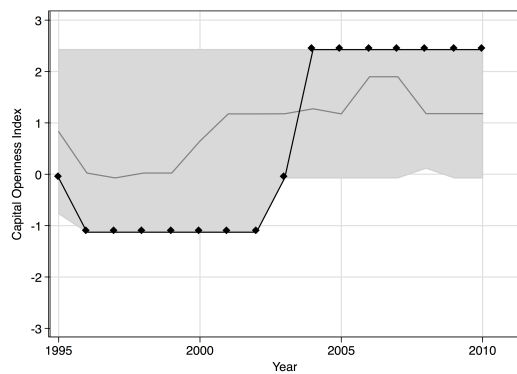
(c) Foreign Exchange Reserves



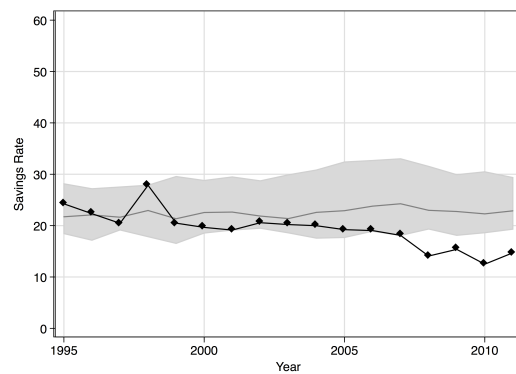
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



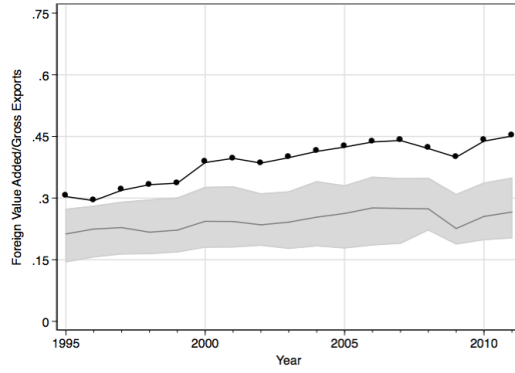
(f) Savings Rate



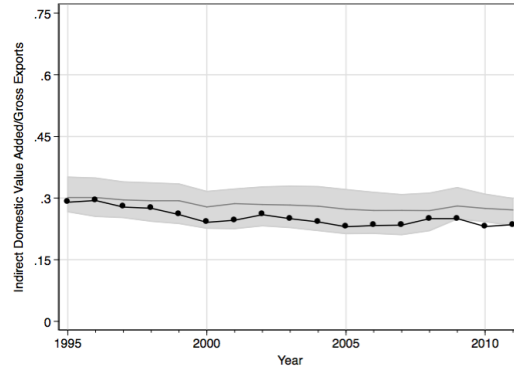
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.27: Czech Republic: GVC and Trade Variables

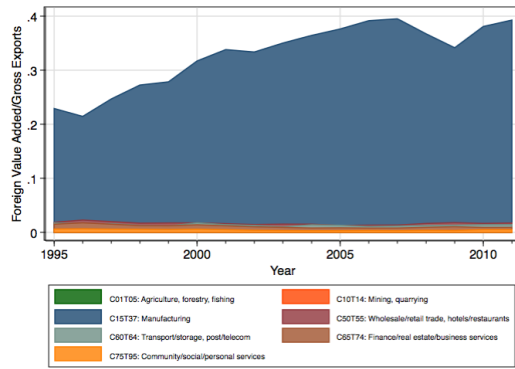
(a) Backward Linkage, all sectors



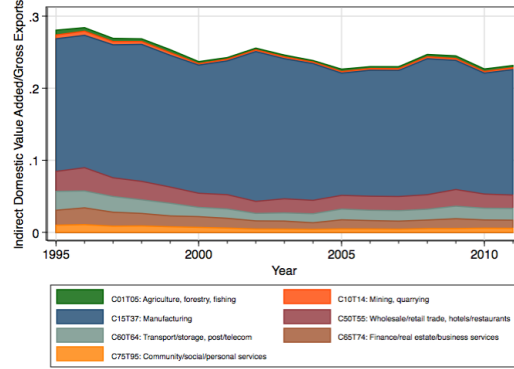
(b) Forward Linkage, all sectors



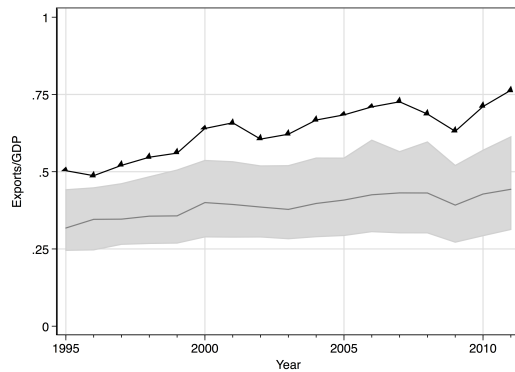
(c) Backward Linkage, by sector



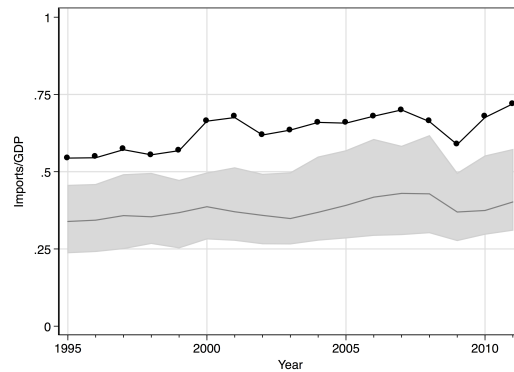
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



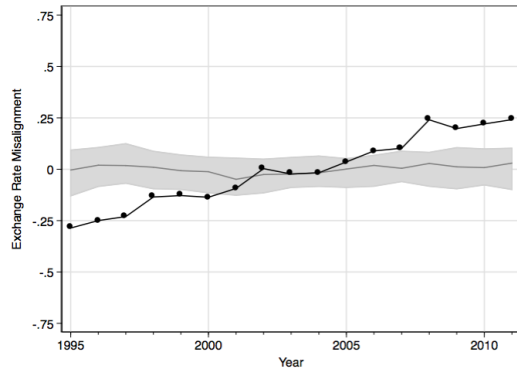
(f) Imports as a share of GDP, all sectors



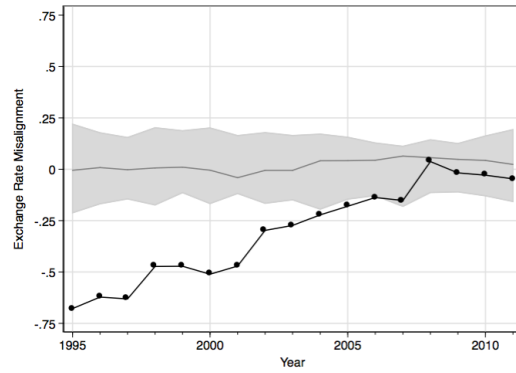
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.28: Czech Republic (cont.): Currency Manipulation Variables

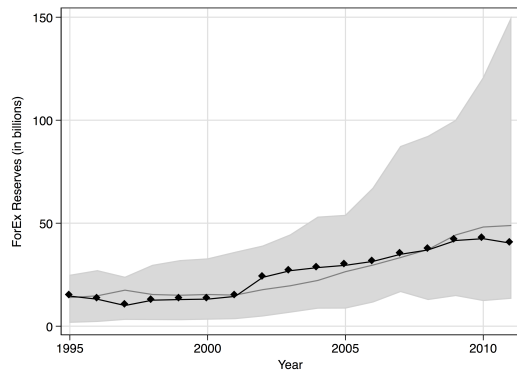
(a) Currency Misalignment, BEER approach



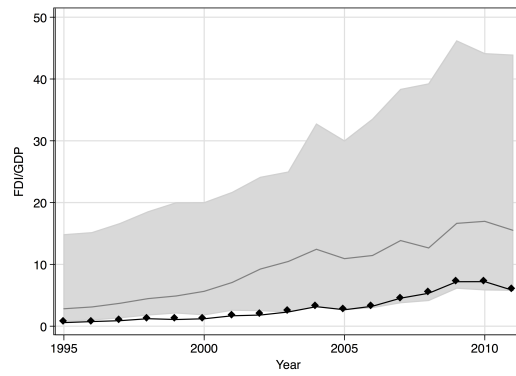
(b) Currency Misalignment, BS approach



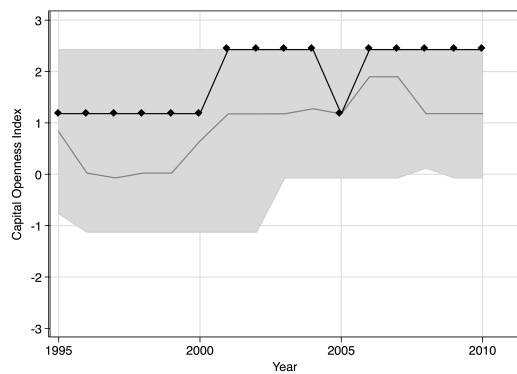
(c) Foreign Exchange Reserves



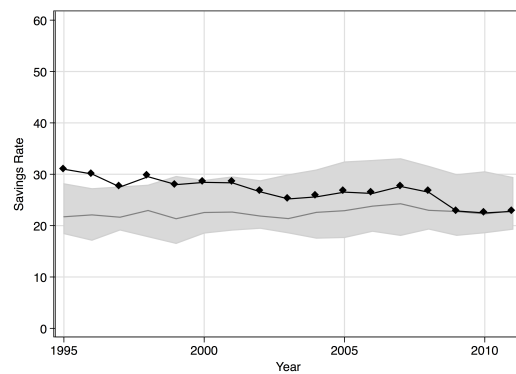
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



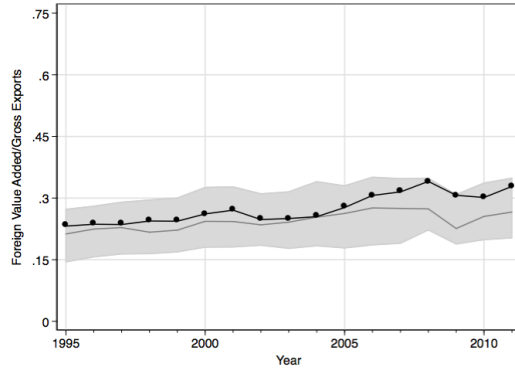
(f) Savings Rate



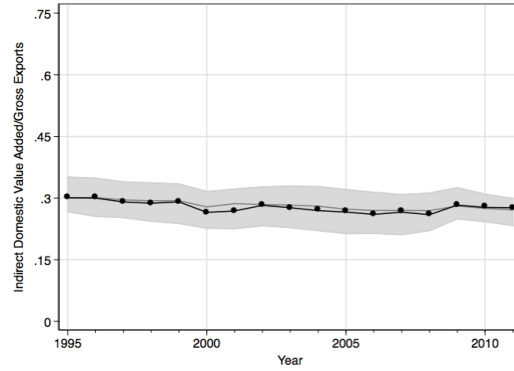
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.29: Denmark: GVC and Trade Variables

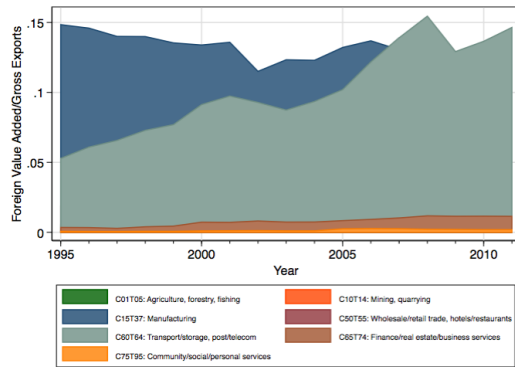
(a) Backward Linkage, all sectors



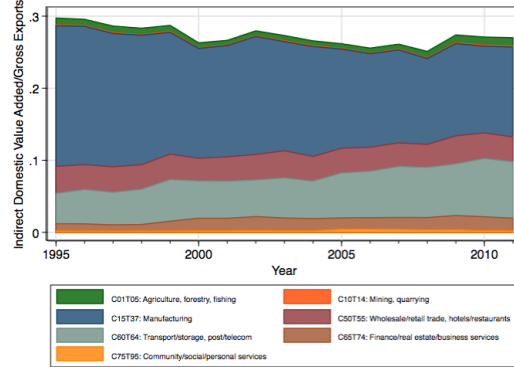
(b) Forward Linkage, all sectors



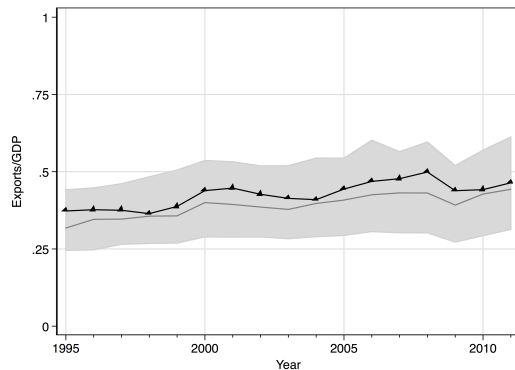
(c) Backward Linkage, by sector



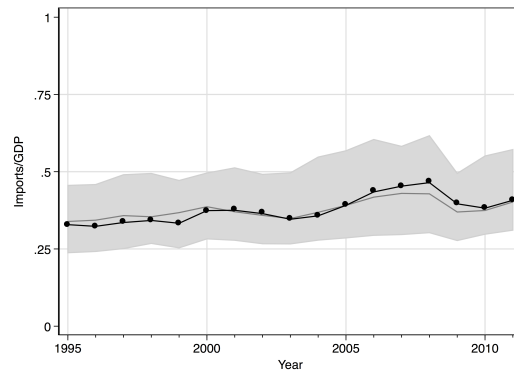
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



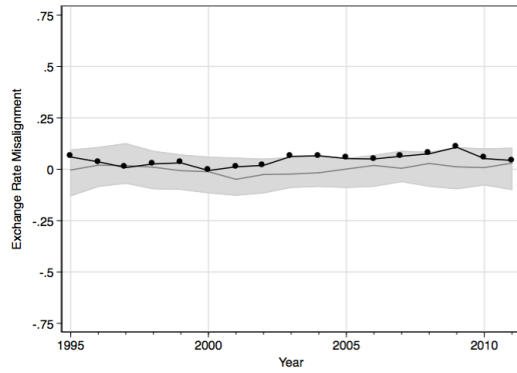
(f) Imports as a share of GDP, all sectors



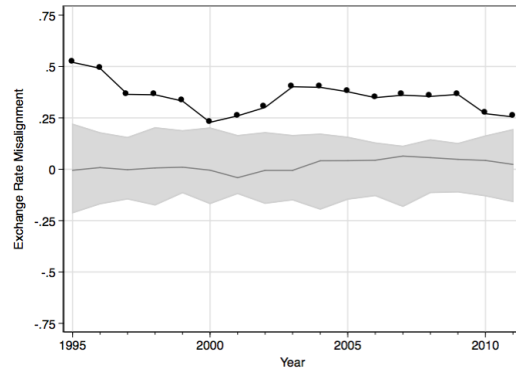
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.30: Denmark (cont.): Currency Manipulation Variables

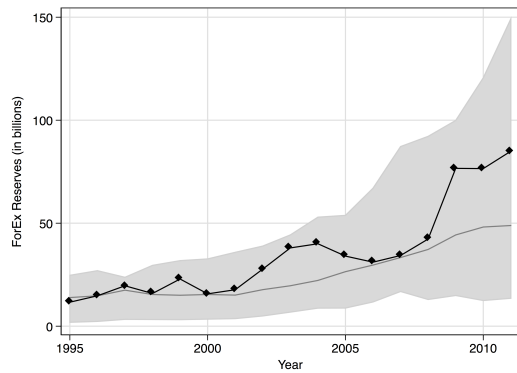
(a) Currency Misalignment, BEER approach



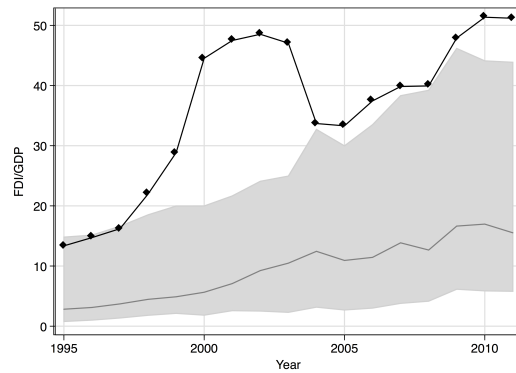
(b) Currency Misalignment, BS approach



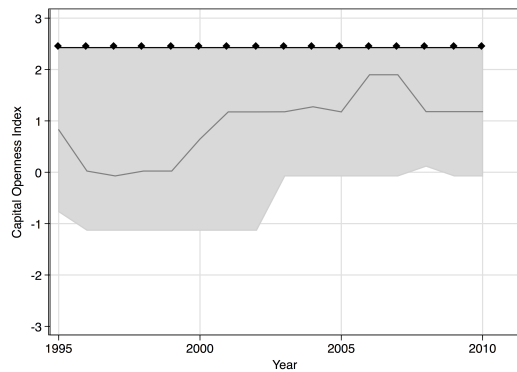
(c) Foreign Exchange Reserves



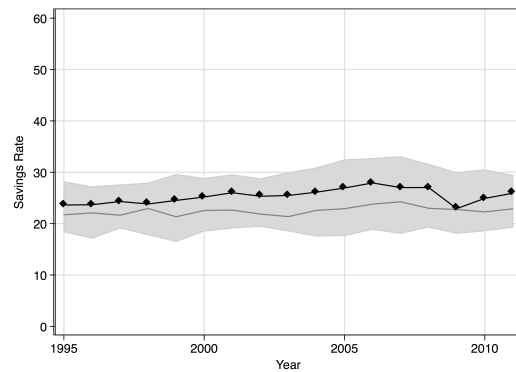
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



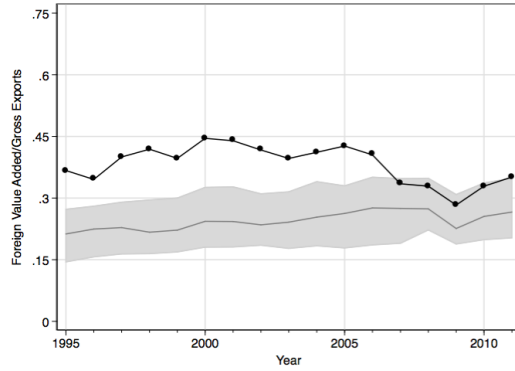
(f) Savings Rate



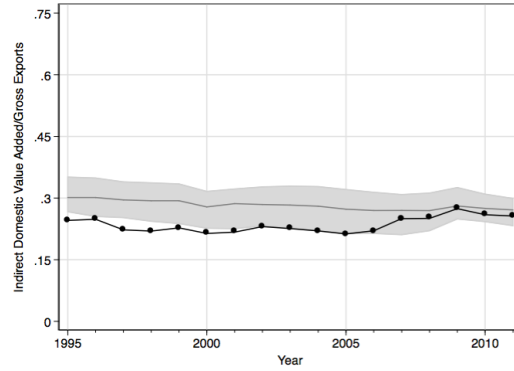
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.31: Estonia: GVC and Trade Variables

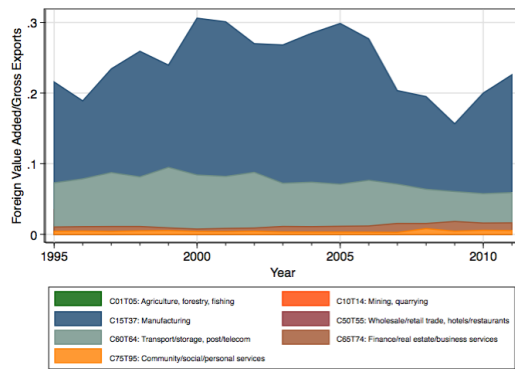
(a) Backward Linkage, all sectors



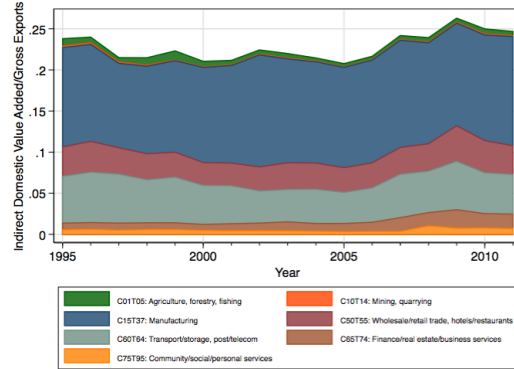
(b) Forward Linkage, all sectors



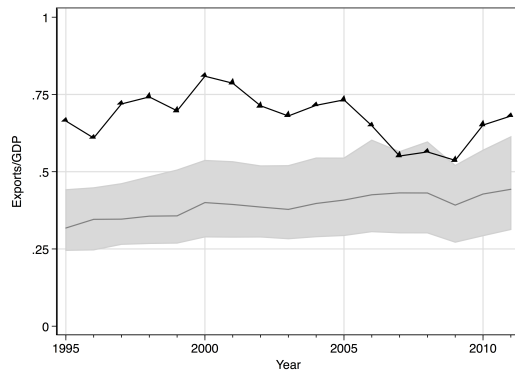
(c) Backward Linkage, by sector



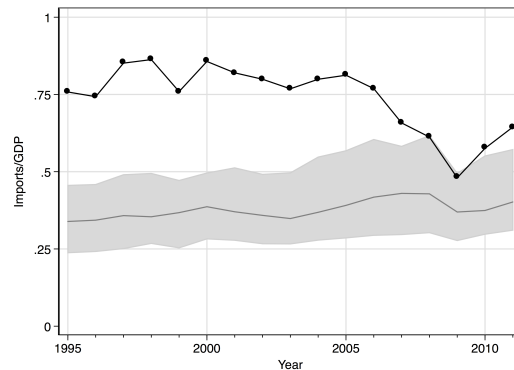
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



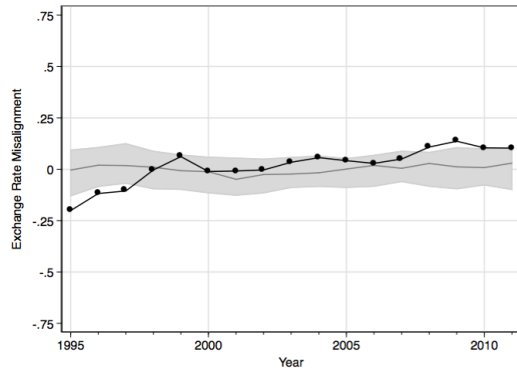
(f) Imports as a share of GDP, all sectors



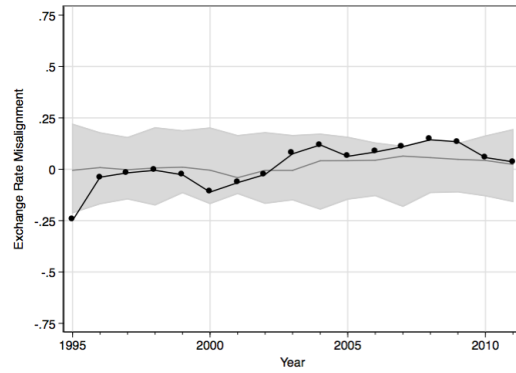
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.32: Estonia (cont.): Currency Manipulation Variables

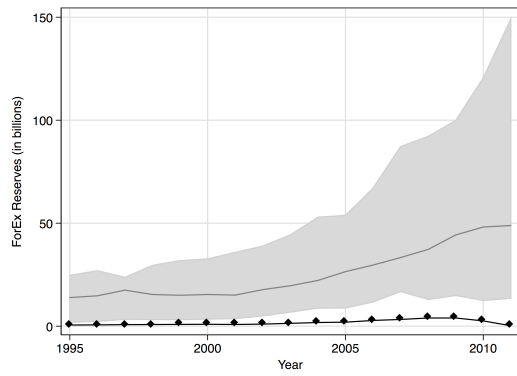
(a) Currency Misalignment, BEER approach



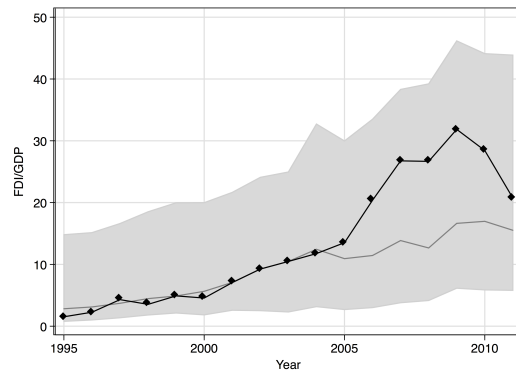
(b) Currency Misalignment, BS approach



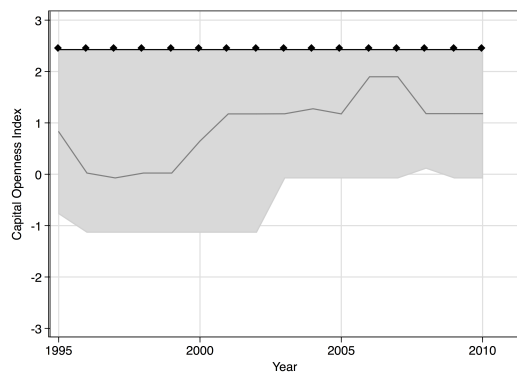
(c) Foreign Exchange Reserves



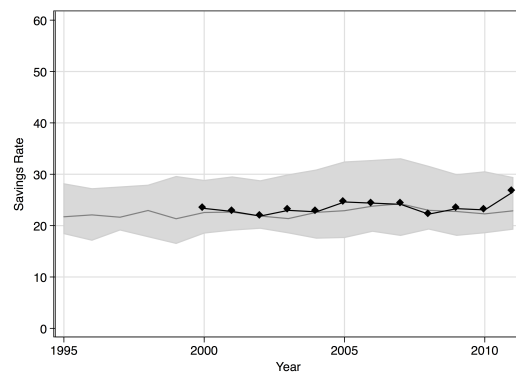
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



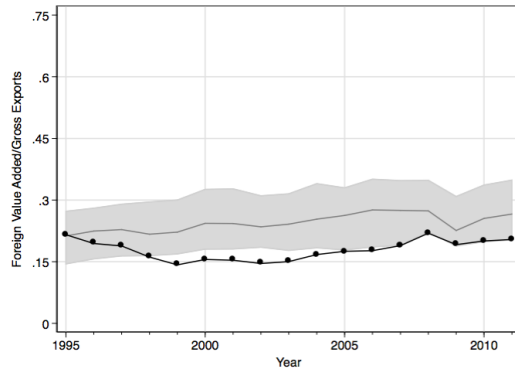
(f) Savings Rate



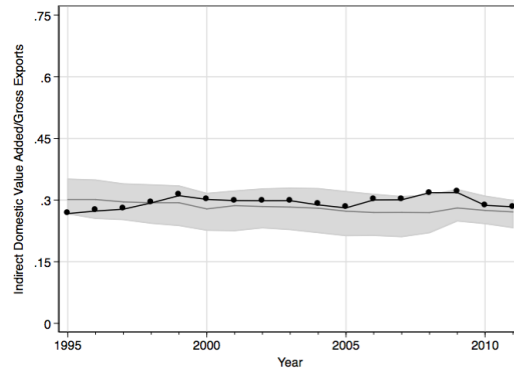
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.33: Hong Kong: GVC and Trade Variables

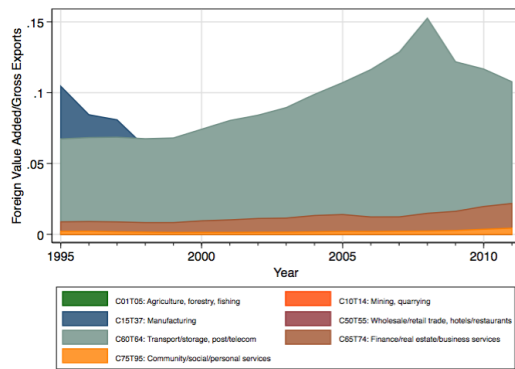
(a) Backward Linkage, all sectors



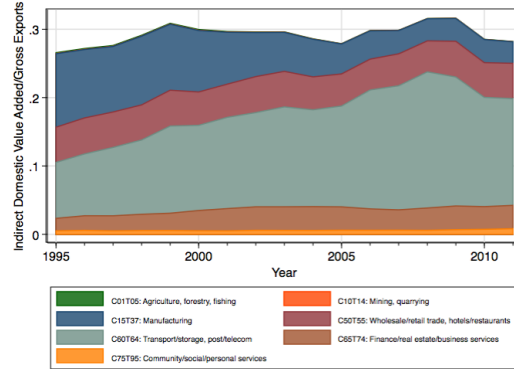
(b) Forward Linkage, all sectors



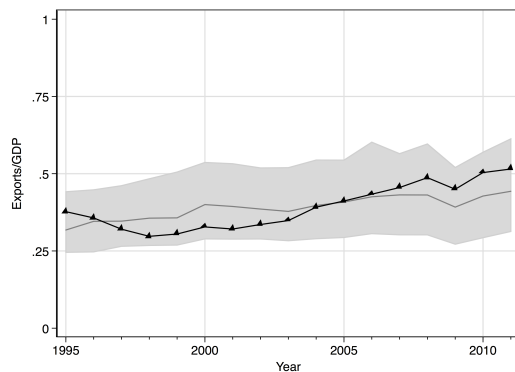
(c) Backward Linkage, by sector



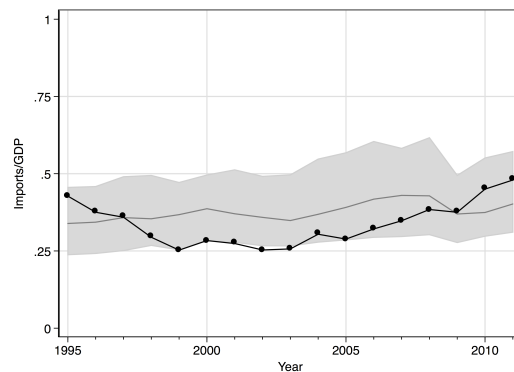
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



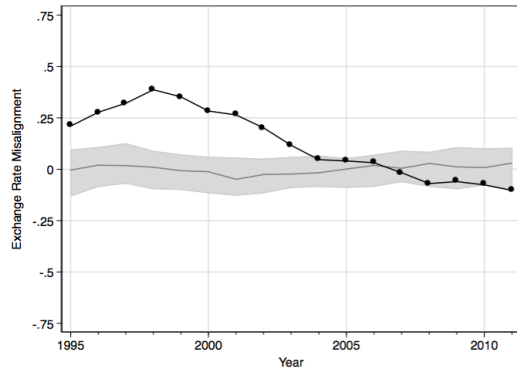
(f) Imports as a share of GDP, all sectors



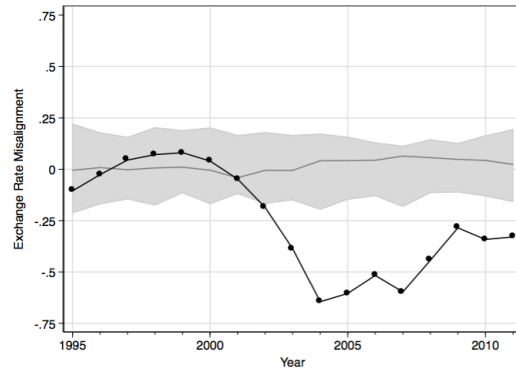
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.34: Hong Kong (cont.): Currency Manipulation Variables

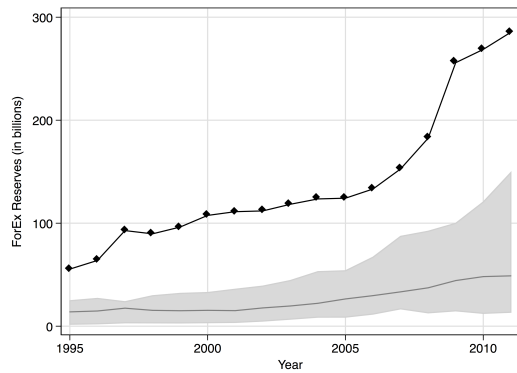
(a) Currency Misalignment, BEER approach



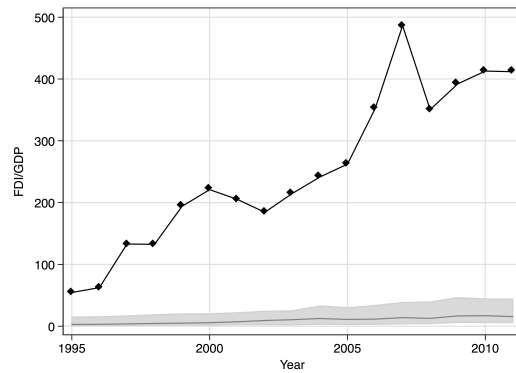
(b) Currency Misalignment, BS approach



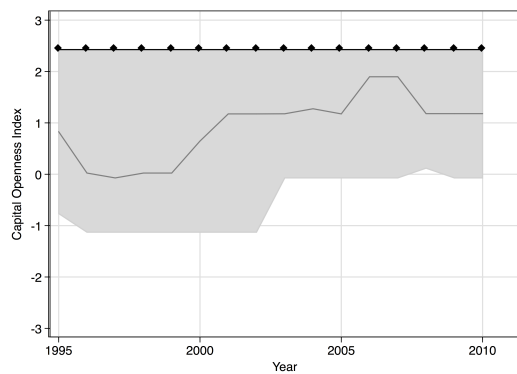
(c) Foreign Exchange Reserves



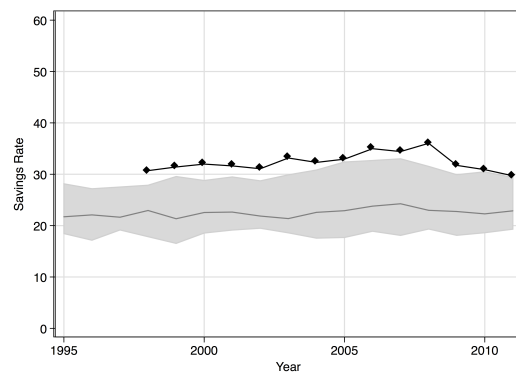
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



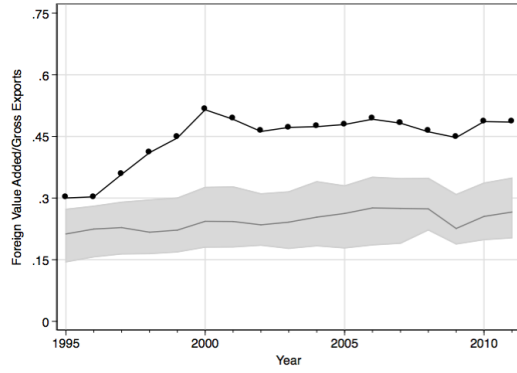
(f) Savings Rate



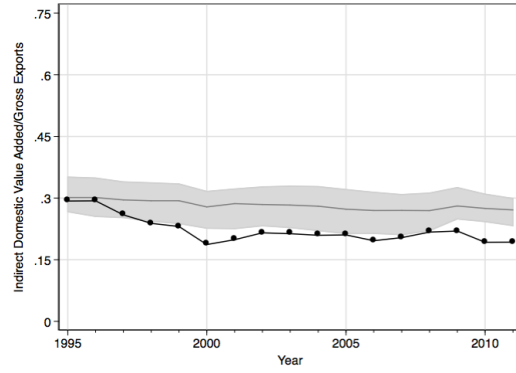
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.35: Hungary: GVC and Trade Variables

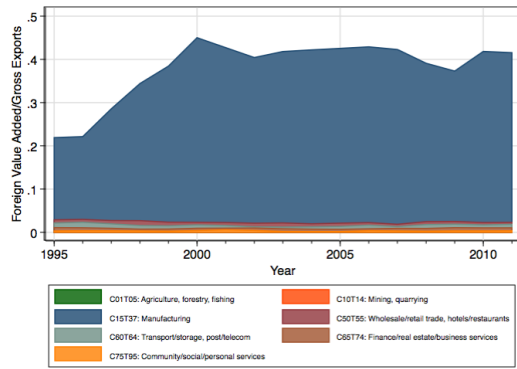
(a) Backward Linkage, all sectors



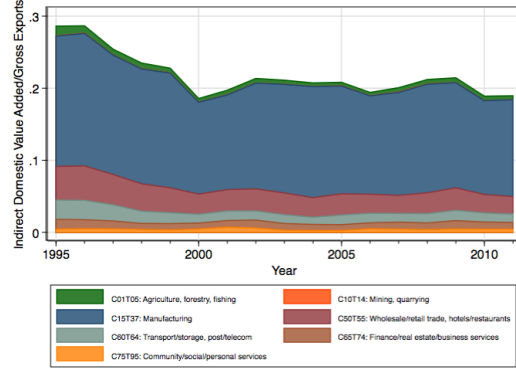
(b) Forward Linkage, all sectors



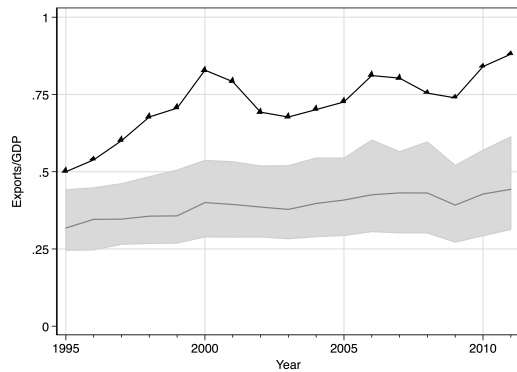
(c) Backward Linkage, by sector



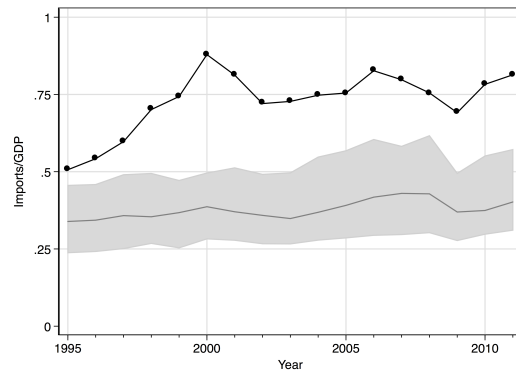
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



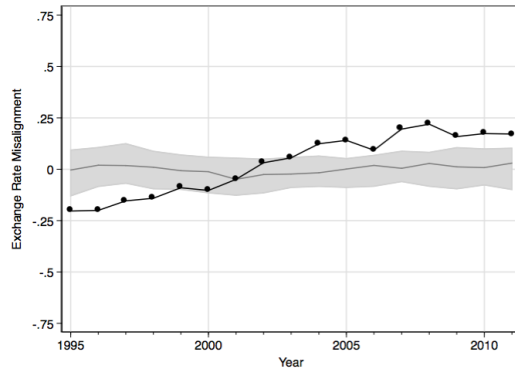
(f) Imports as a share of GDP, all sectors



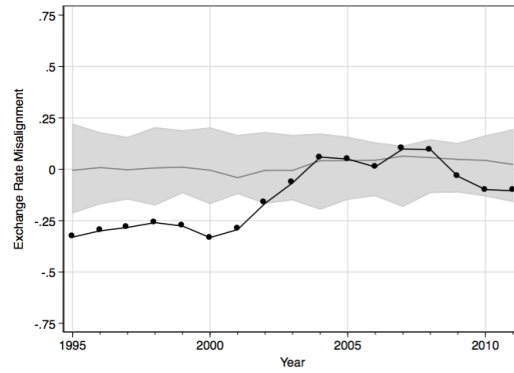
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.36: Hungary (cont.): Currency Manipulation Variables

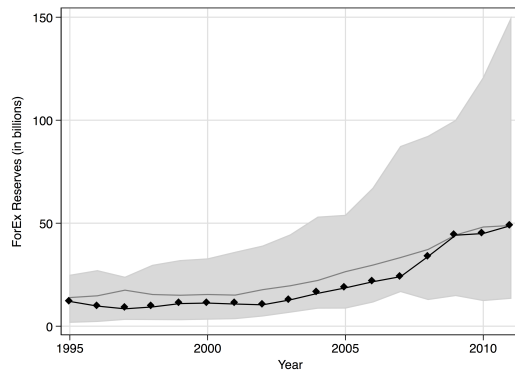
(a) Currency Misalignment, BEER approach



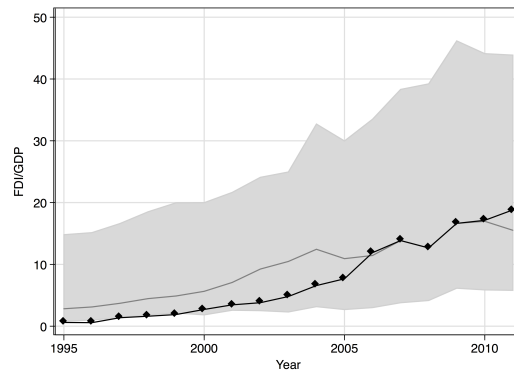
(b) Currency Misalignment, BS approach



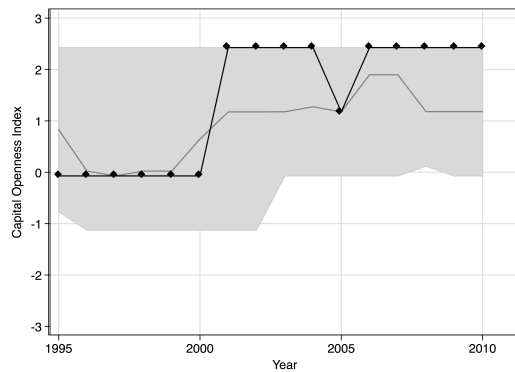
(c) Foreign Exchange Reserves



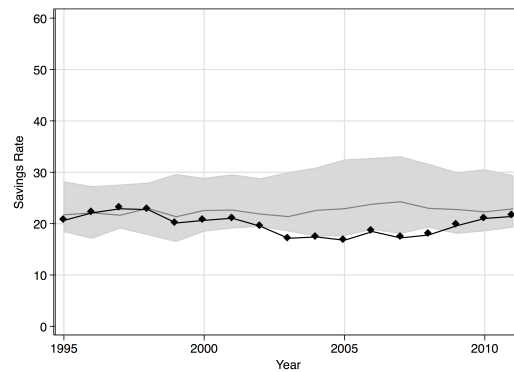
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



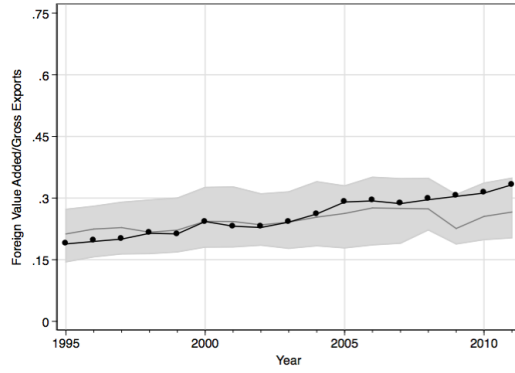
(f) Savings Rate



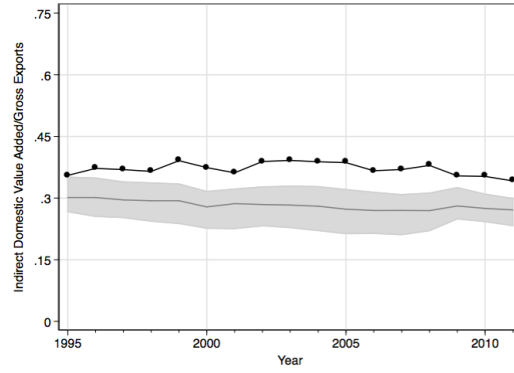
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.37: Iceland: GVC and Trade Variables

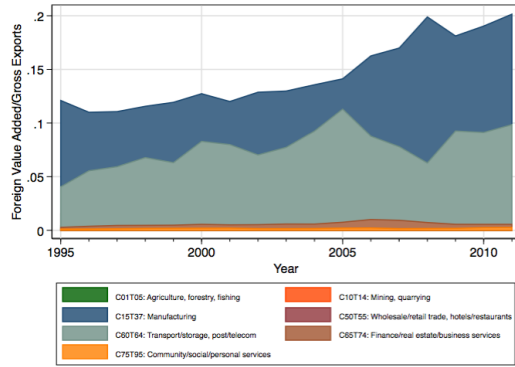
(a) Backward Linkage, all sectors



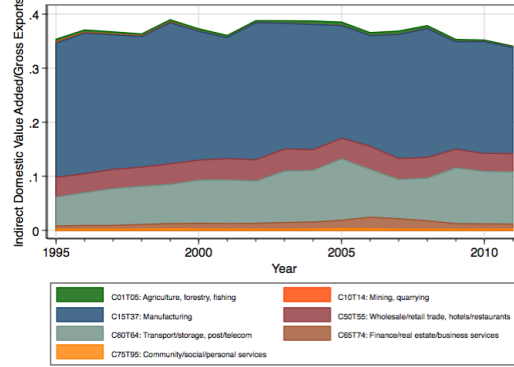
(b) Forward Linkage, all sectors



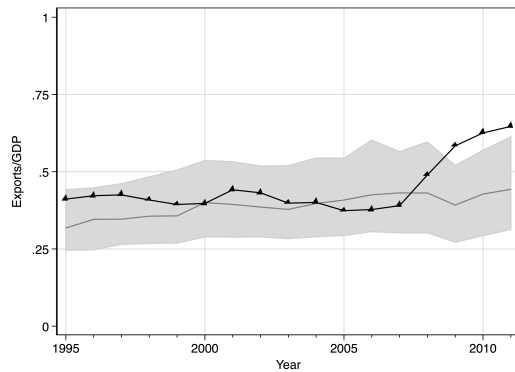
(c) Backward Linkage, by sector



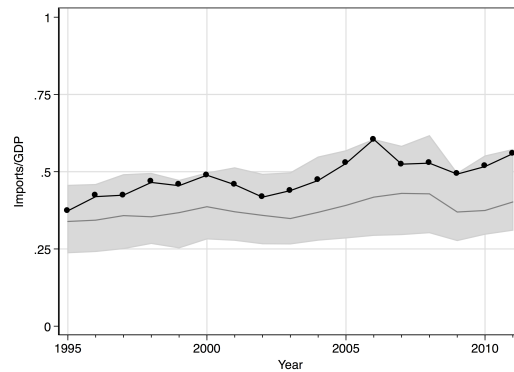
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



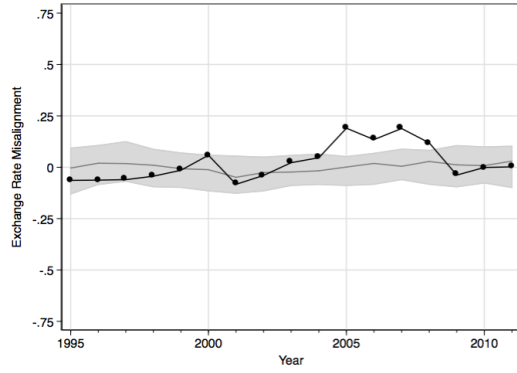
(f) Imports as a share of GDP, all sectors



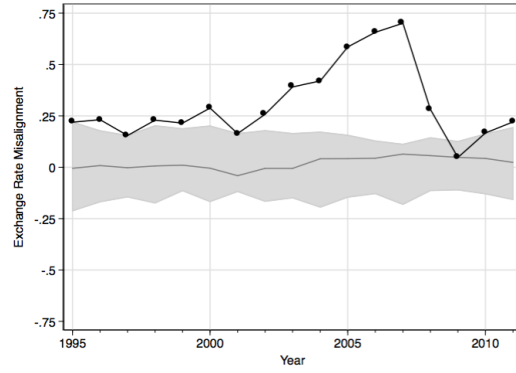
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.38: Iceland (cont.): Currency Manipulation Variables

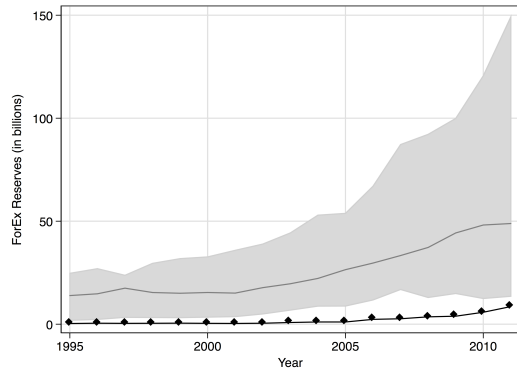
(a) Currency Misalignment, BEER approach



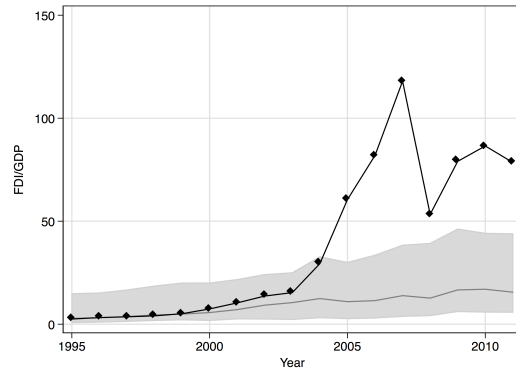
(b) Currency Misalignment, BS approach



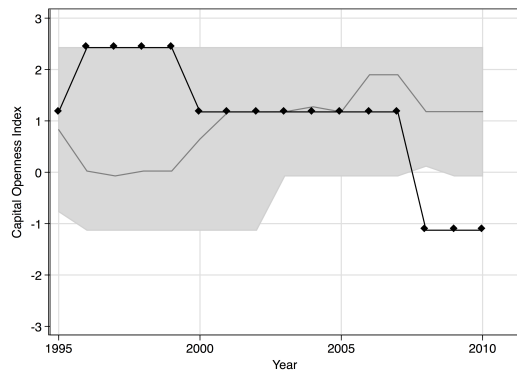
(c) Foreign Exchange Reserves



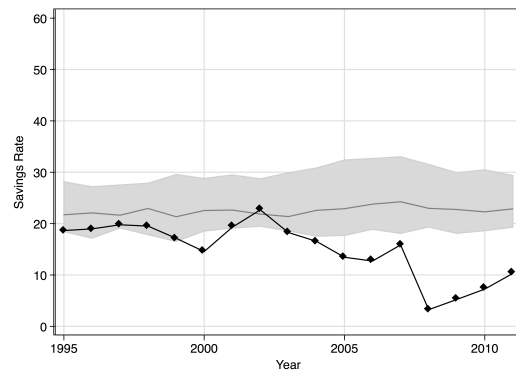
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



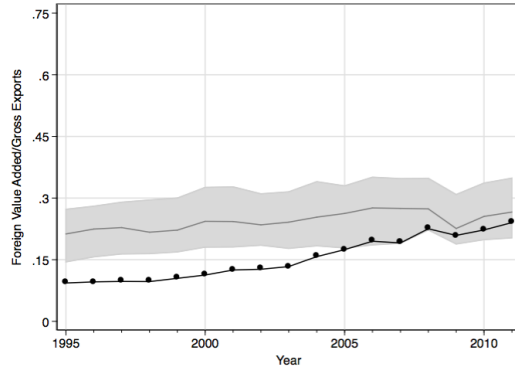
(f) Savings Rate



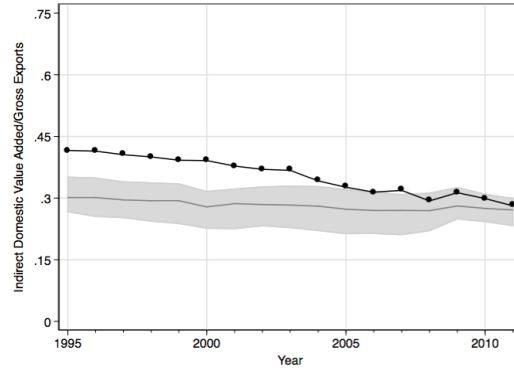
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.39: India: GVC and Trade Variables

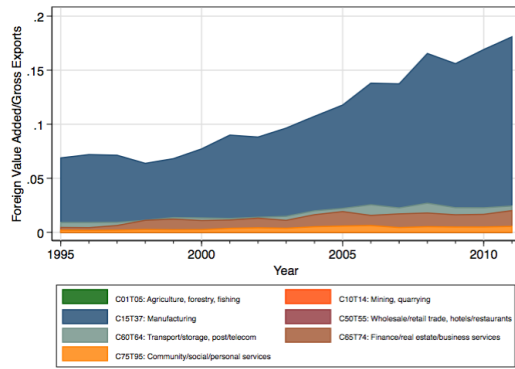
(a) Backward Linkage, all sectors



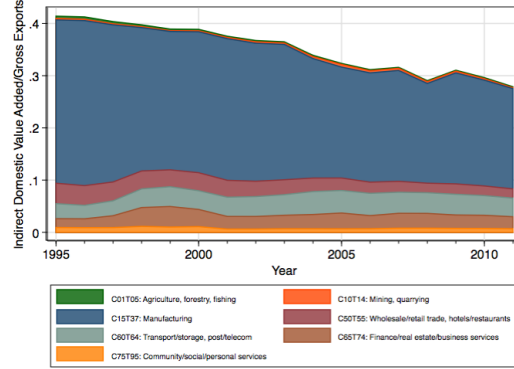
(b) Forward Linkage, all sectors



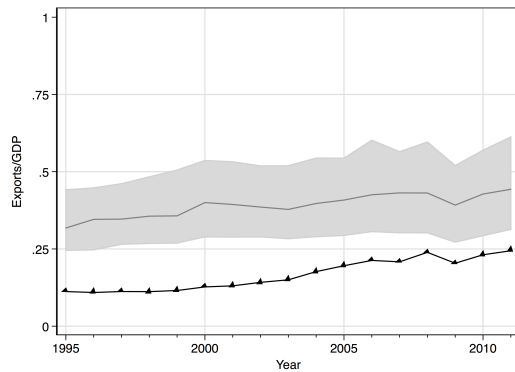
(c) Backward Linkage, by sector



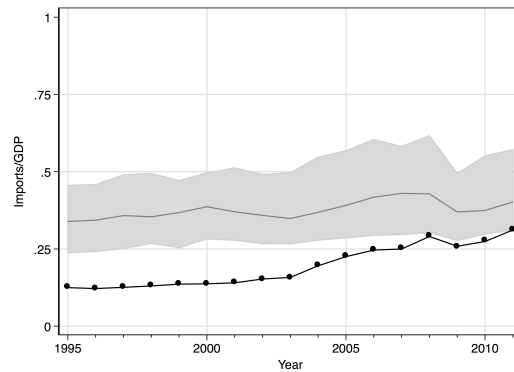
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



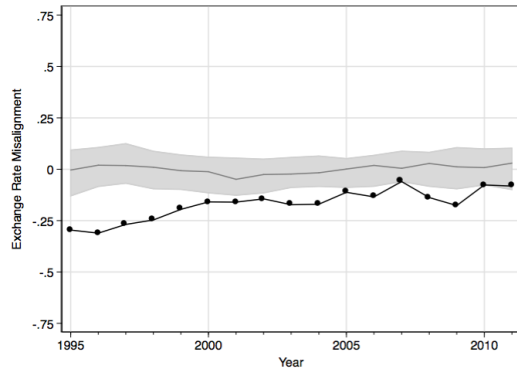
(f) Imports as a share of GDP, all sectors



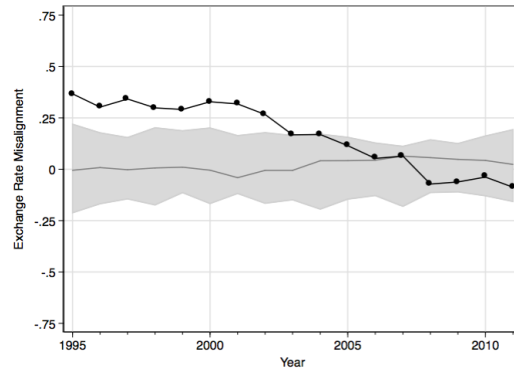
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.40: India (cont.): Currency Manipulation Variables

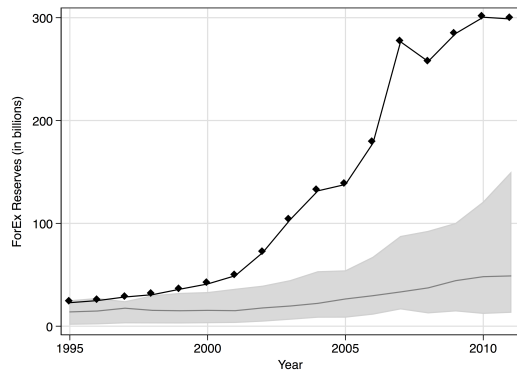
(a) Currency Misalignment, BEER approach



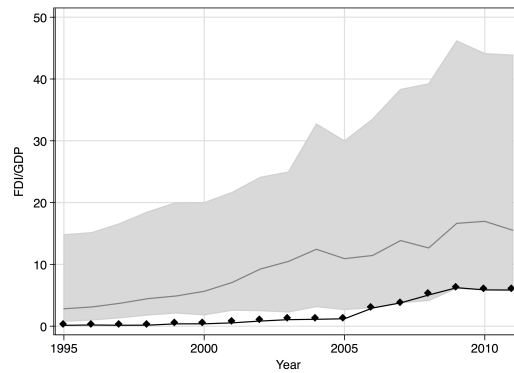
(b) Currency Misalignment, BS approach



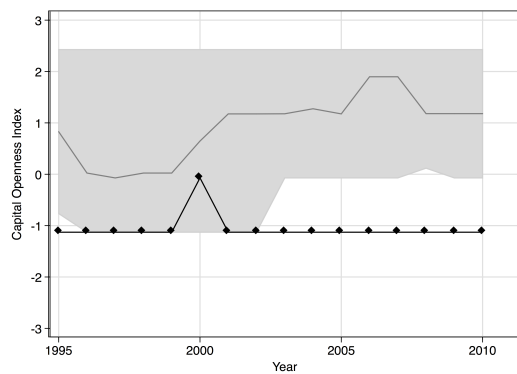
(c) Foreign Exchange Reserves



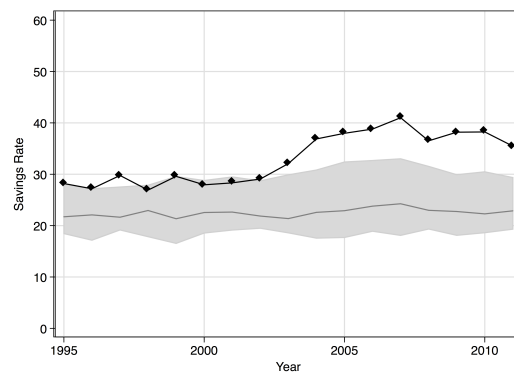
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



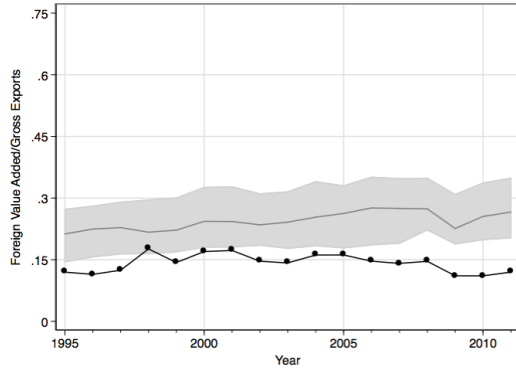
(f) Savings Rate



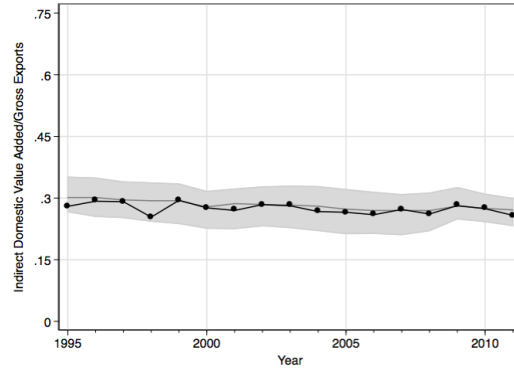
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.41: Indonesia: GVC and Trade Variables

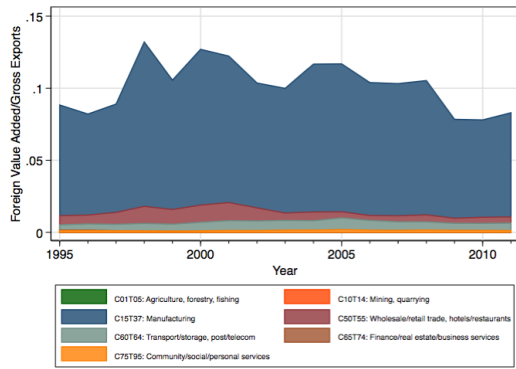
(a) Backward Linkage, all sectors



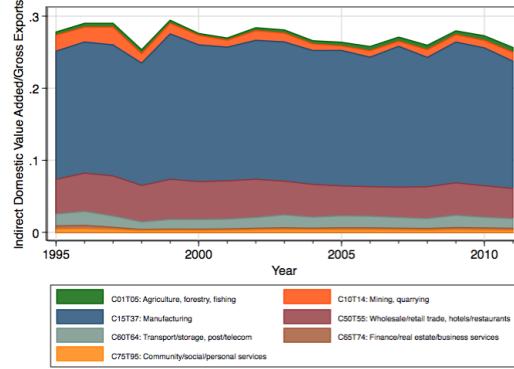
(b) Forward Linkage, all sectors



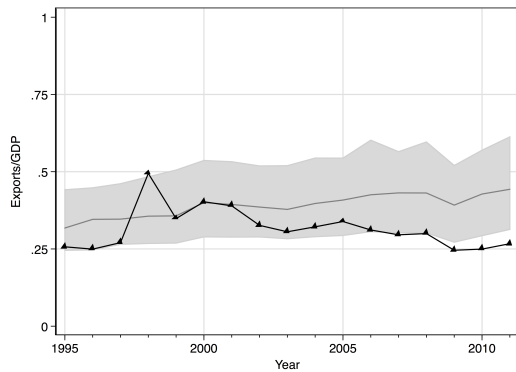
(c) Backward Linkage, by sector



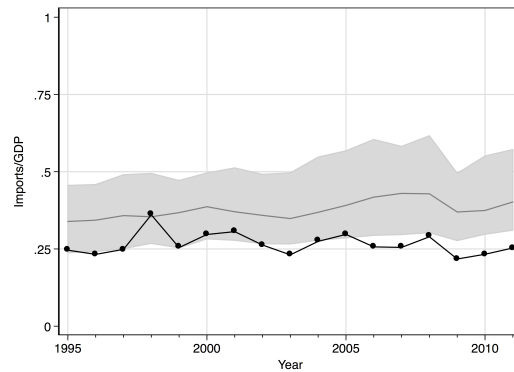
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



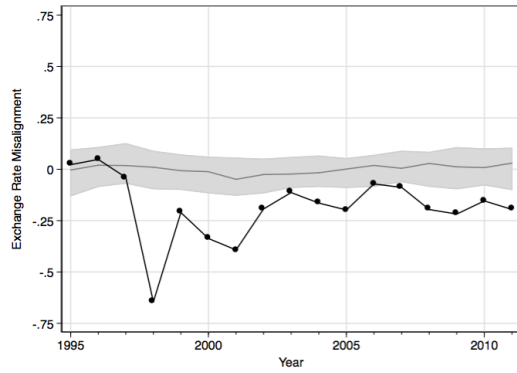
(f) Imports as a share of GDP, all sectors



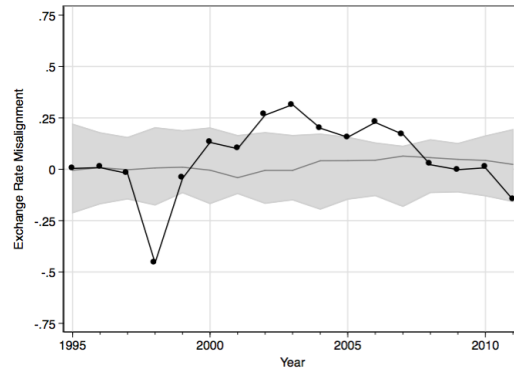
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.42: Indonesia (cont.): Currency Manipulation Variables

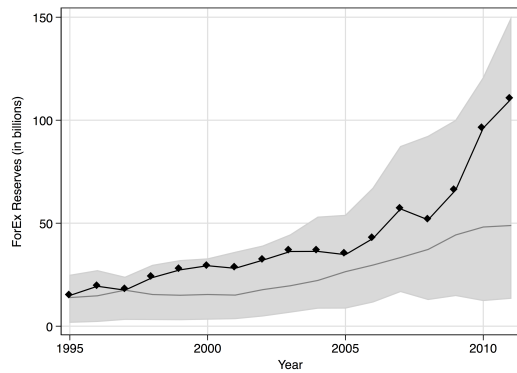
(a) Currency Misalignment, BEER approach



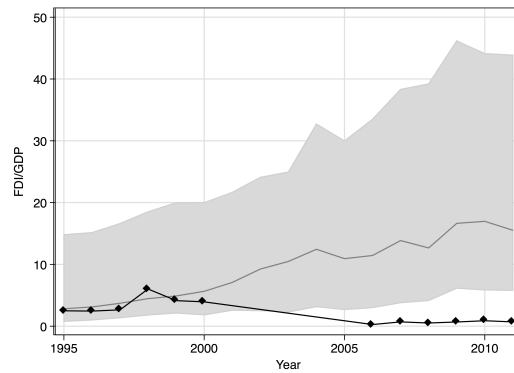
(b) Currency Misalignment, BS approach



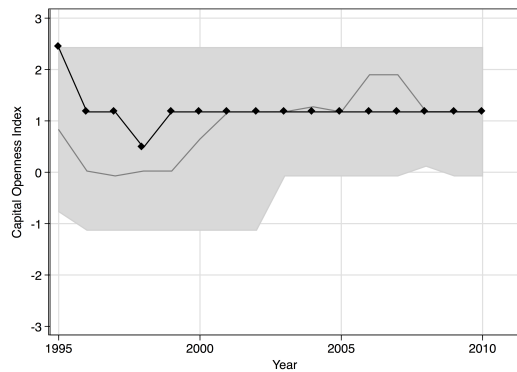
(c) Foreign Exchange Reserves



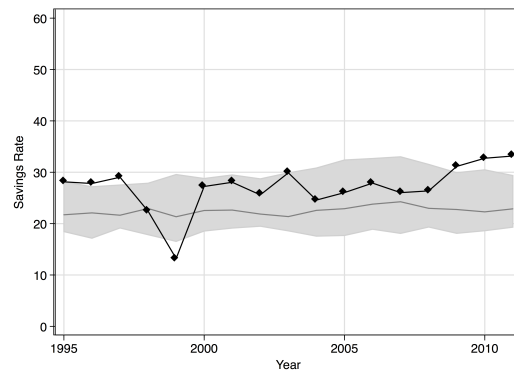
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



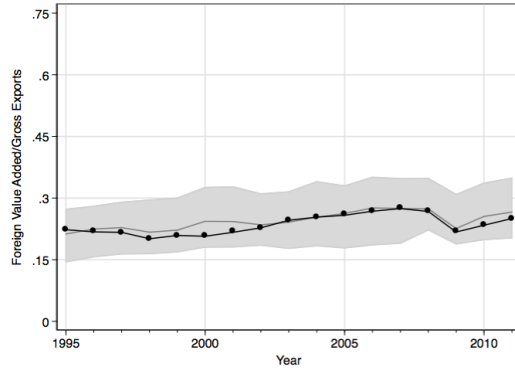
(f) Savings Rate



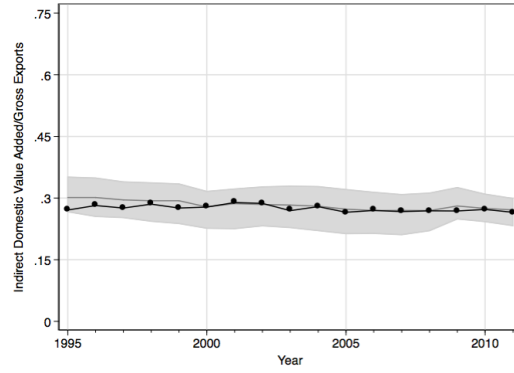
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.43: Israel: GVC and Trade Variables

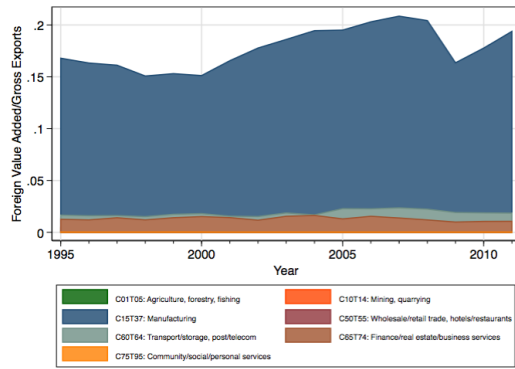
(a) Backward Linkage, all sectors



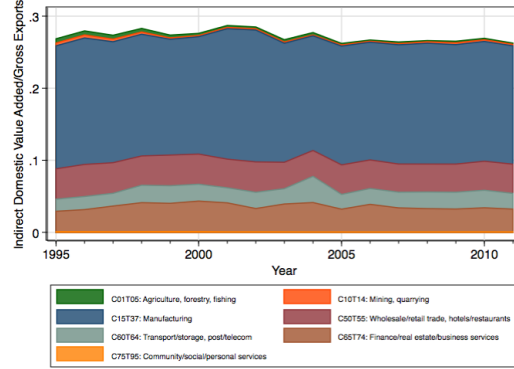
(b) Forward Linkage, all sectors



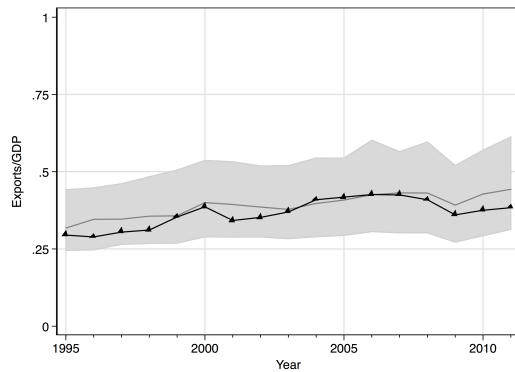
(c) Backward Linkage, by sector



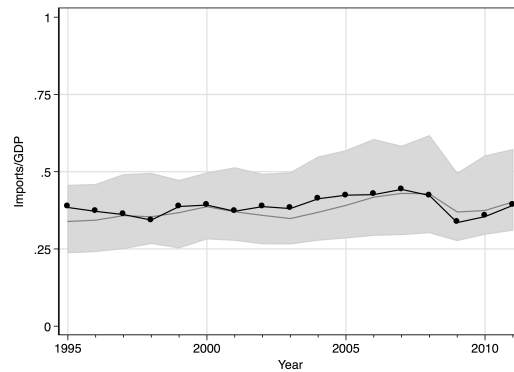
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



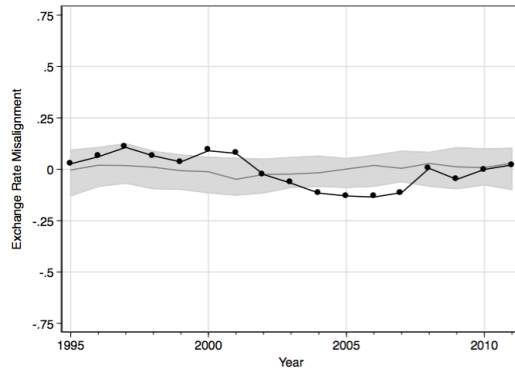
(f) Imports as a share of GDP, all sectors



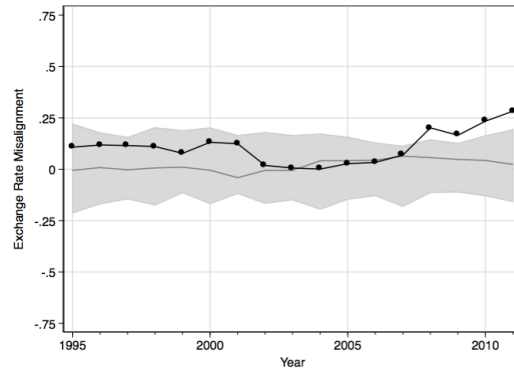
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.44: Israel (cont.): Currency Manipulation Variables

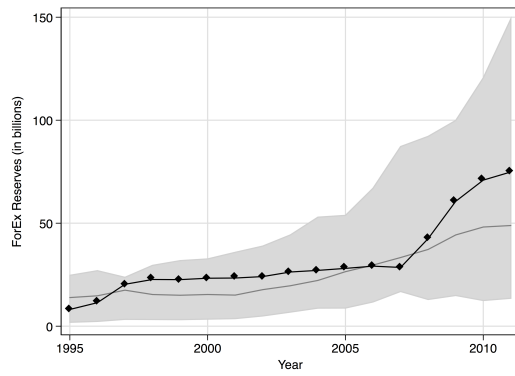
(a) Currency Misalignment, BEER approach



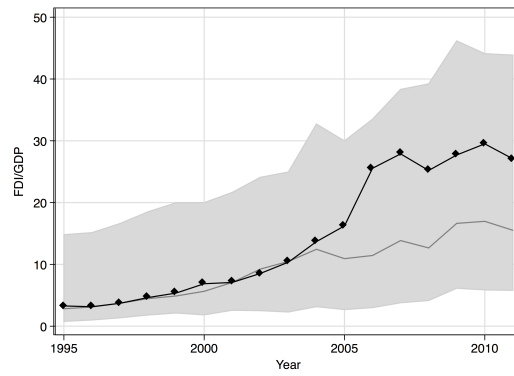
(b) Currency Misalignment, BS approach



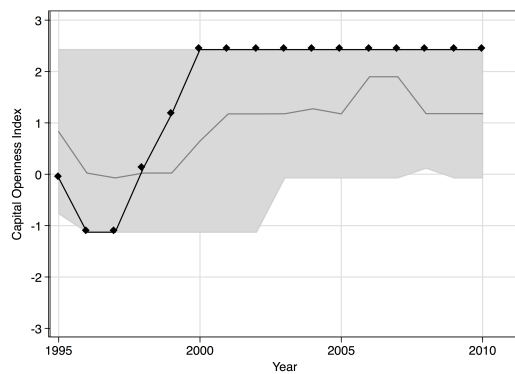
(c) Foreign Exchange Reserves



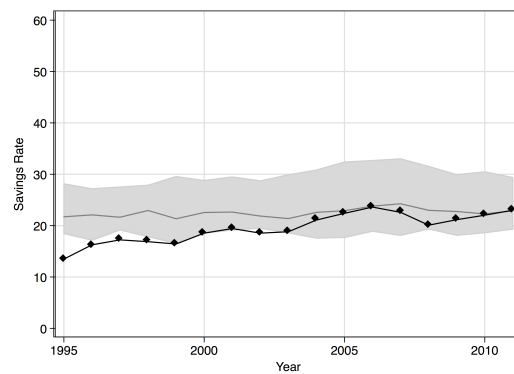
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



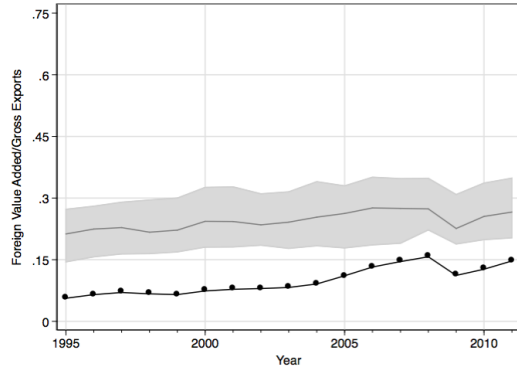
(f) Savings Rate



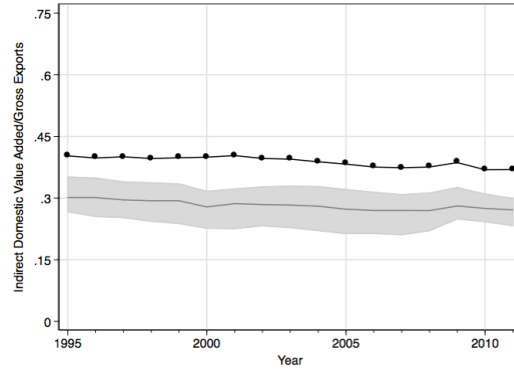
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.45: Japan: GVC and Trade Variables

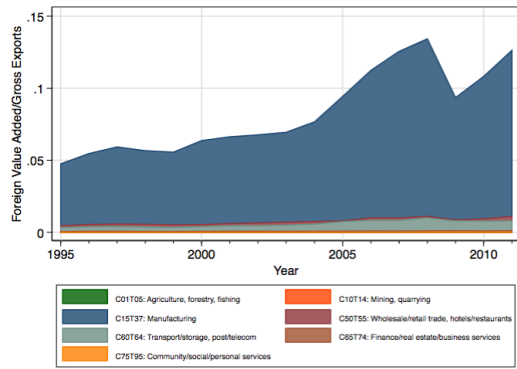
(a) Backward Linkage, all sectors



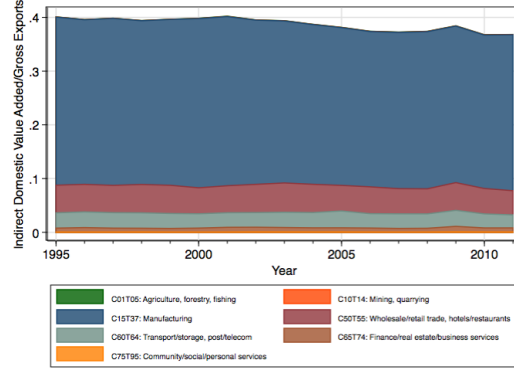
(b) Forward Linkage, all sectors



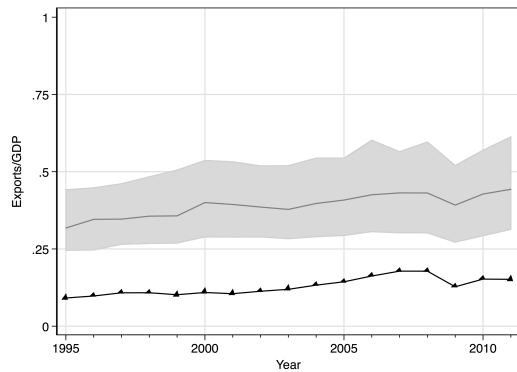
(c) Backward Linkage, by sector



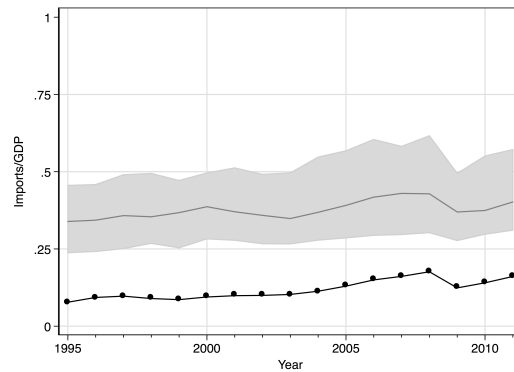
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



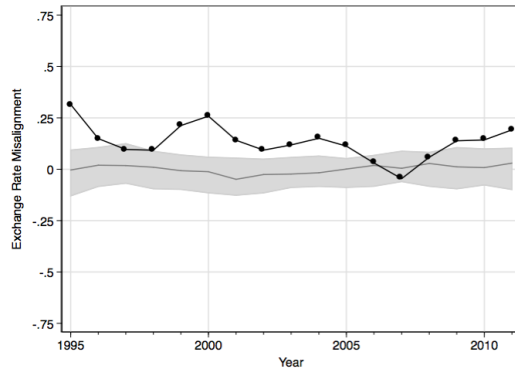
(f) Imports as a share of GDP, all sectors



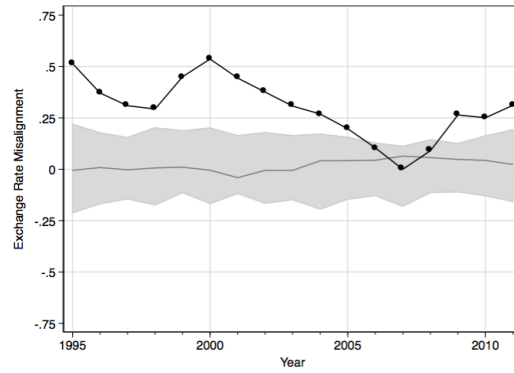
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.46: Japan (cont.): Currency Manipulation Variables

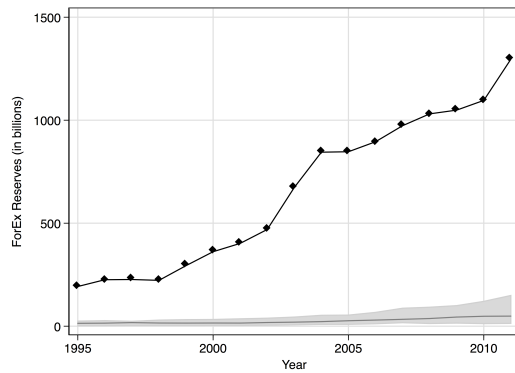
(a) Currency Misalignment, BEER approach



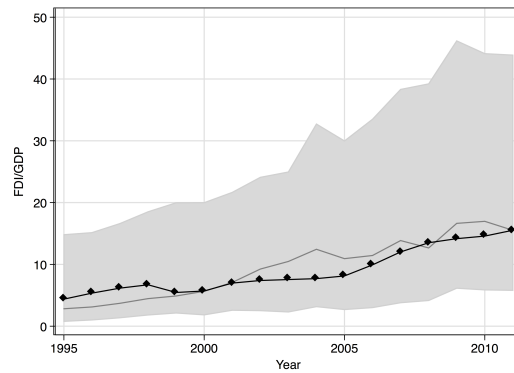
(b) Currency Misalignment, BS approach



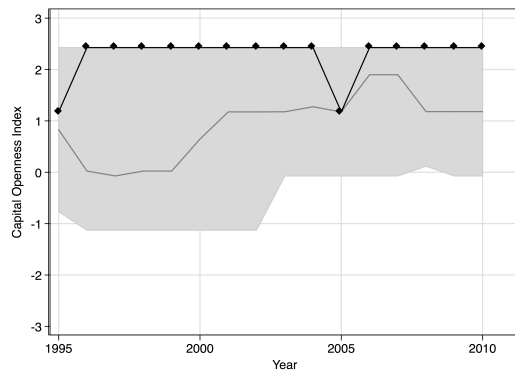
(c) Foreign Exchange Reserves



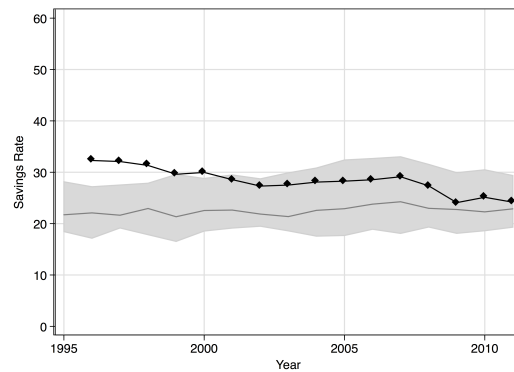
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



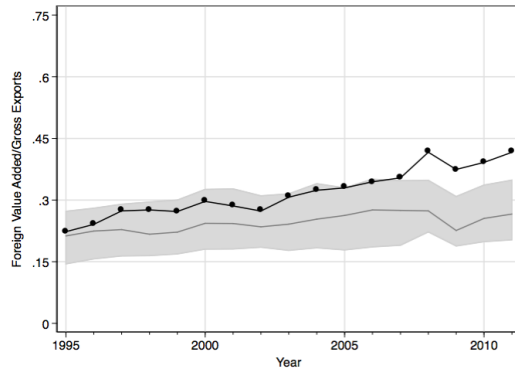
(f) Savings Rate



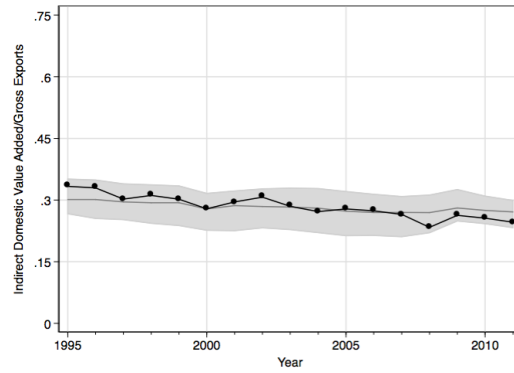
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.47: Korea: GVC and Trade Variables

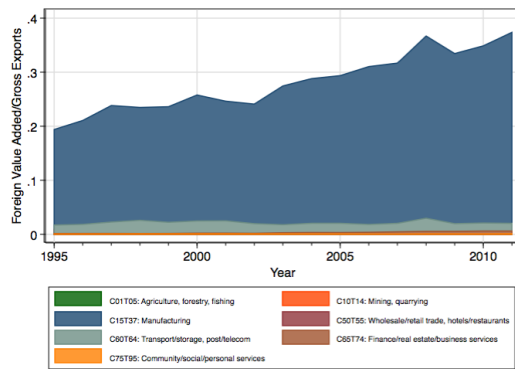
(a) Backward Linkage, all sectors



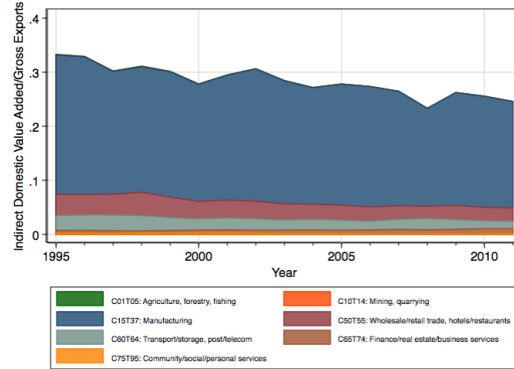
(b) Forward Linkage, all sectors



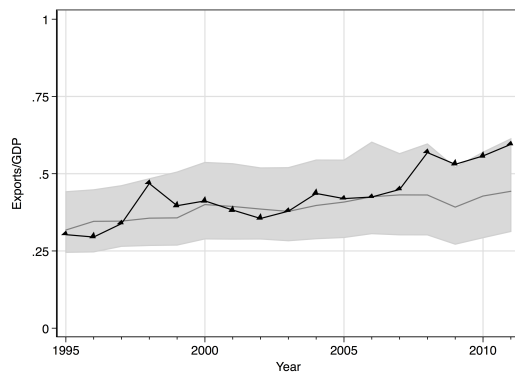
(c) Backward Linkage, by sector



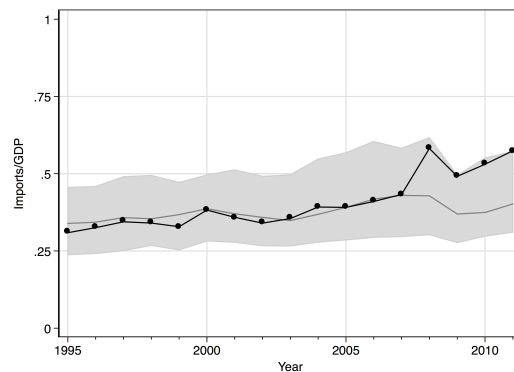
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



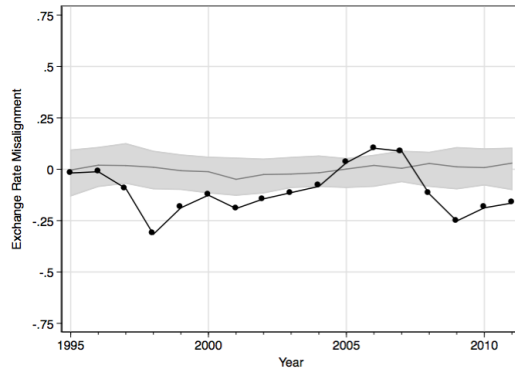
(f) Imports as a share of GDP, all sectors



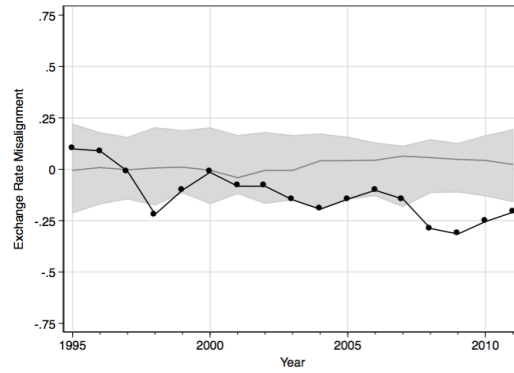
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.48: Korea (cont.): Currency Manipulation Variables

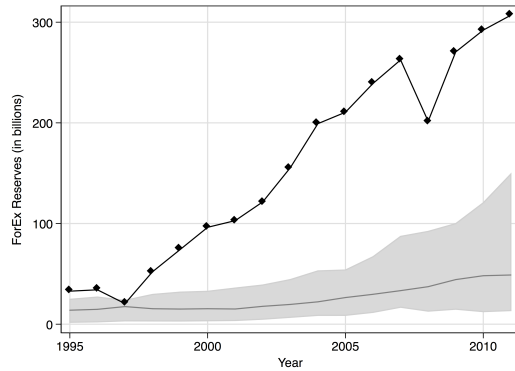
(a) Currency Misalignment, BEER approach



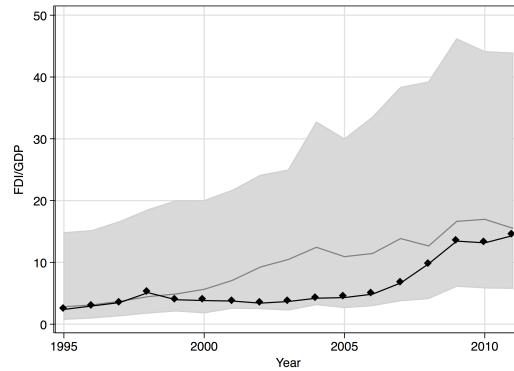
(b) Currency Misalignment, BS approach



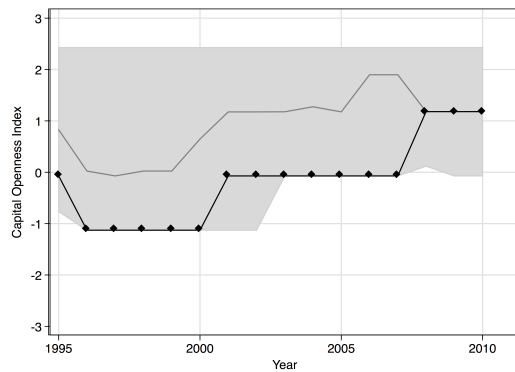
(c) Foreign Exchange Reserves



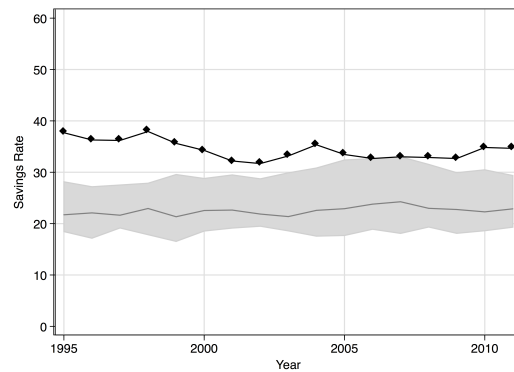
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



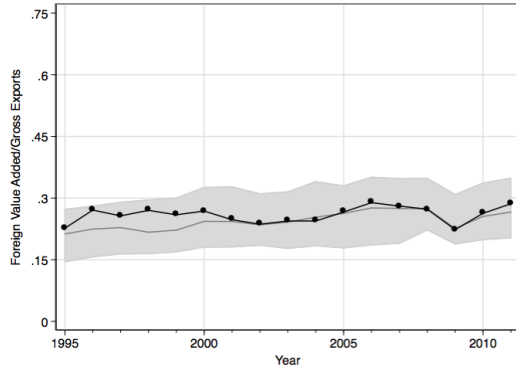
(f) Savings Rate



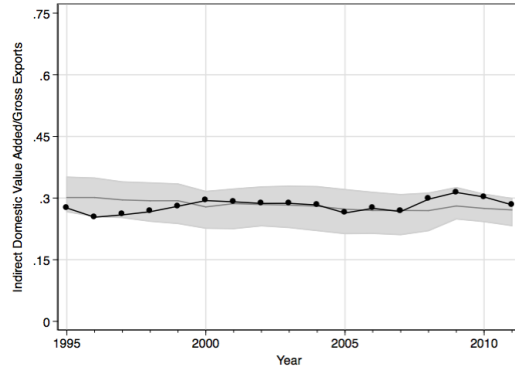
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.49: Latvia: GVC and Trade Variables

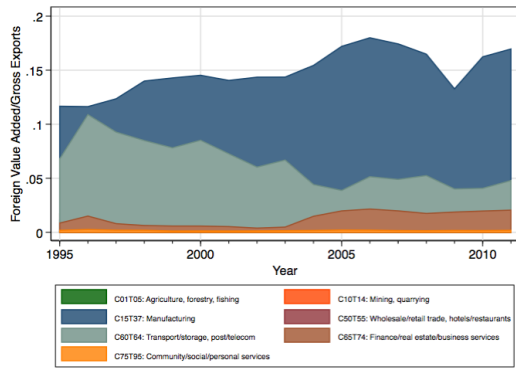
(a) Backward Linkage, all sectors



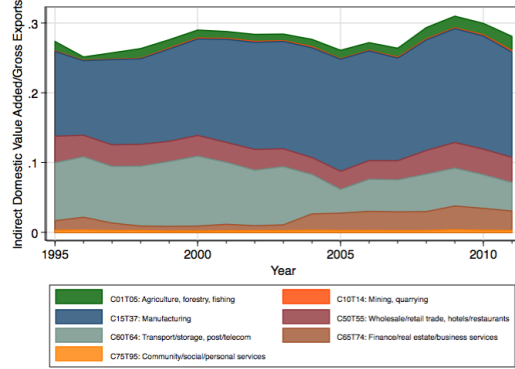
(b) Forward Linkage, all sectors



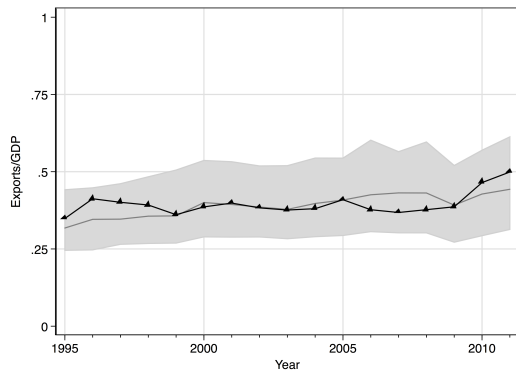
(c) Backward Linkage, by sector



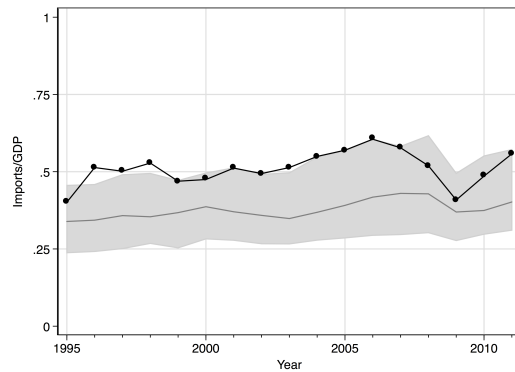
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



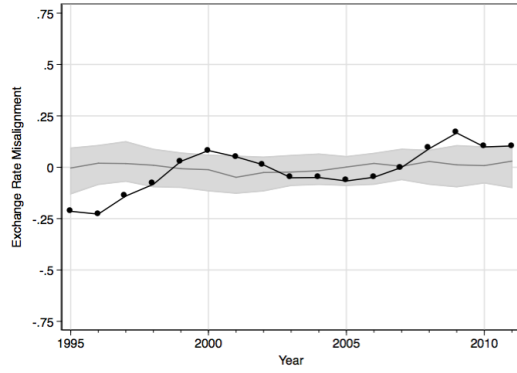
(f) Imports as a share of GDP, all sectors



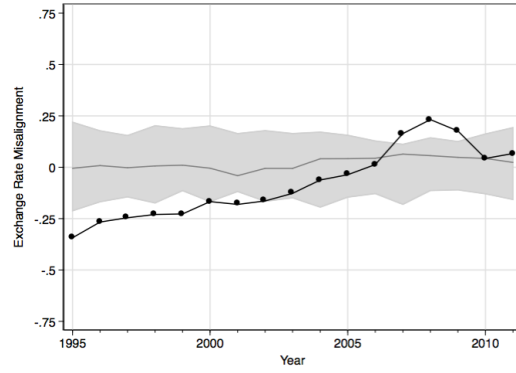
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.50: Latvia (cont.): Currency Manipulation Variables

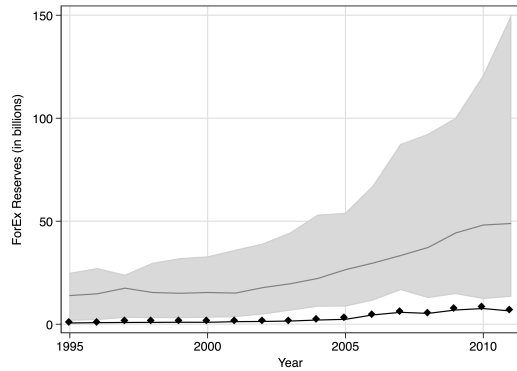
(a) Currency Misalignment, BEER approach



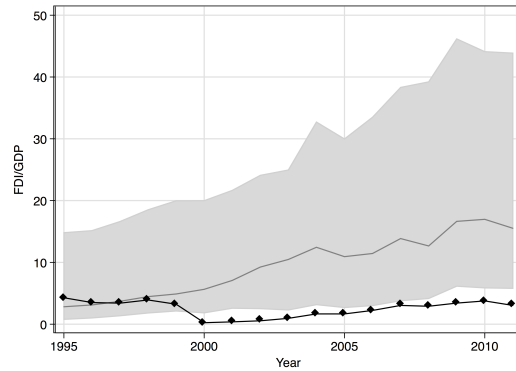
(b) Currency Misalignment, BS approach



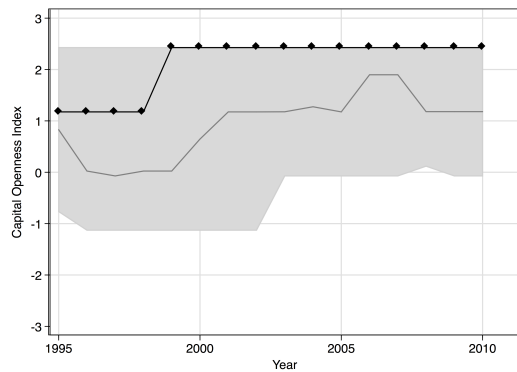
(c) Foreign Exchange Reserves



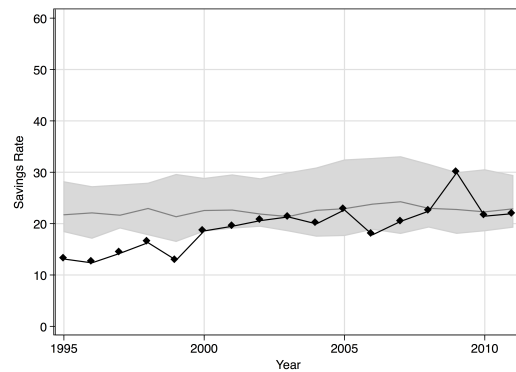
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



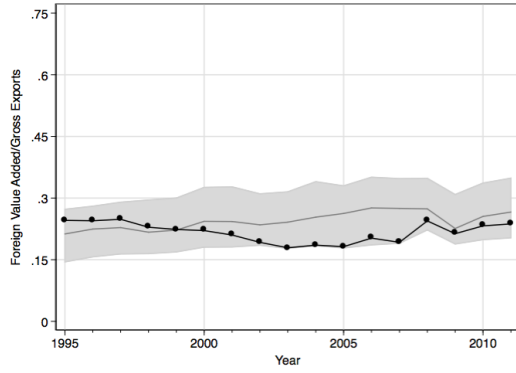
(f) Savings Rate



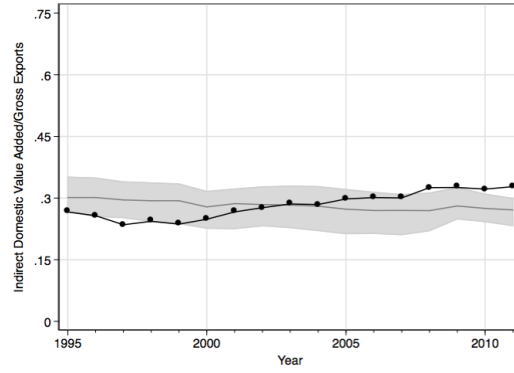
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.51: Lithuania: GVC and Trade Variables

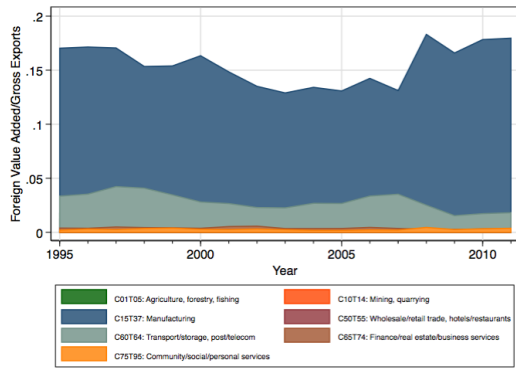
(a) Backward Linkage, all sectors



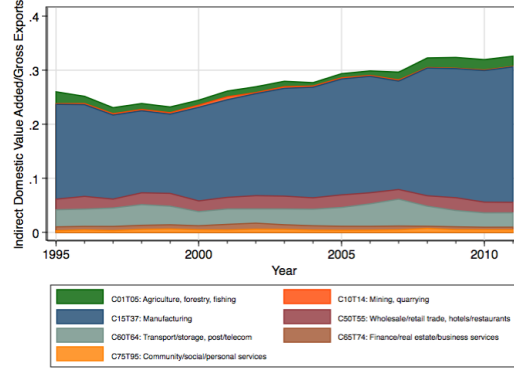
(b) Forward Linkage, all sectors



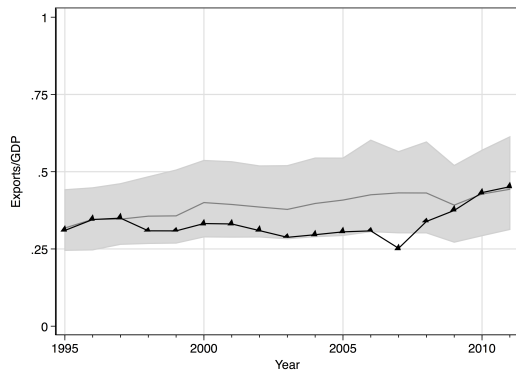
(c) Backward Linkage, by sector



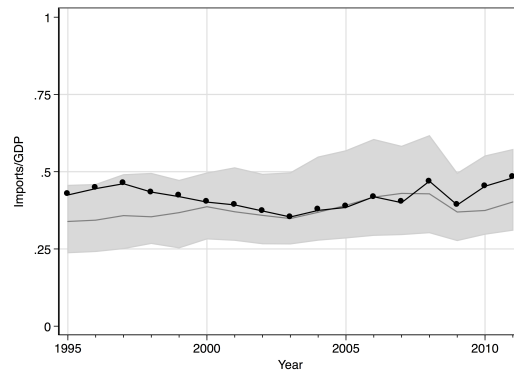
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



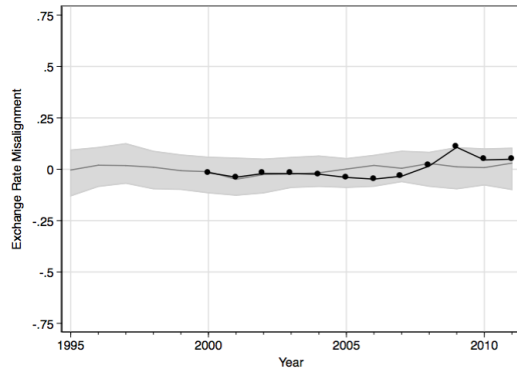
(f) Imports as a share of GDP, all sectors



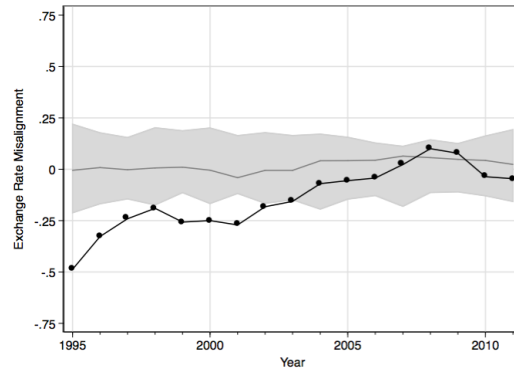
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.52: Lithuania (cont.): Currency Manipulation Variables

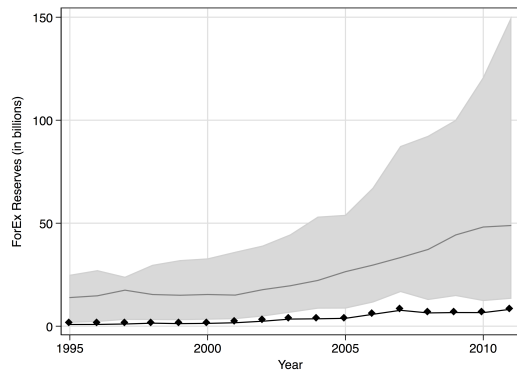
(a) Currency Misalignment, BEER approach



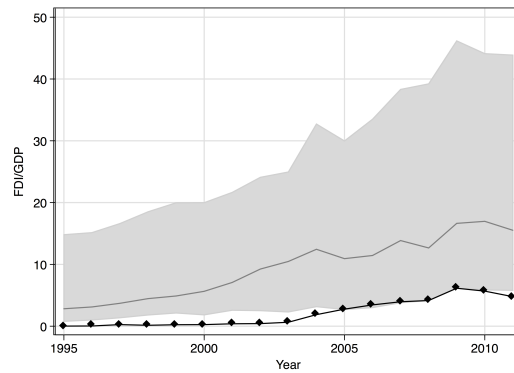
(b) Currency Misalignment, BS approach



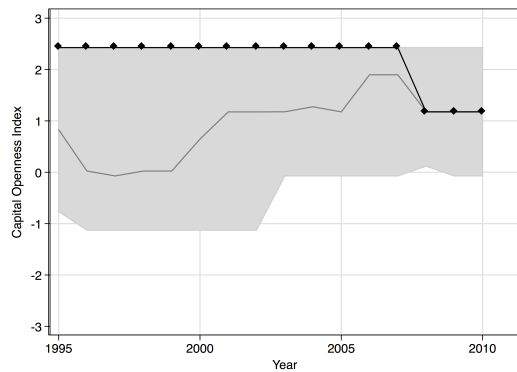
(c) Foreign Exchange Reserves



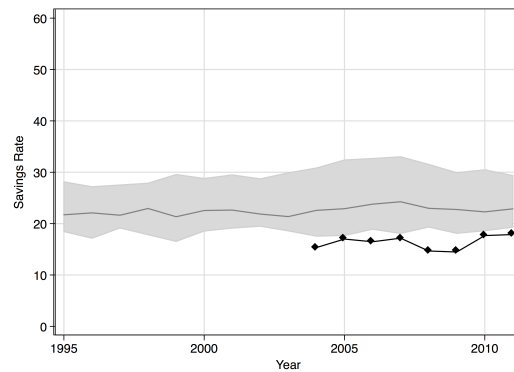
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



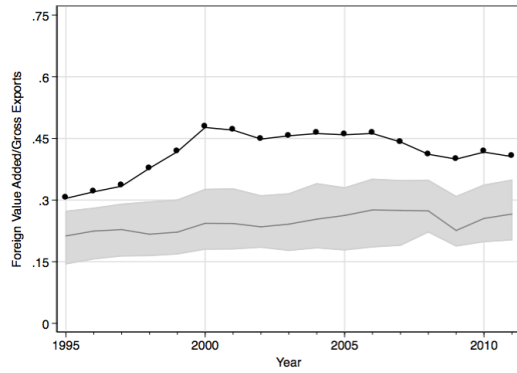
(f) Savings Rate



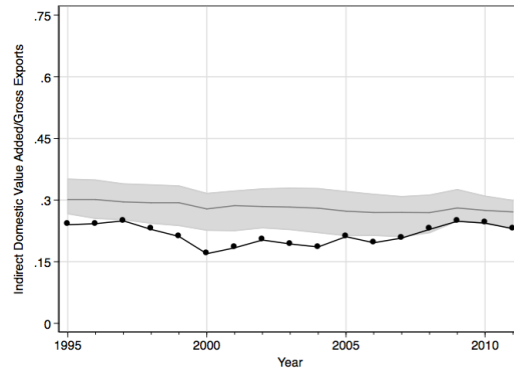
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.53: Malaysia: GVC and Trade Variables

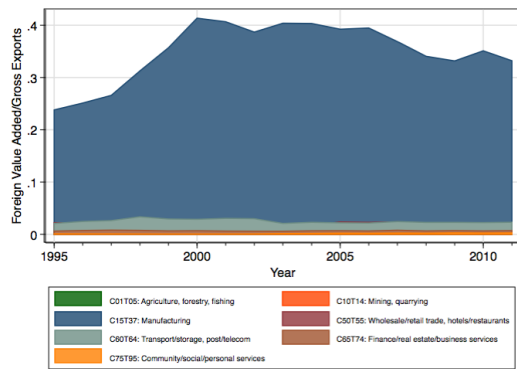
(a) Backward Linkage, all sectors



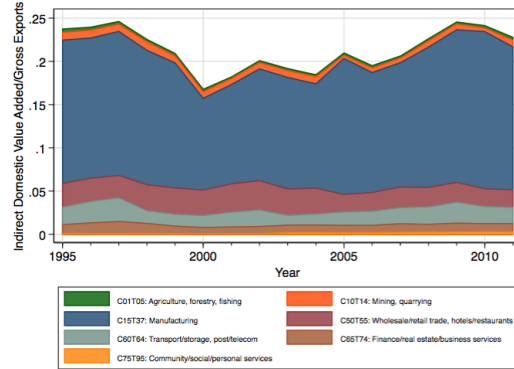
(b) Forward Linkage, all sectors



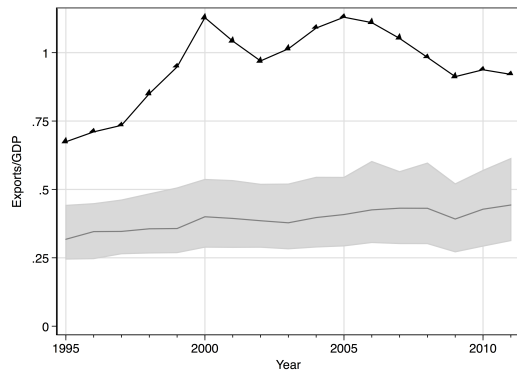
(c) Backward Linkage, by sector



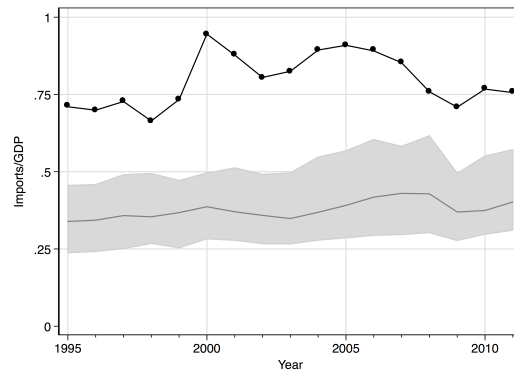
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



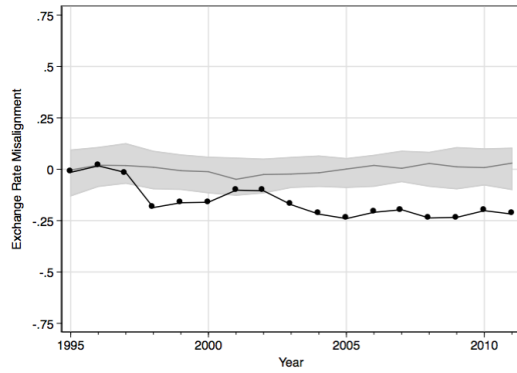
(f) Imports as a share of GDP, all sectors



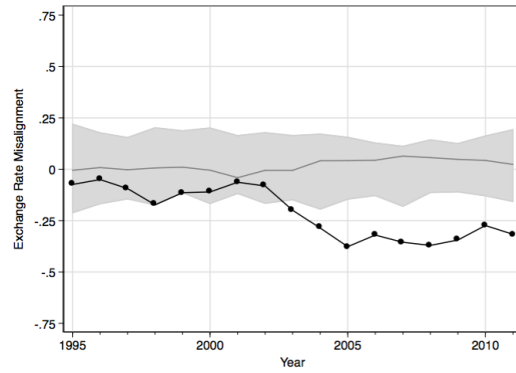
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.54: Malaysia (cont.): Currency Manipulation Variables

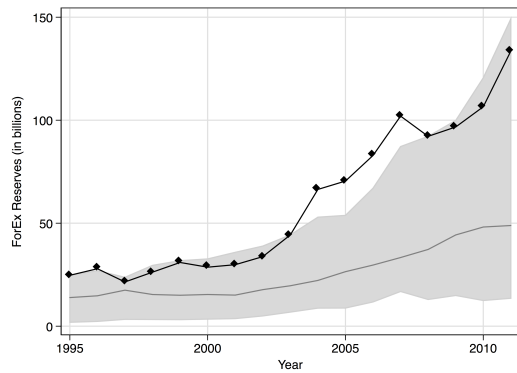
(a) Currency Misalignment, BEER approach



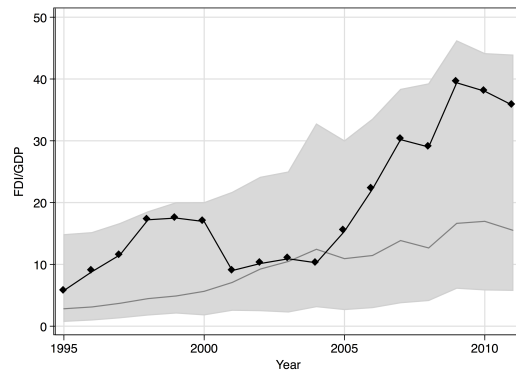
(b) Currency Misalignment, BS approach



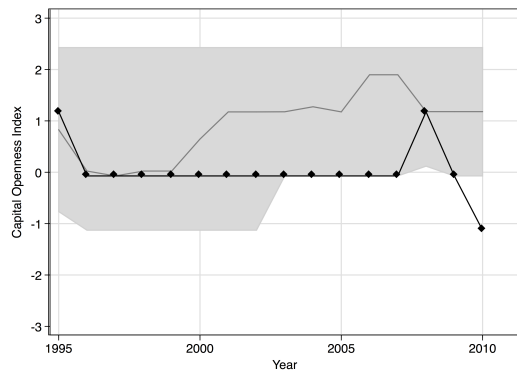
(c) Foreign Exchange Reserves



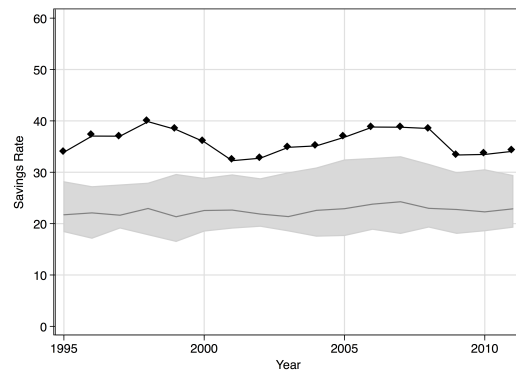
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



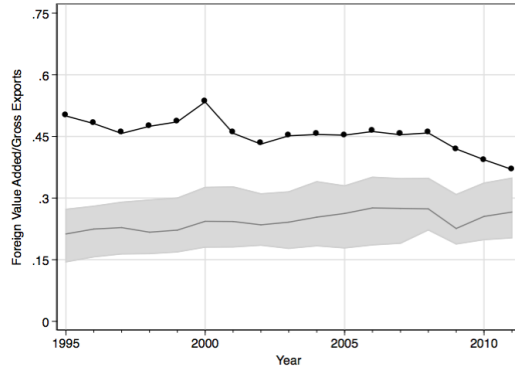
(f) Savings Rate



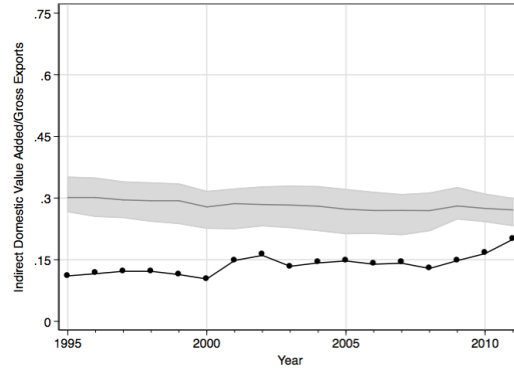
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.55: Malta: GVC and Trade Variables

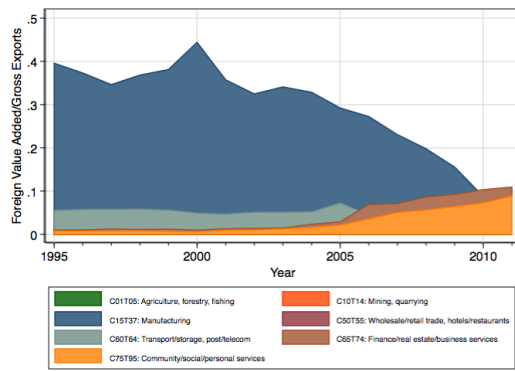
(a) Backward Linkage, all sectors



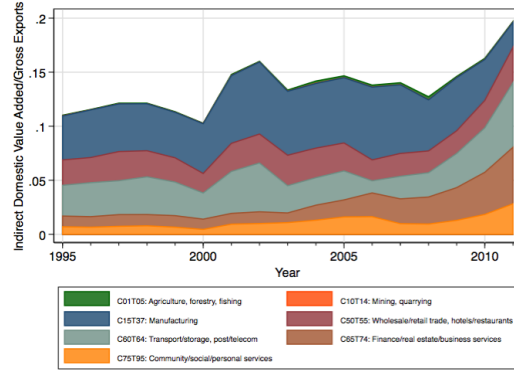
(b) Forward Linkage, all sectors



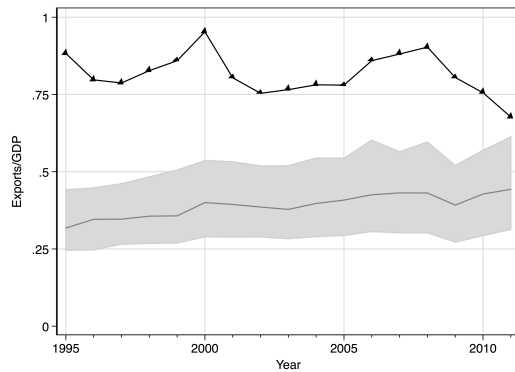
(c) Backward Linkage, by sector



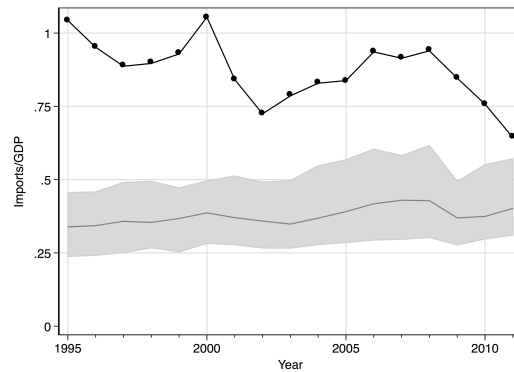
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



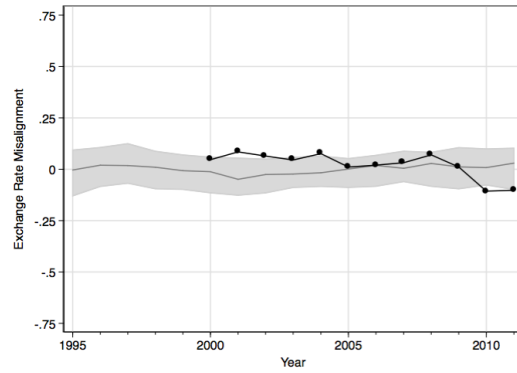
(f) Imports as a share of GDP, all sectors



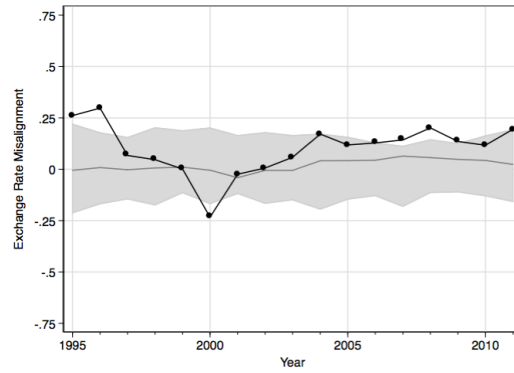
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.56: Malta (cont.): Currency Manipulation Variables

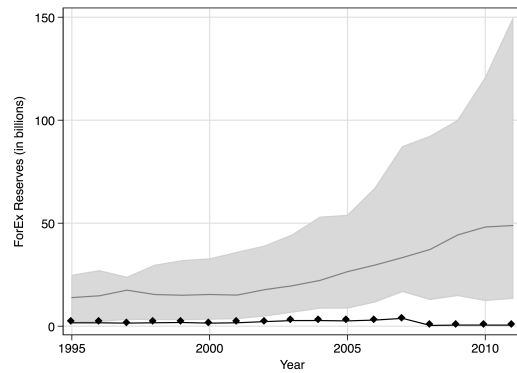
(a) Currency Misalignment, BEER approach



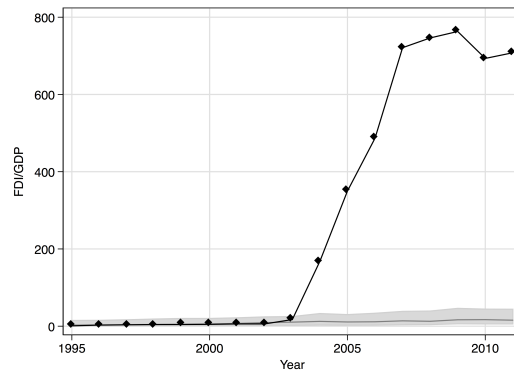
(b) Currency Misalignment, BS approach



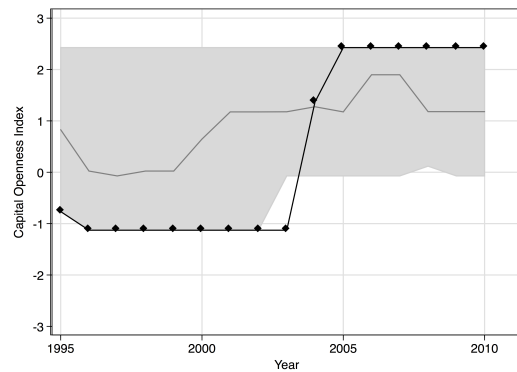
(c) Foreign Exchange Reserves



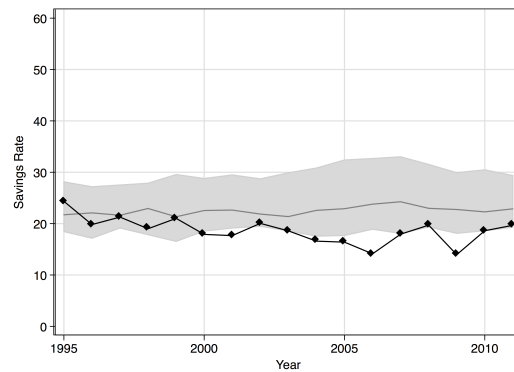
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



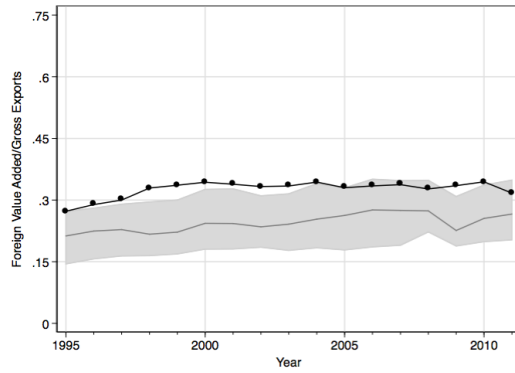
(f) Savings Rate



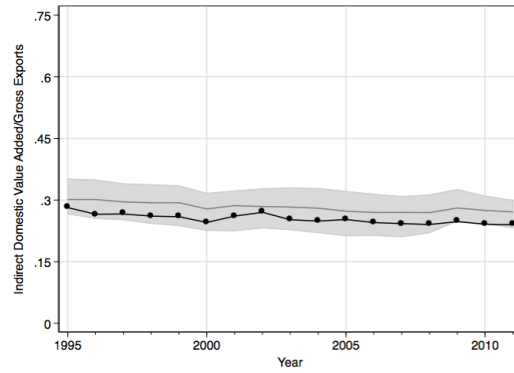
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.57: Mexico: GVC and Trade Variables

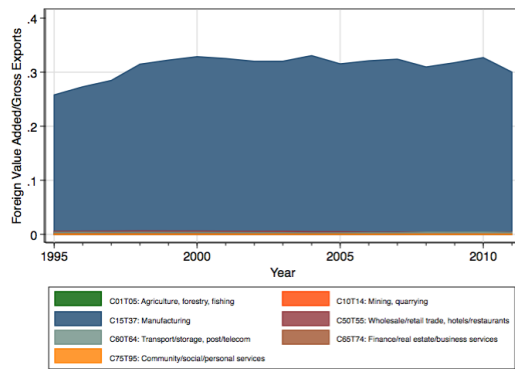
(a) Backward Linkage, all sectors



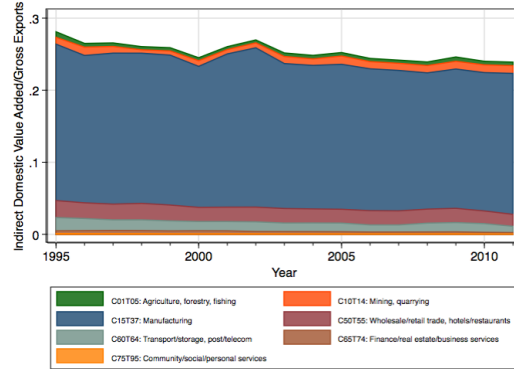
(b) Forward Linkage, all sectors



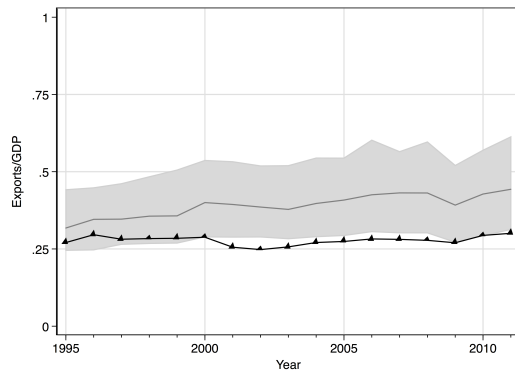
(c) Backward Linkage, by sector



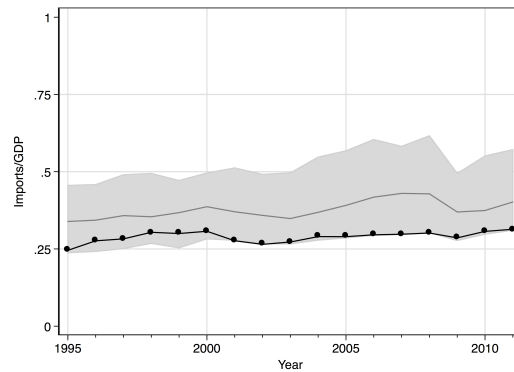
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



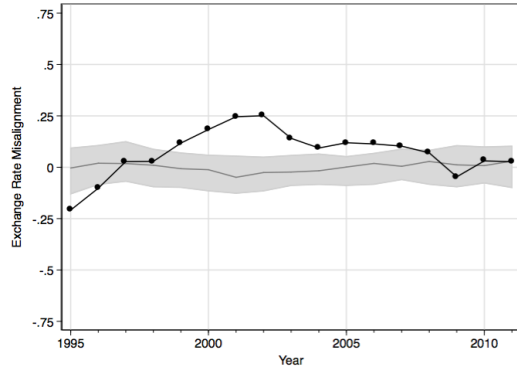
(f) Imports as a share of GDP, all sectors



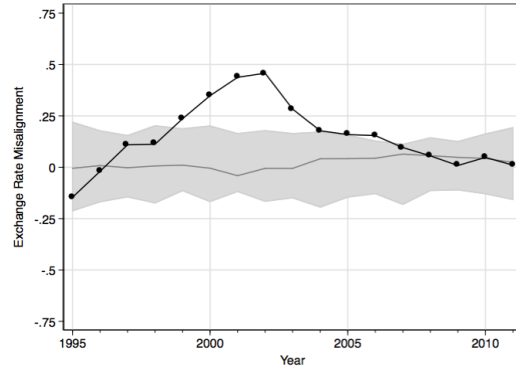
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.58: Mexico (cont.): Currency Manipulation Variables

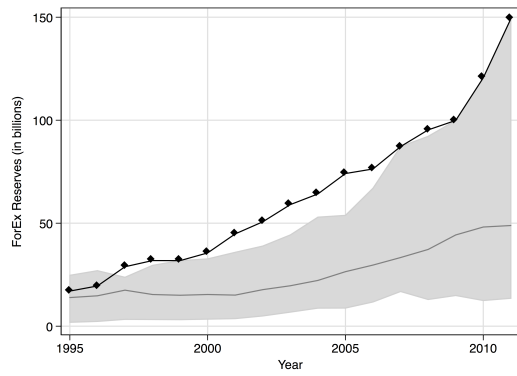
(a) Currency Misalignment, BEER approach



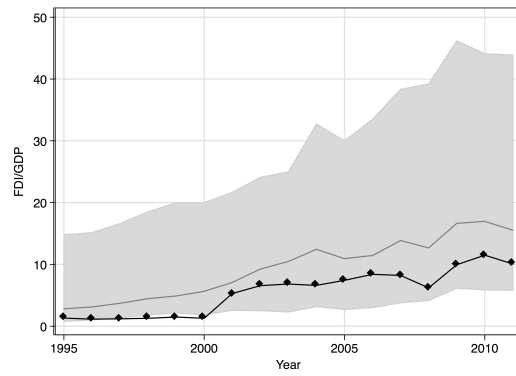
(b) Currency Misalignment, BS approach



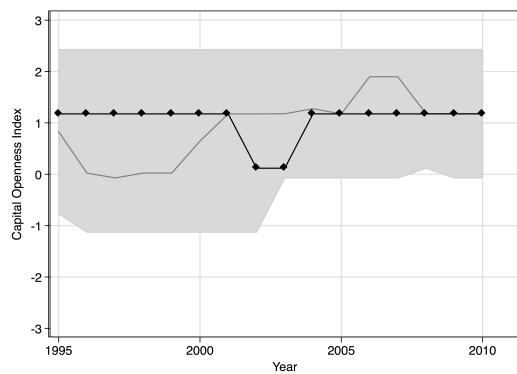
(c) Foreign Exchange Reserves



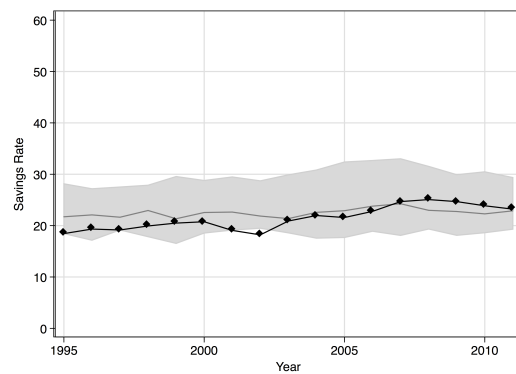
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



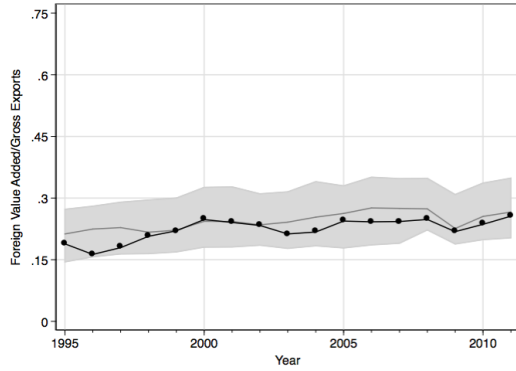
(f) Savings Rate



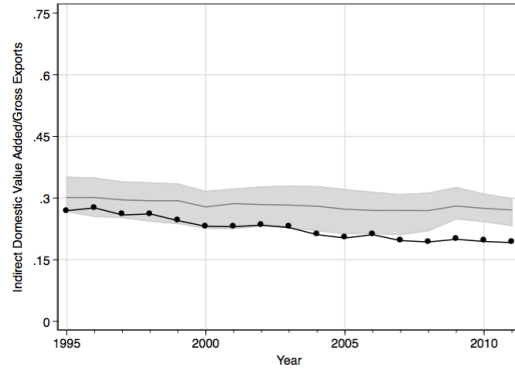
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.59: Morocco: GVC and Trade Variables

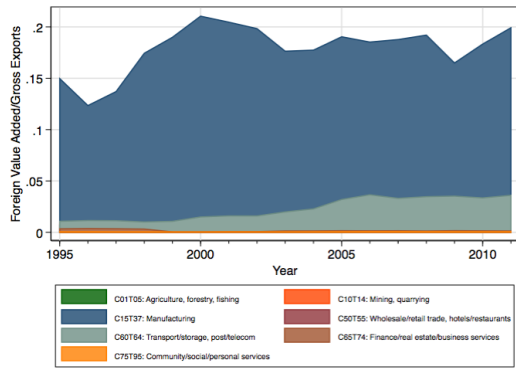
(a) Backward Linkage, all sectors



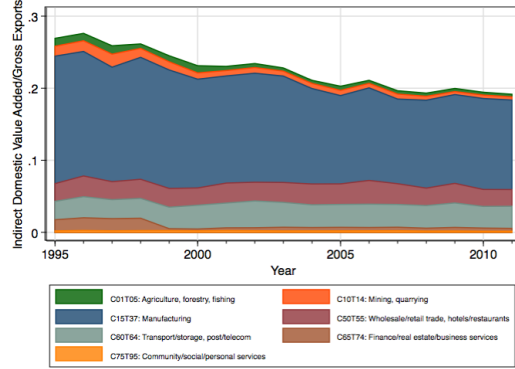
(b) Forward Linkage, all sectors



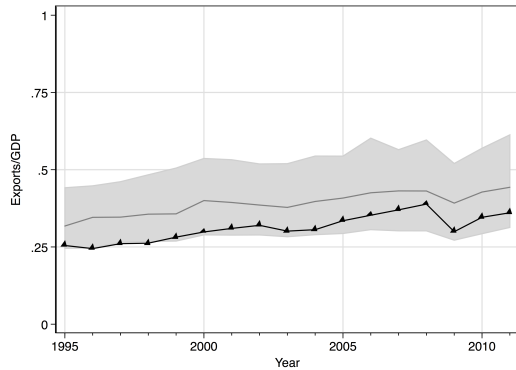
(c) Backward Linkage, by sector



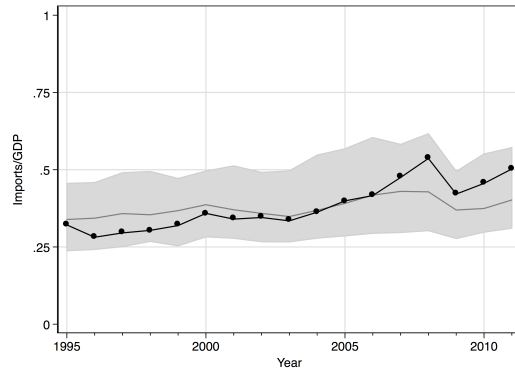
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



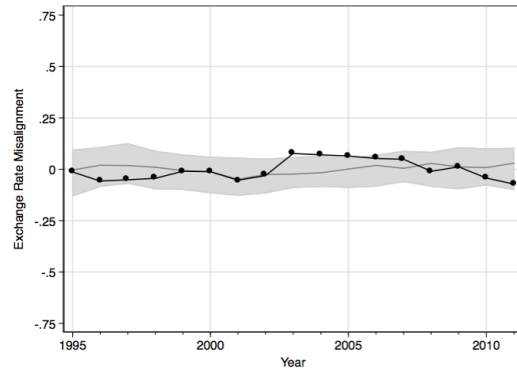
(f) Imports as a share of GDP, all sectors



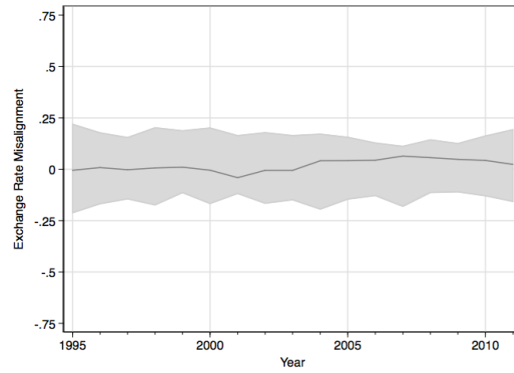
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.60: Morocco (cont.): Currency Manipulation Variables

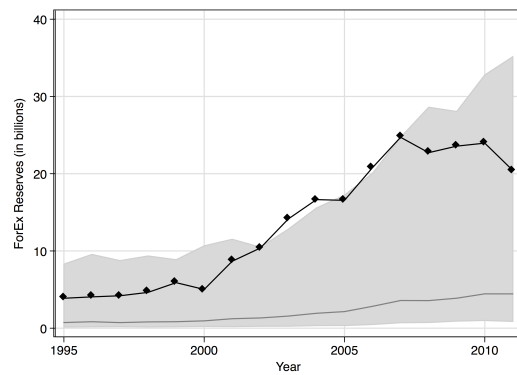
(a) Currency Misalignment, BEER approach



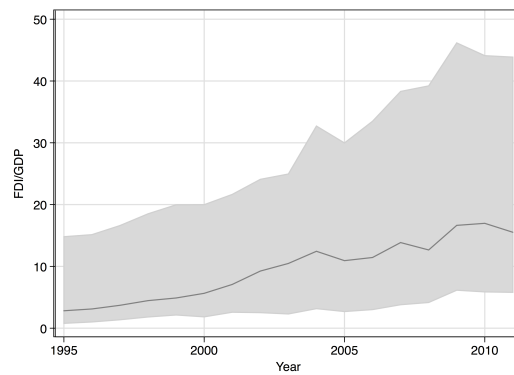
(b) Currency Misalignment, BS approach



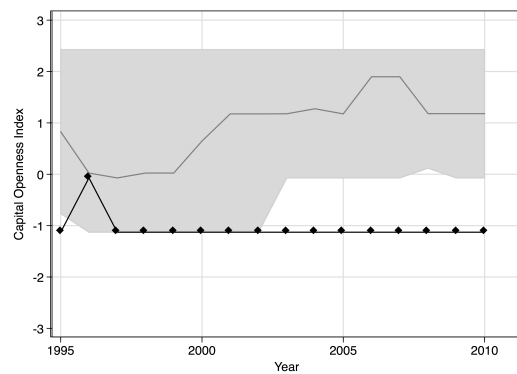
(c) Foreign Exchange Reserves



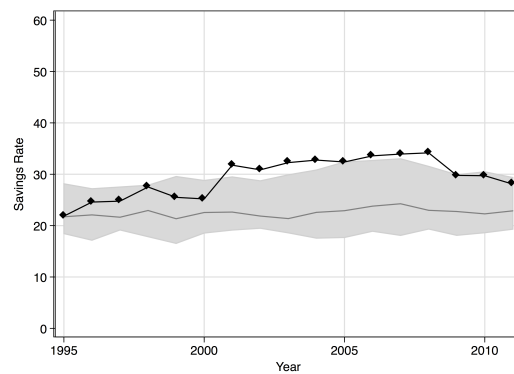
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



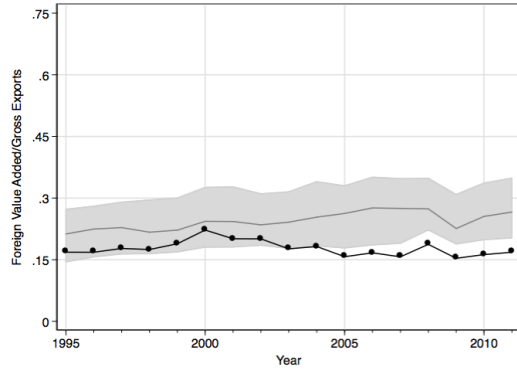
(f) Savings Rate



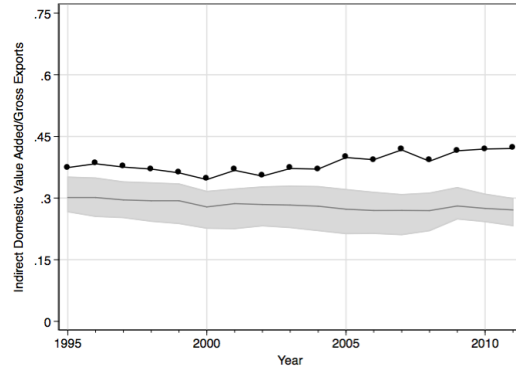
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.61: New Zealand: GVC and Trade Variables

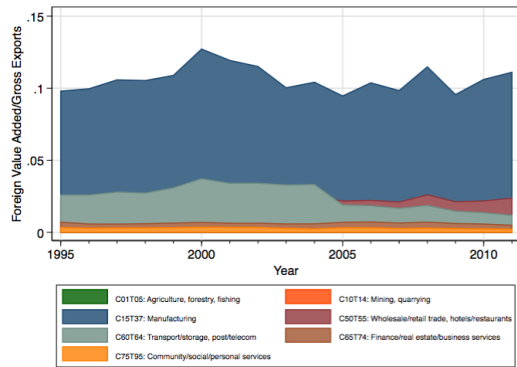
(a) Backward Linkage, all sectors



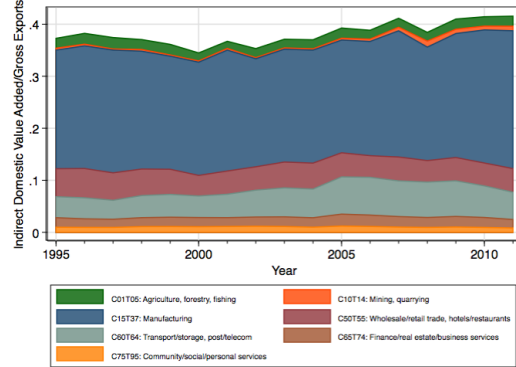
(b) Forward Linkage, all sectors



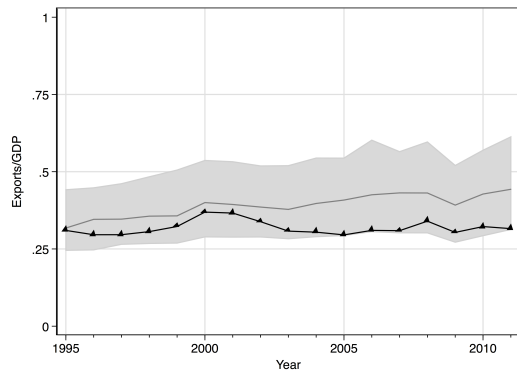
(c) Backward Linkage, by sector



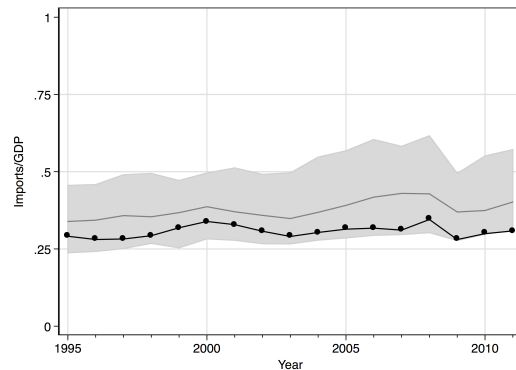
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



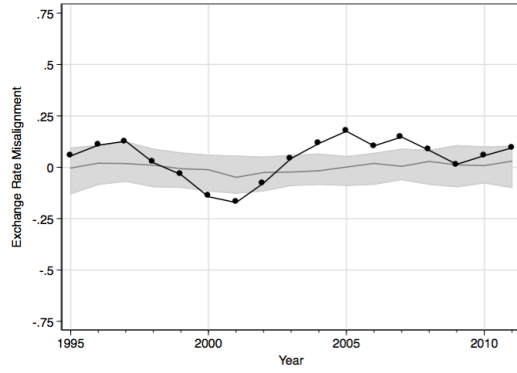
(f) Imports as a share of GDP, all sectors



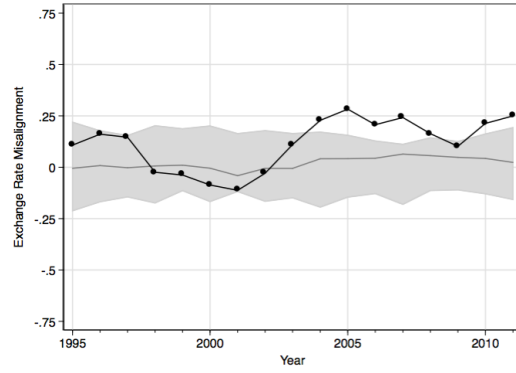
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.62: New Zealand (cont.): Currency Manipulation Variables

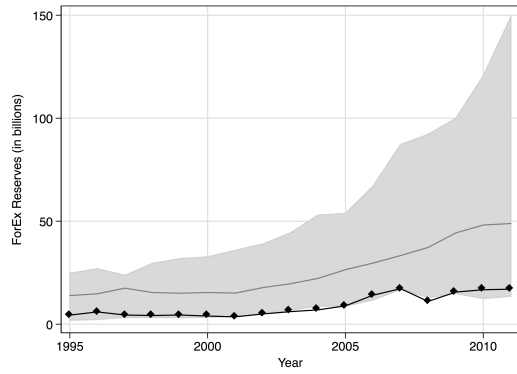
(a) Currency Misalignment, BEER approach



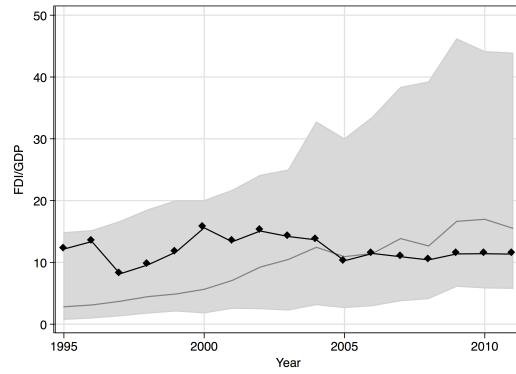
(b) Currency Misalignment, BS approach



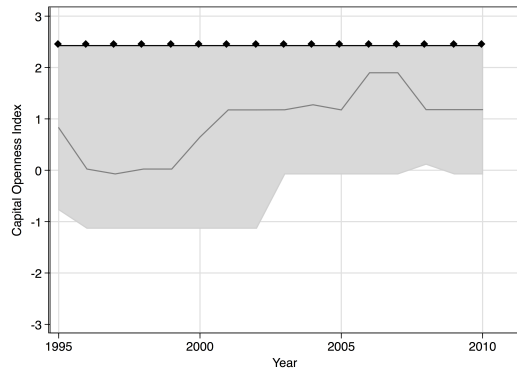
(c) Foreign Exchange Reserves



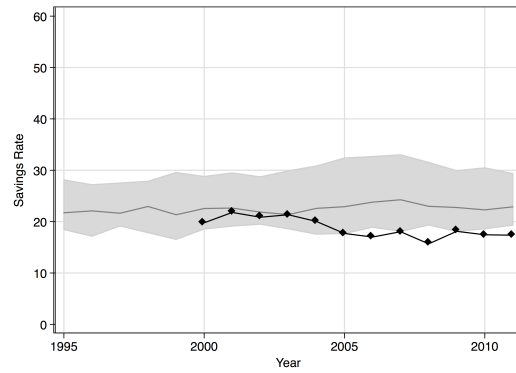
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



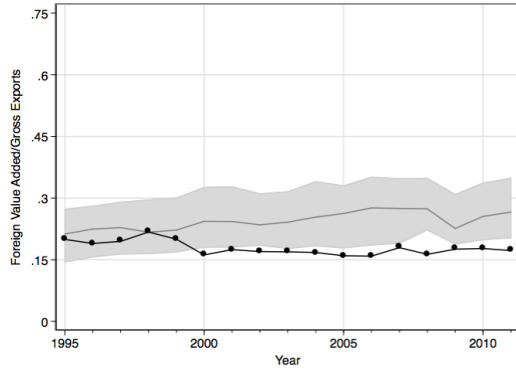
(f) Savings Rate



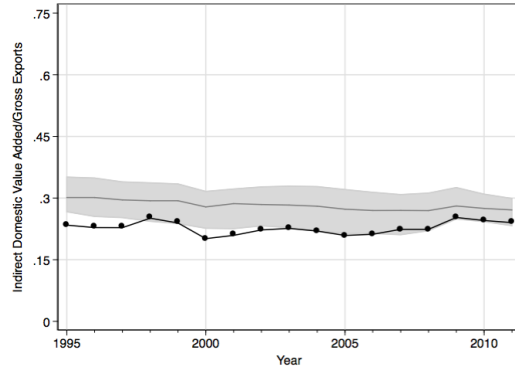
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.63: Norway: GVC and Trade Variables

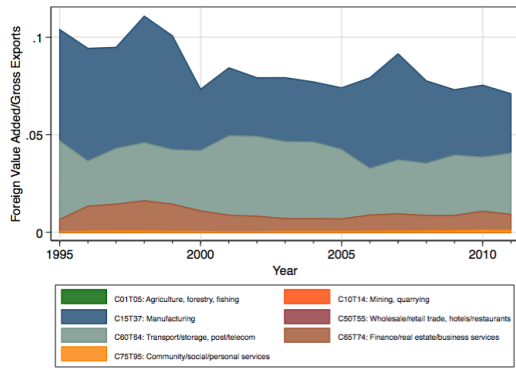
(a) Backward Linkage, all sectors



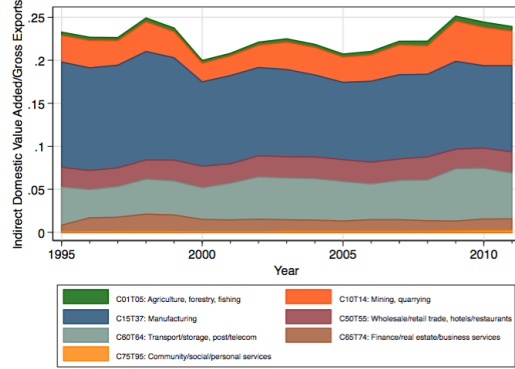
(b) Forward Linkage, all sectors



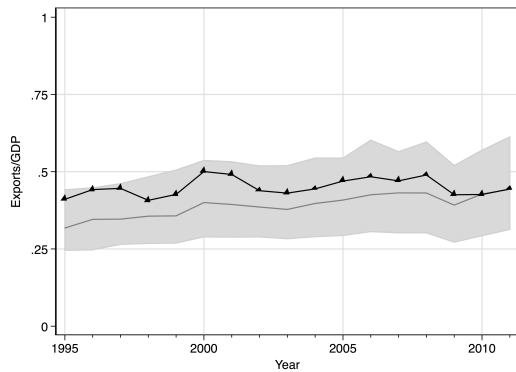
(c) Backward Linkage, by sector



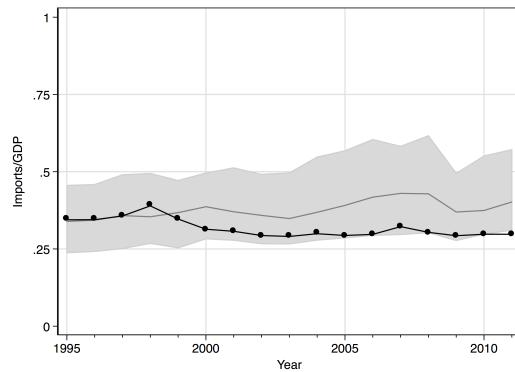
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



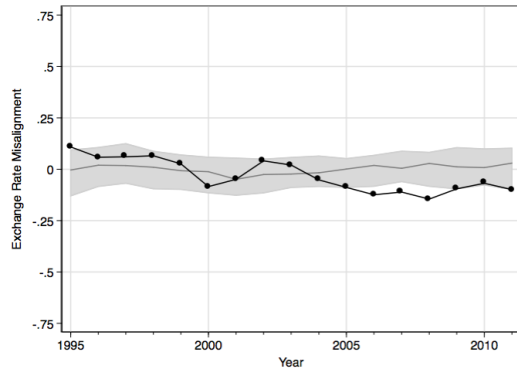
(f) Imports as a share of GDP, all sectors



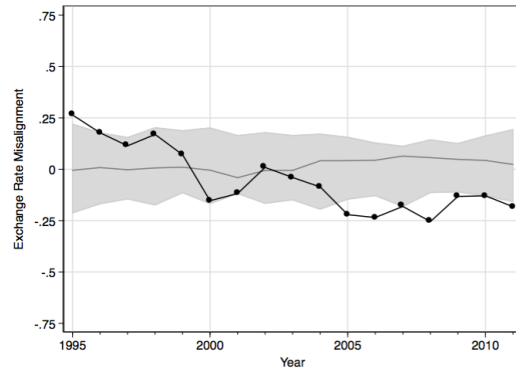
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.64: Norway (cont.): Currency Manipulation Variables

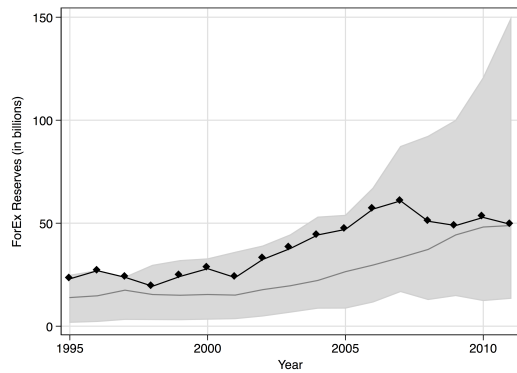
(a) Currency Misalignment, BEER approach



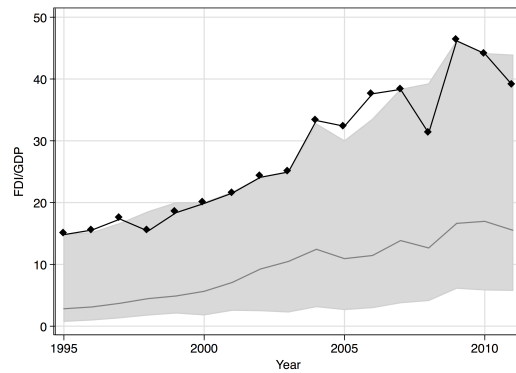
(b) Currency Misalignment, BS approach



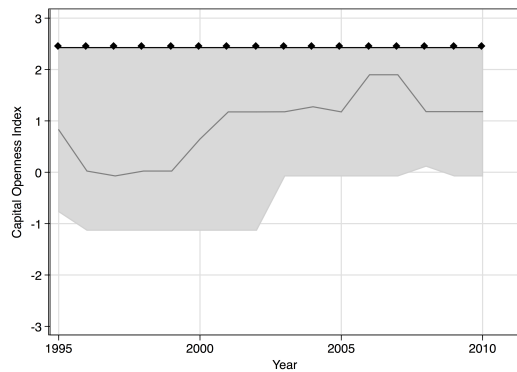
(c) Foreign Exchange Reserves



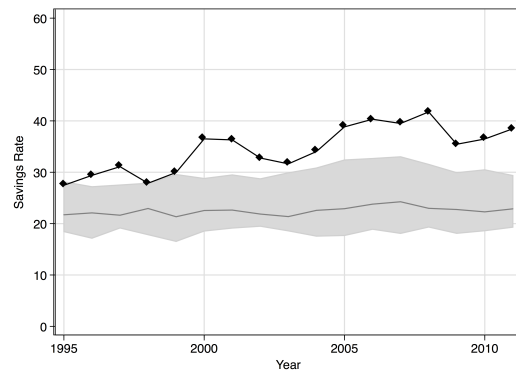
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



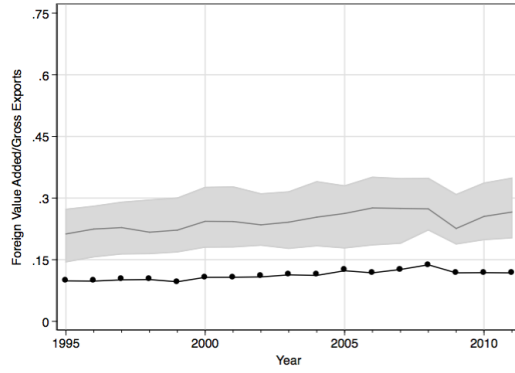
(f) Savings Rate



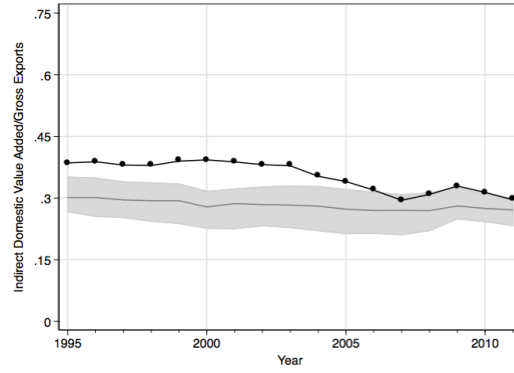
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.65: Peru: GVC and Trade Variables

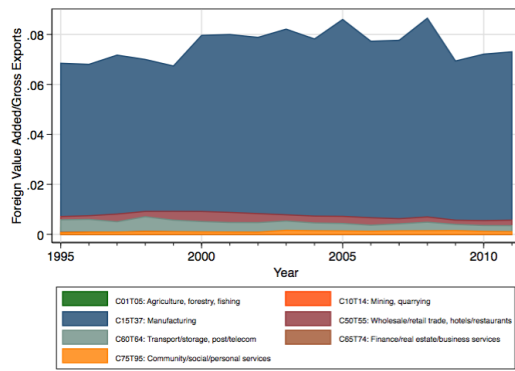
(a) Backward Linkage, all sectors



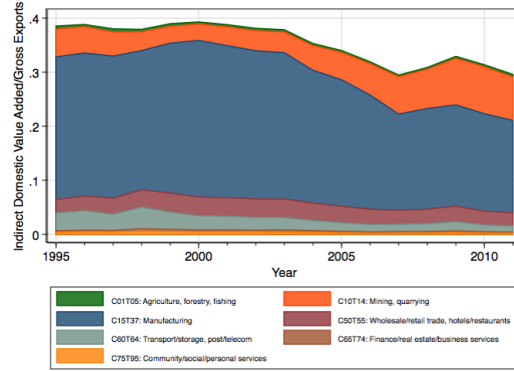
(b) Forward Linkage, all sectors



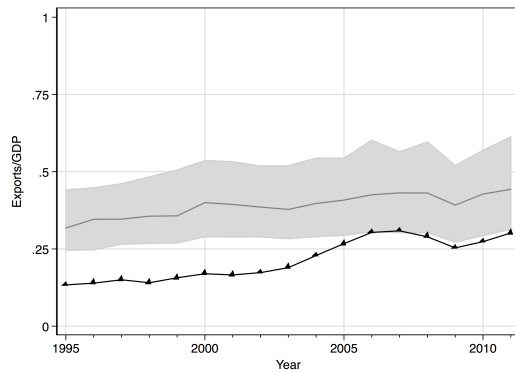
(c) Backward Linkage, by sector



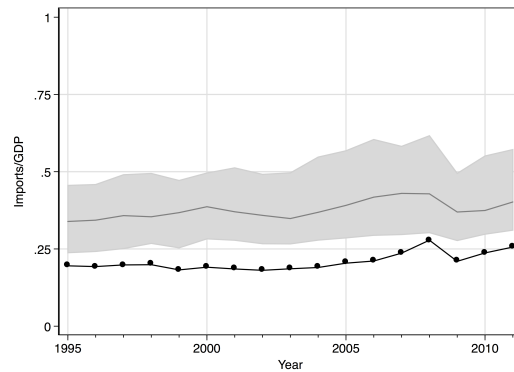
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



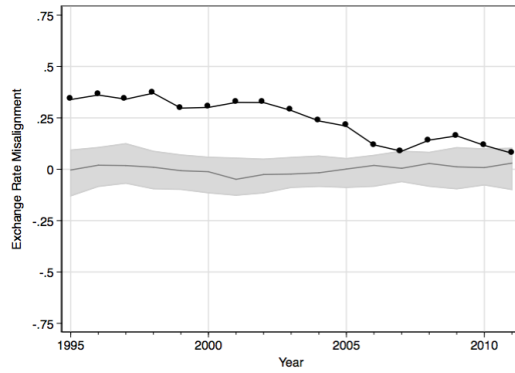
(f) Imports as a share of GDP, all sectors



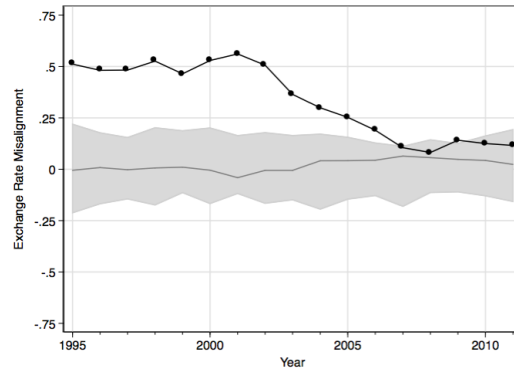
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.66: Peru (cont.): Currency Manipulation Variables

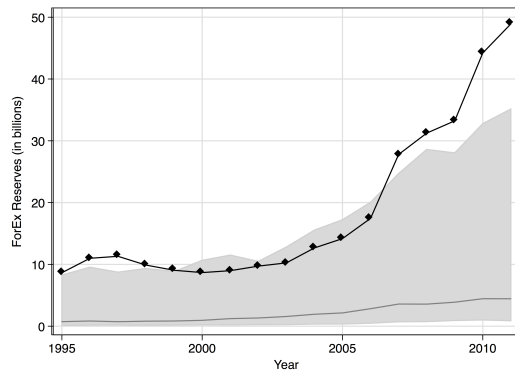
(a) Currency Misalignment, BEER approach



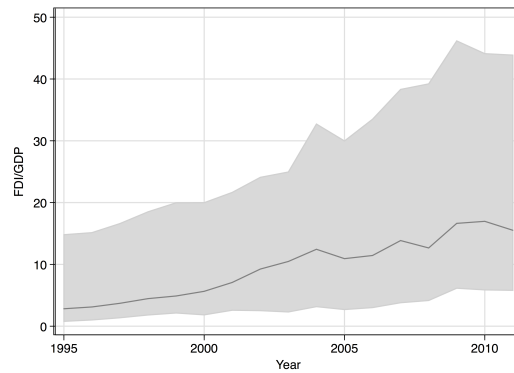
(b) Currency Misalignment, BS approach



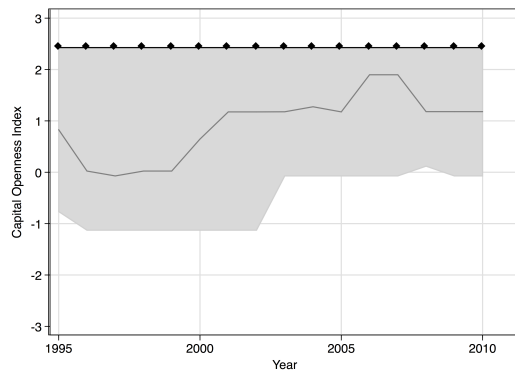
(c) Foreign Exchange Reserves



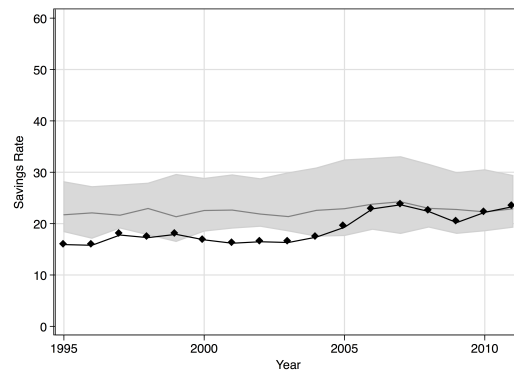
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



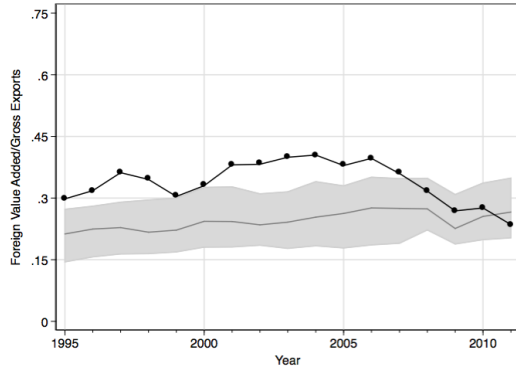
(f) Savings Rate



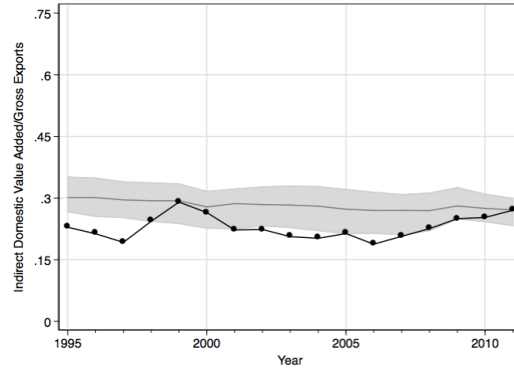
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.67: Philippines: GVC and Trade Variables

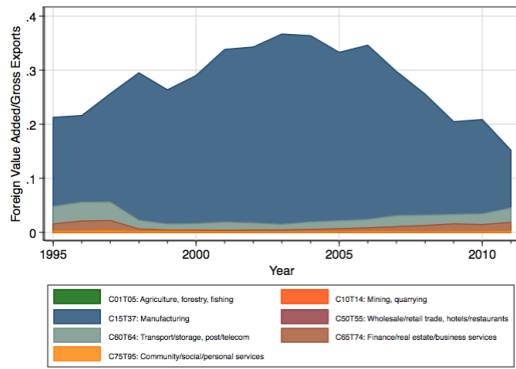
(a) Backward Linkage, all sectors



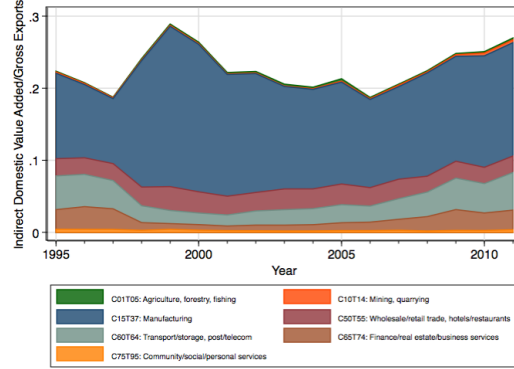
(b) Forward Linkage, all sectors



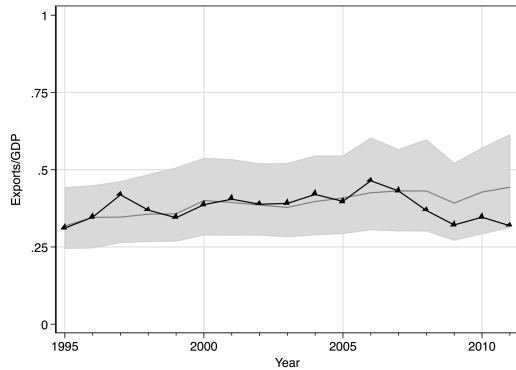
(c) Backward Linkage, by sector



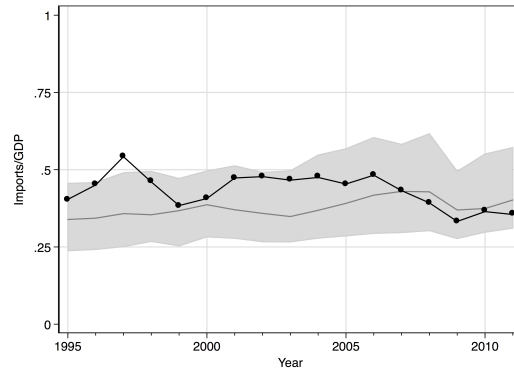
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



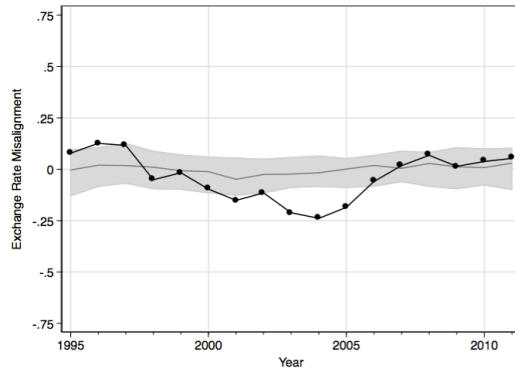
(f) Imports as a share of GDP, all sectors



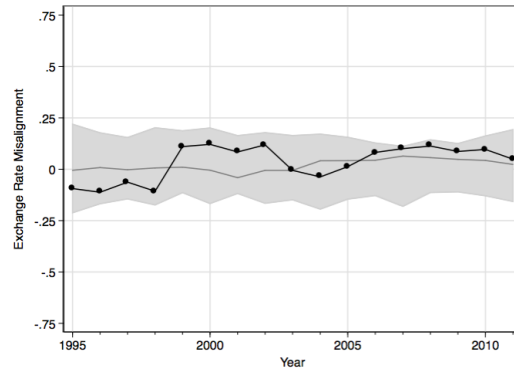
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.68: Philippines (cont.): Currency Manipulation Variables

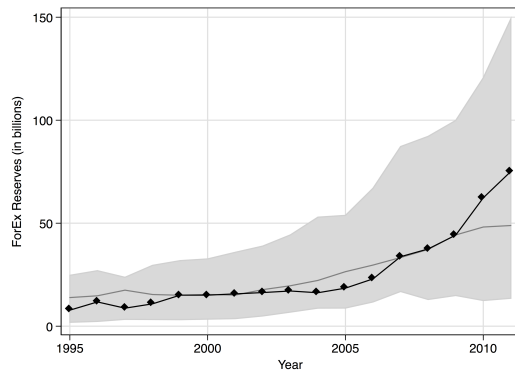
(a) Currency Misalignment, BEER approach



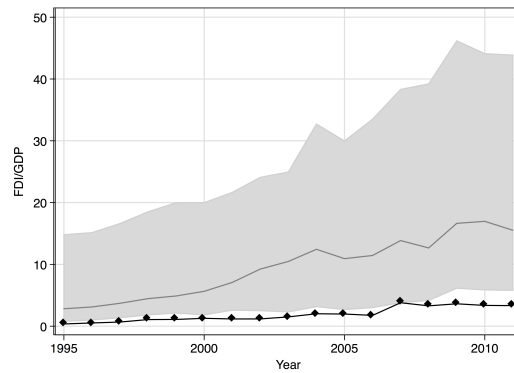
(b) Currency Misalignment, BS approach



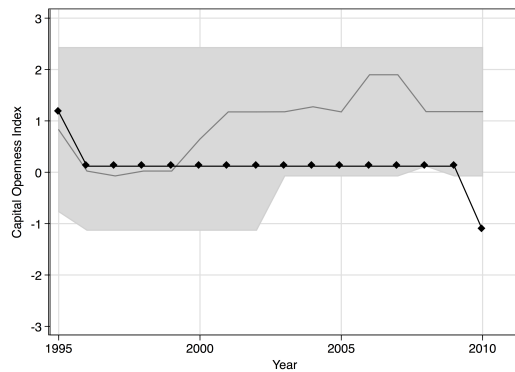
(c) Foreign Exchange Reserves



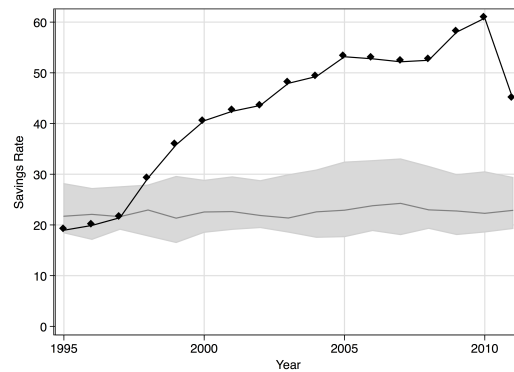
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



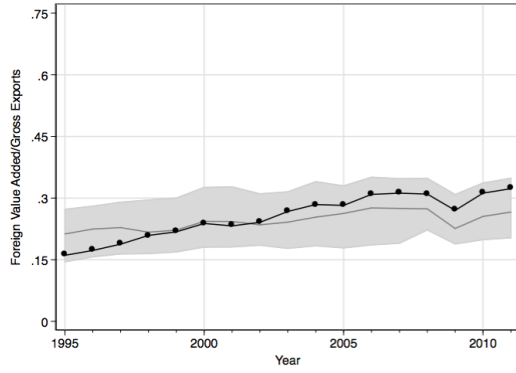
(f) Savings Rate



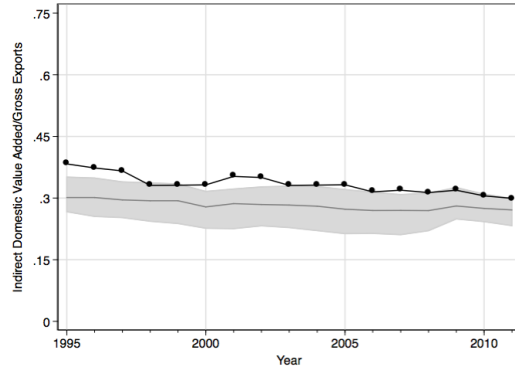
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.69: Poland: GVC and Trade Variables

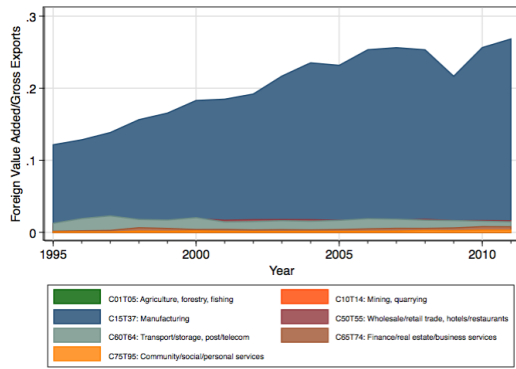
(a) Backward Linkage, all sectors



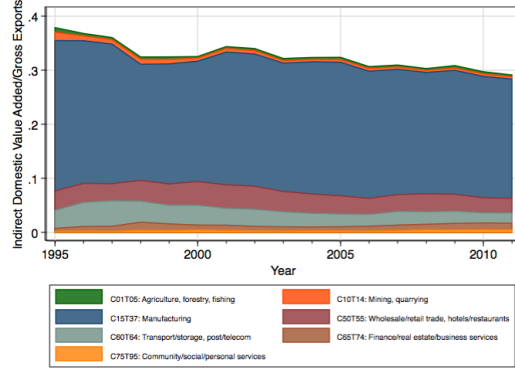
(b) Forward Linkage, all sectors



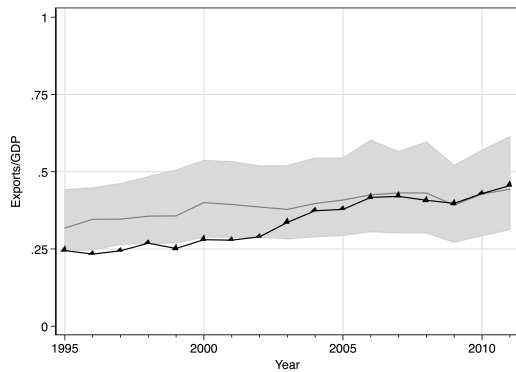
(c) Backward Linkage, by sector



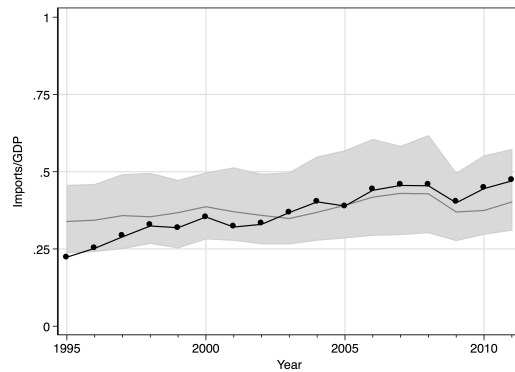
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



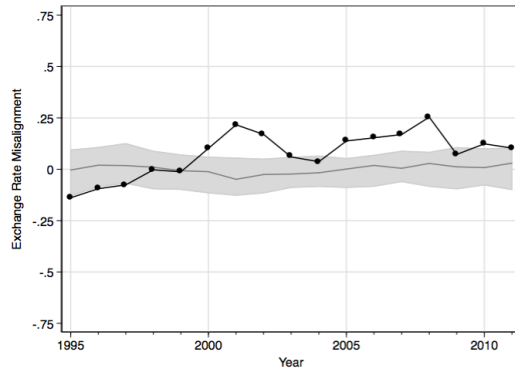
(f) Imports as a share of GDP, all sectors



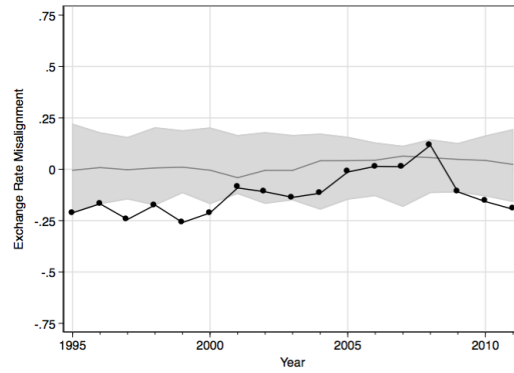
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.70: Poland (cont.): Currency Manipulation Variables

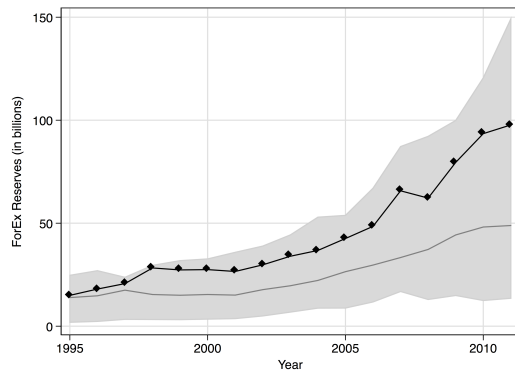
(a) Currency Misalignment, BEER approach



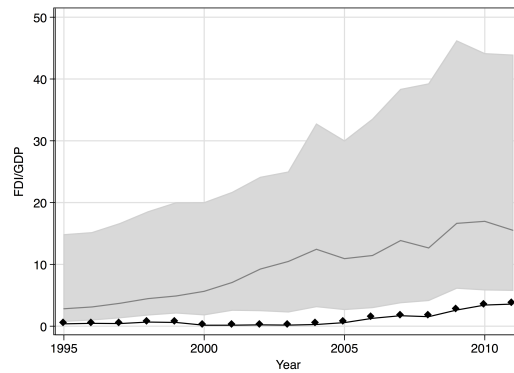
(b) Currency Misalignment, BS approach



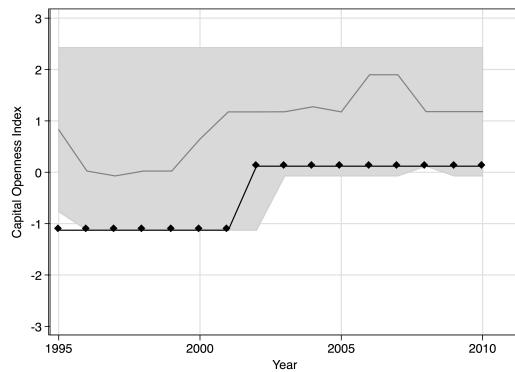
(c) Foreign Exchange Reserves



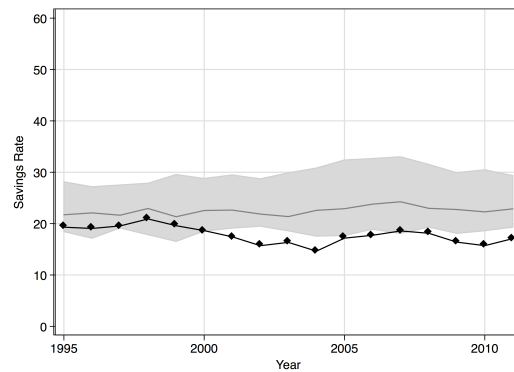
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



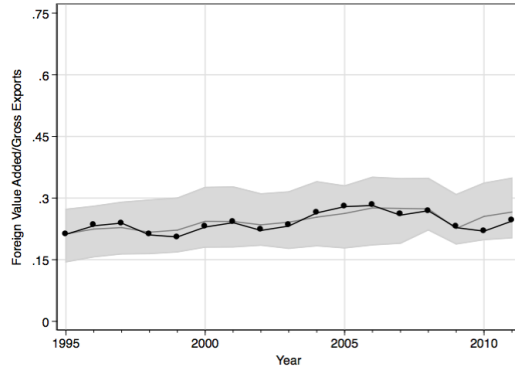
(f) Savings Rate



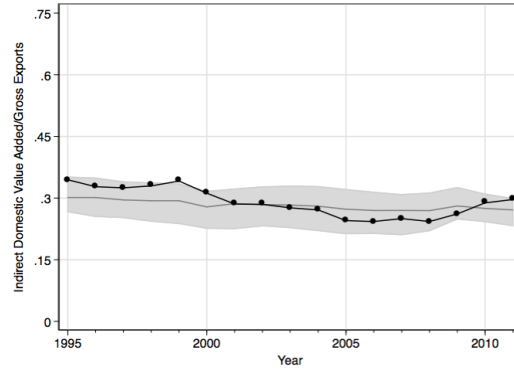
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.71: Romania: GVC and Trade Variables

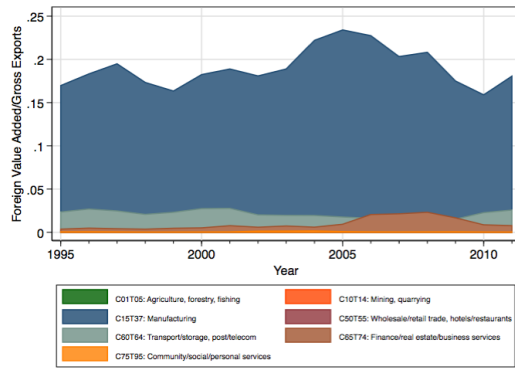
(a) Backward Linkage, all sectors



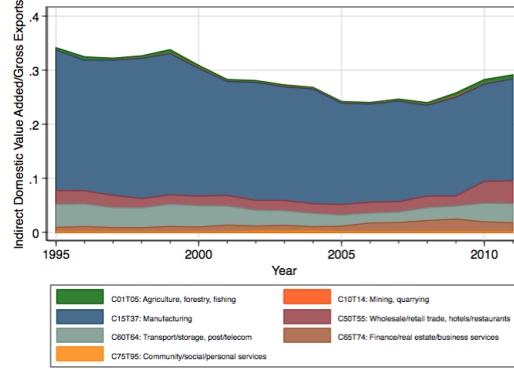
(b) Forward Linkage, all sectors



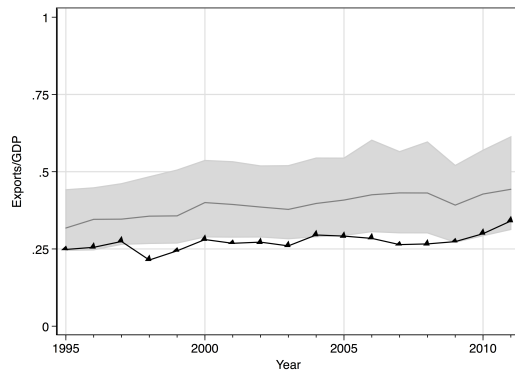
(c) Backward Linkage, by sector



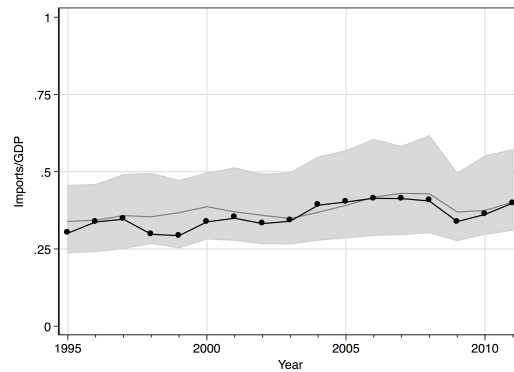
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



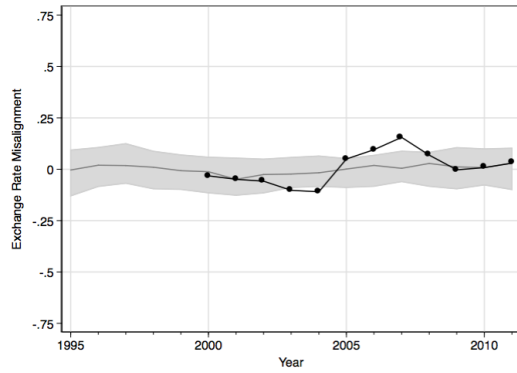
(f) Imports as a share of GDP, all sectors



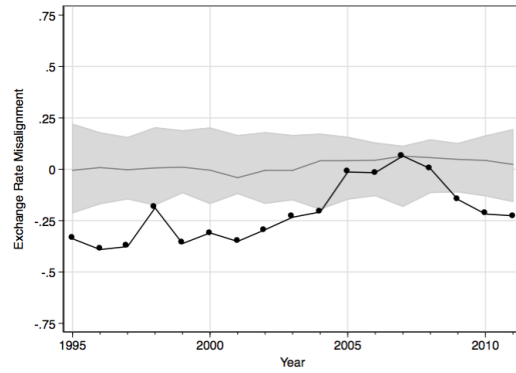
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.72: Romania (cont.): Currency Manipulation Variables

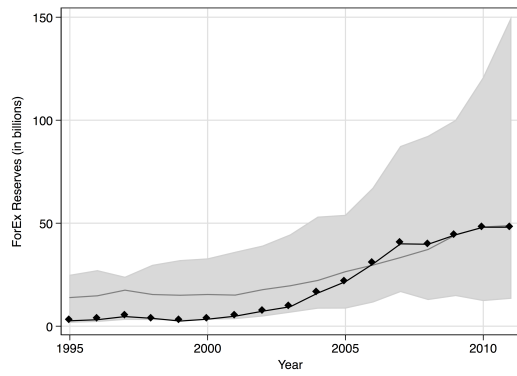
(a) Currency Misalignment, BEER approach



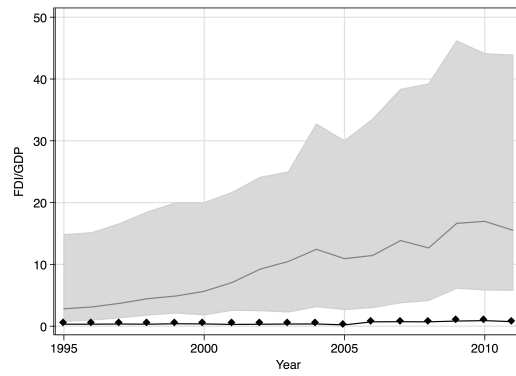
(b) Currency Misalignment, BS approach



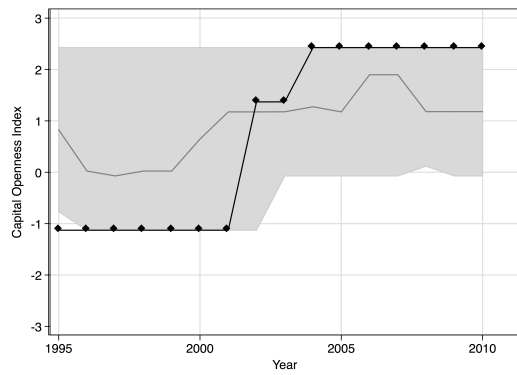
(c) Foreign Exchange Reserves



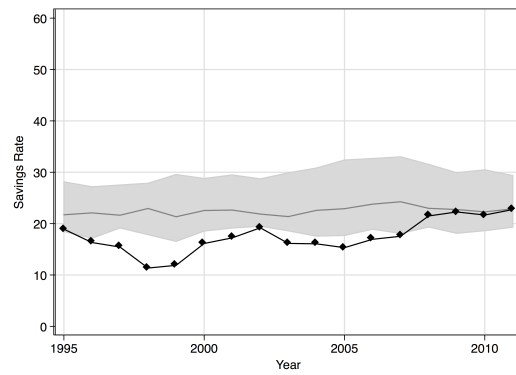
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



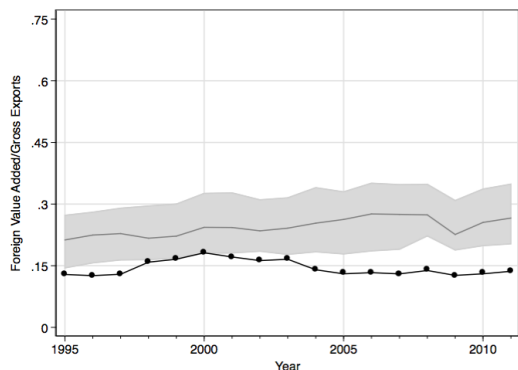
(f) Savings Rate



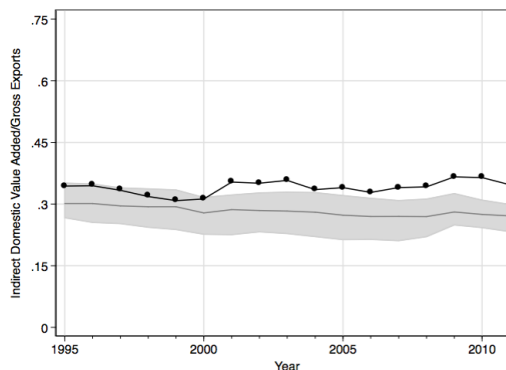
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.73: Russia: GVC and Trade Variables

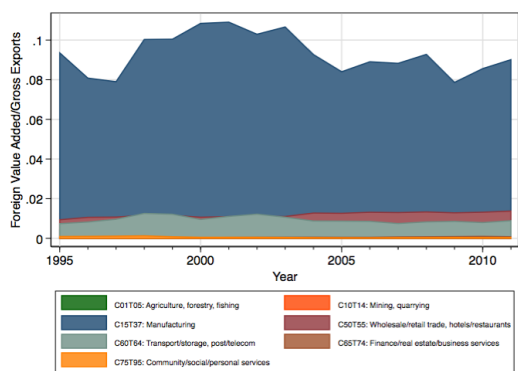
(a) Backward Linkage, all sectors



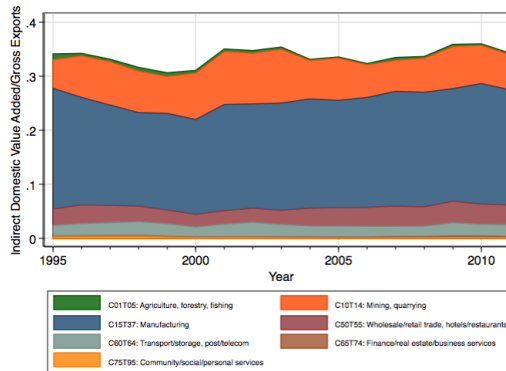
(b) Forward Linkage, all sectors



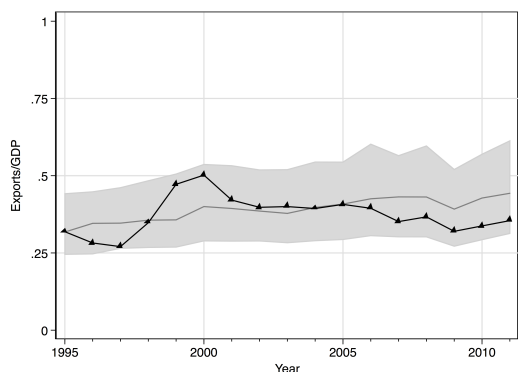
(c) Backward Linkage, by sector



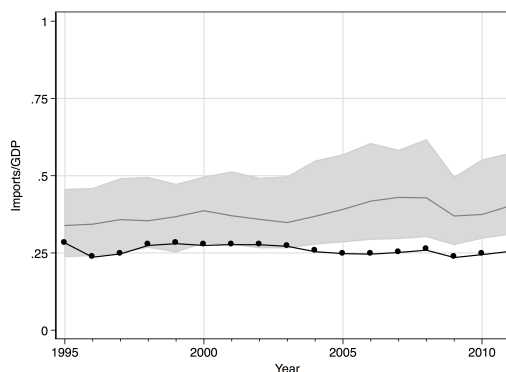
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



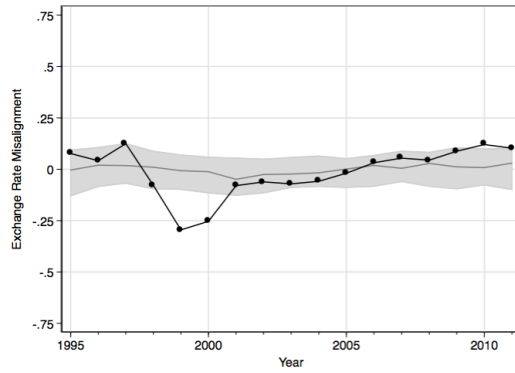
(f) Imports as a share of GDP, all sectors



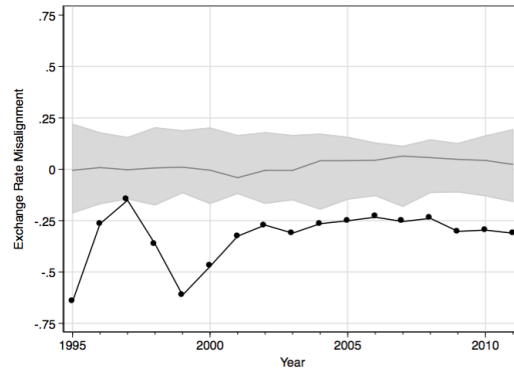
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.74: Russia (cont.): Currency Manipulation Variables

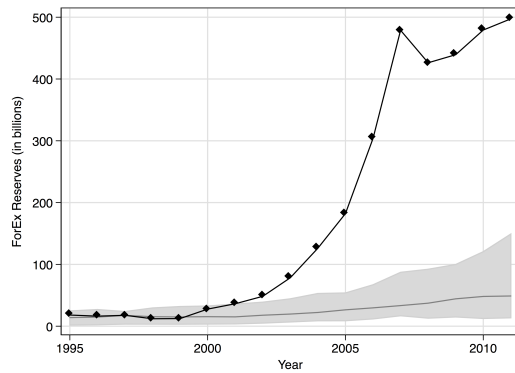
(a) Currency Misalignment, BEER approach



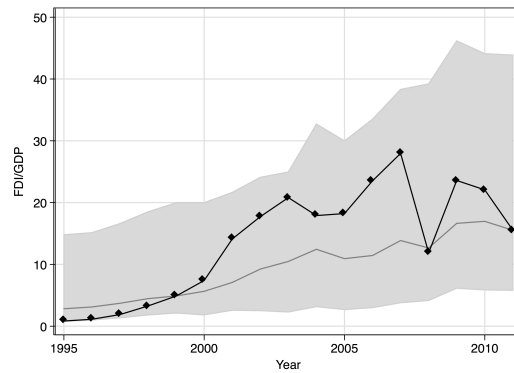
(b) Currency Misalignment, BS approach



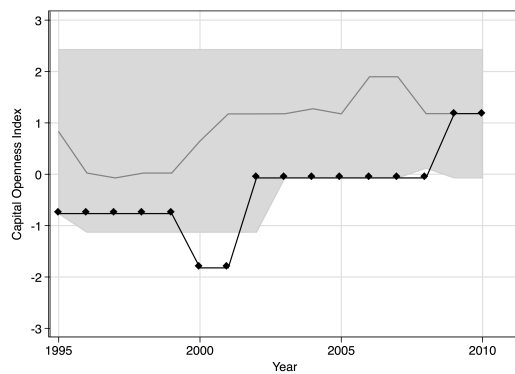
(c) Foreign Exchange Reserves



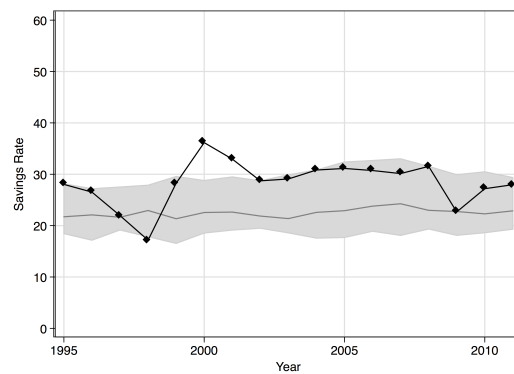
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



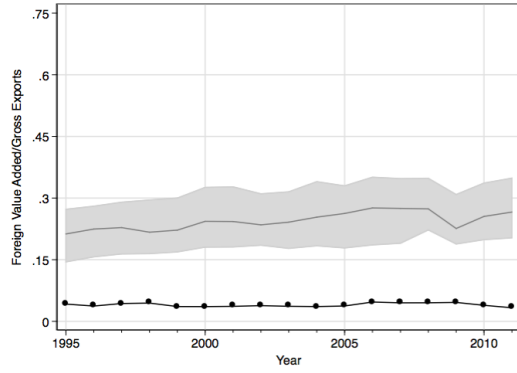
(f) Savings Rate



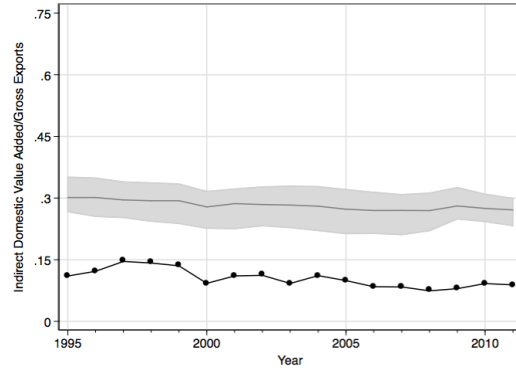
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.75: Saudi Arabia: GVC and Trade Variables

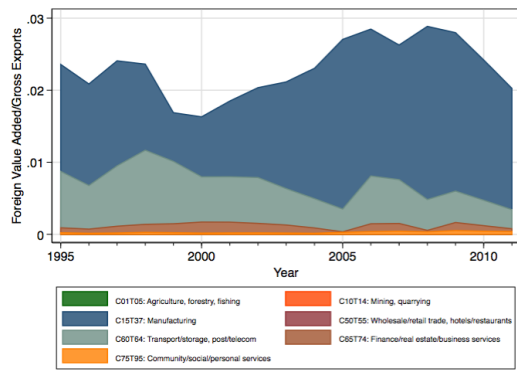
(a) Backward Linkage, all sectors



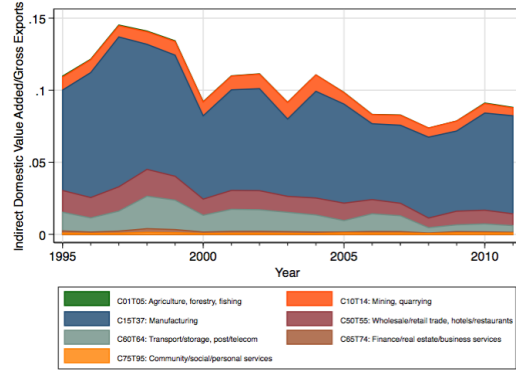
(b) Forward Linkage, all sectors



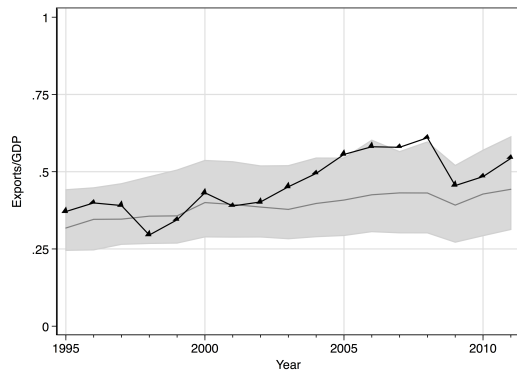
(c) Backward Linkage, by sector



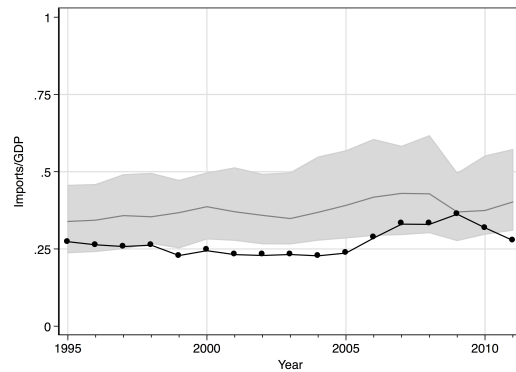
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



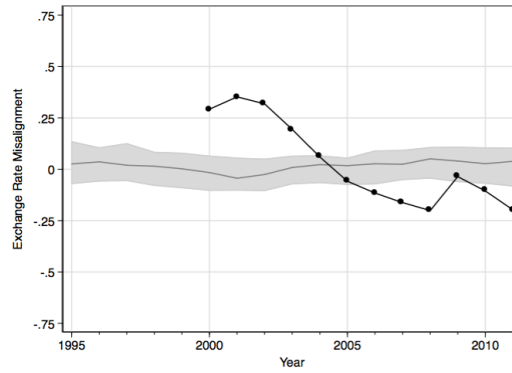
(f) Imports as a share of GDP, all sectors



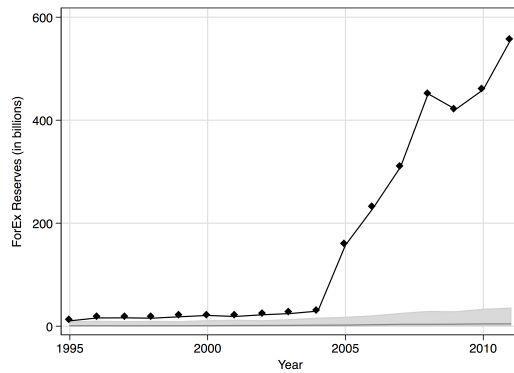
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.76: Saudi Arabia (cont.): Currency Manipulation Variables

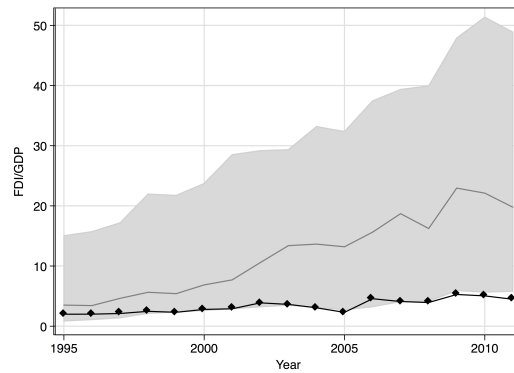
(a) Currency Misalignment, BEER approach



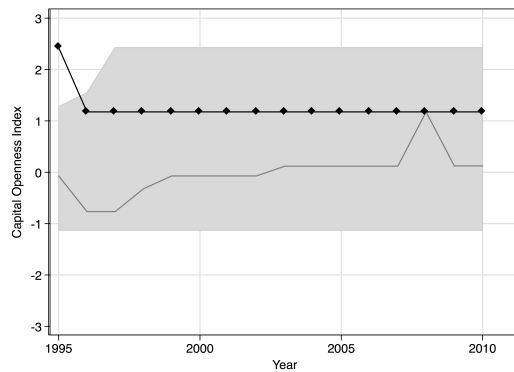
(b) Foreign Exchange Reserves



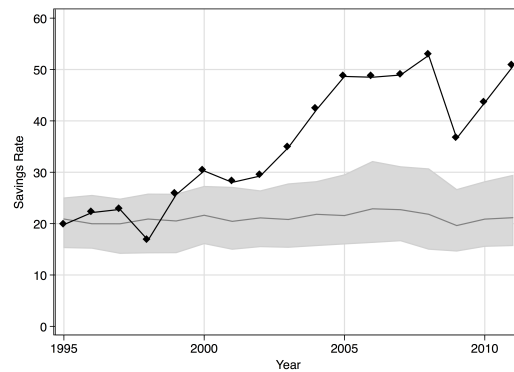
(c) Foreign Direct Investment as share of GDP



(d) Capital Account Openness



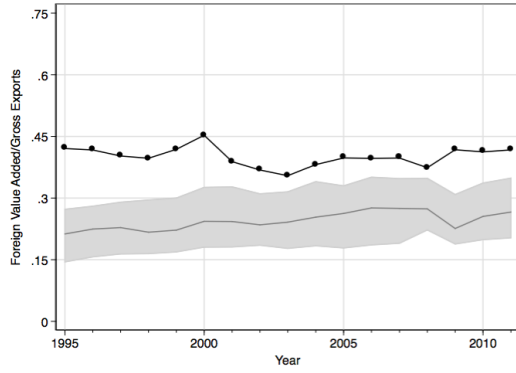
(e) Savings Rate



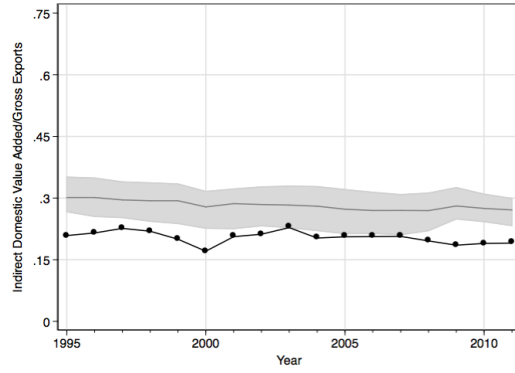
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.77: Singapore: GVC and Trade Variables

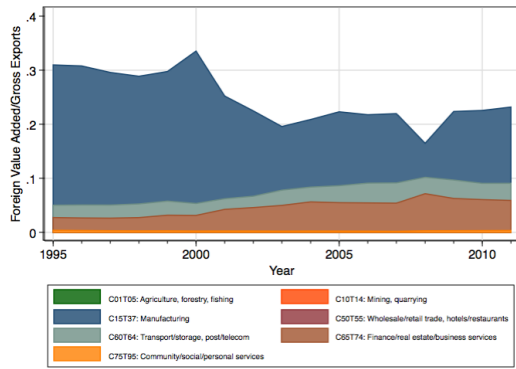
(a) Backward Linkage, all sectors



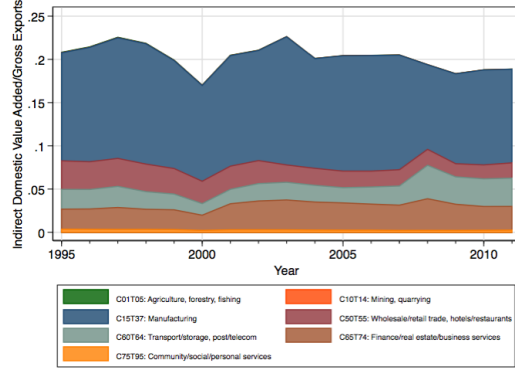
(b) Forward Linkage, all sectors



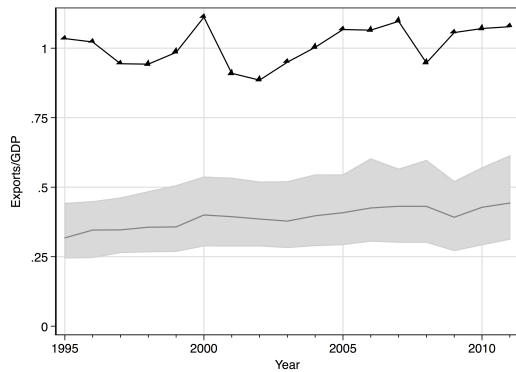
(c) Backward Linkage, by sector



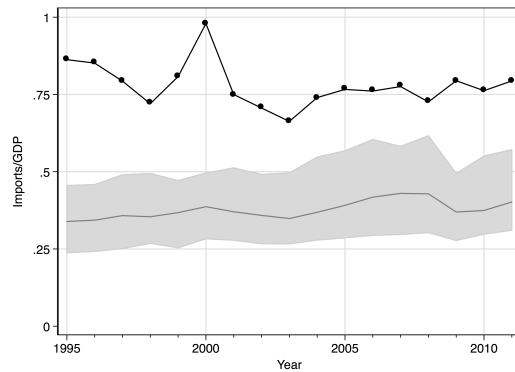
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



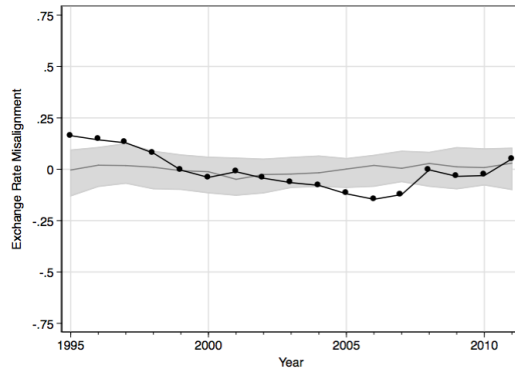
(f) Imports as a share of GDP, all sectors



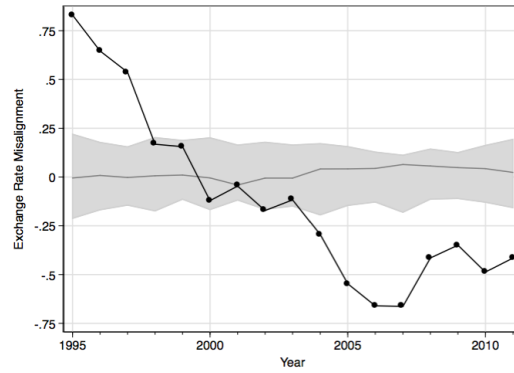
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.78: Singapore (cont.): Currency Manipulation Variables

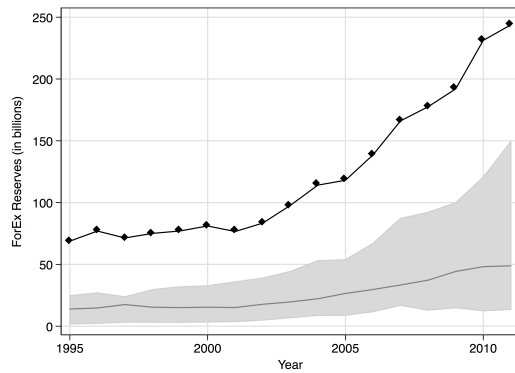
(a) Currency Misalignment, BEER approach



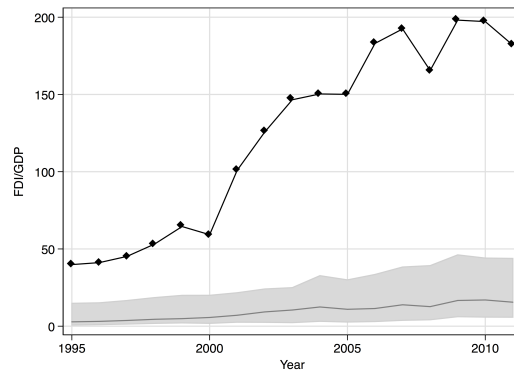
(b) Currency Misalignment, BS approach



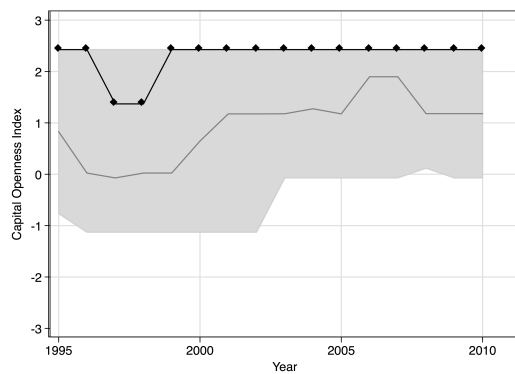
(c) Foreign Exchange Reserves



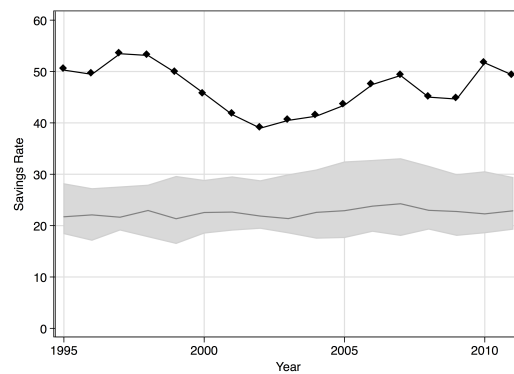
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



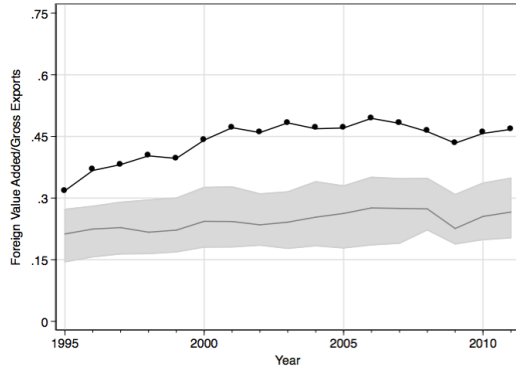
(f) Savings Rate



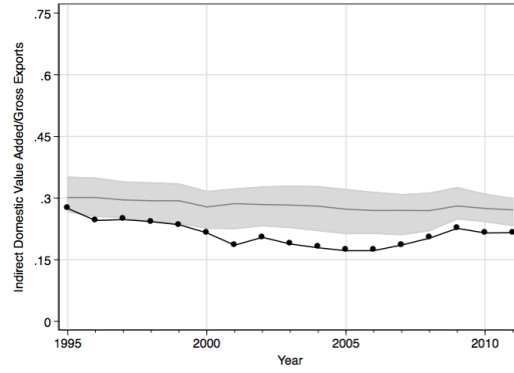
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.79: Slovak Republic: GVC and Trade Variables

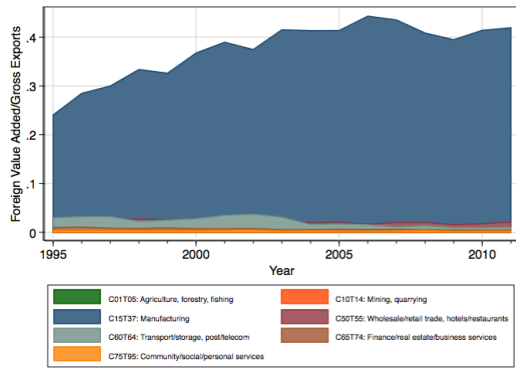
(a) Backward Linkage, all sectors



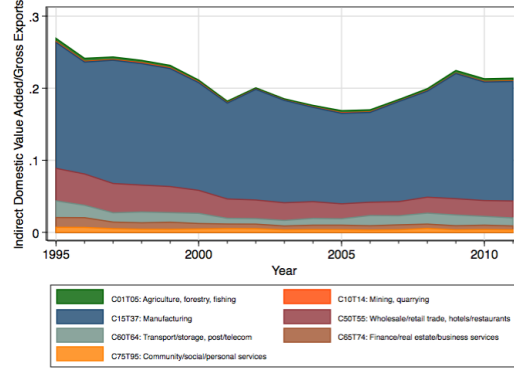
(b) Forward Linkage, all sectors



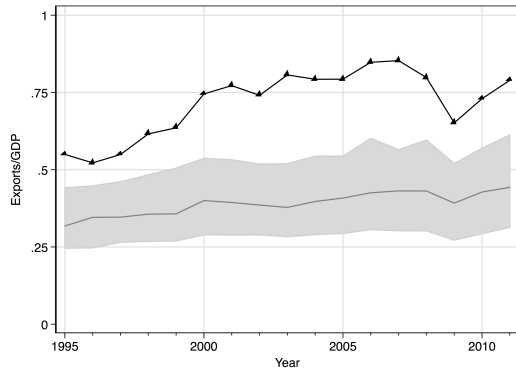
(c) Backward Linkage, by sector



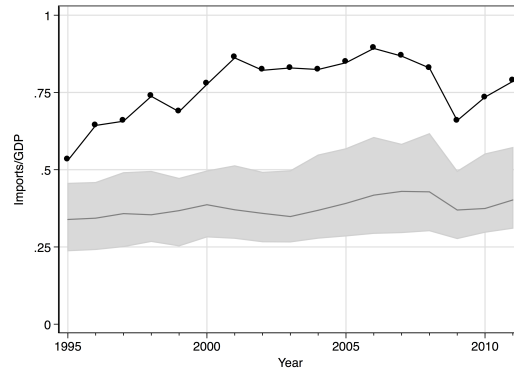
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



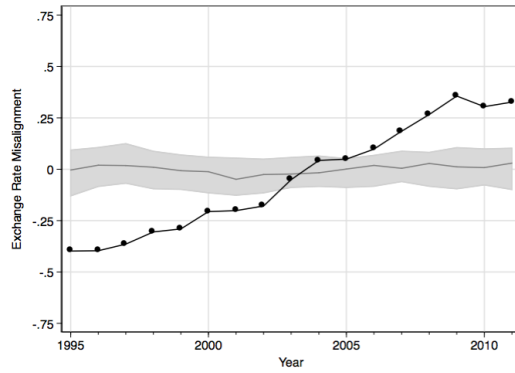
(f) Imports as a share of GDP, all sectors



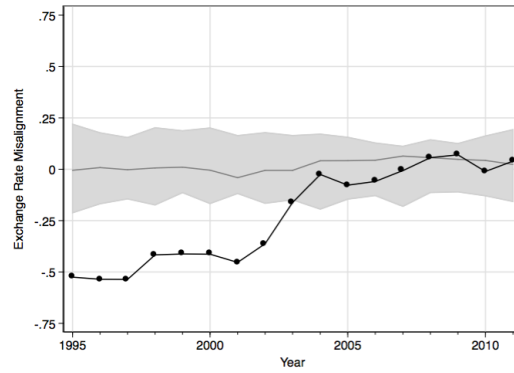
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.80: Slovak Republic (cont.): Currency Manipulation Variables

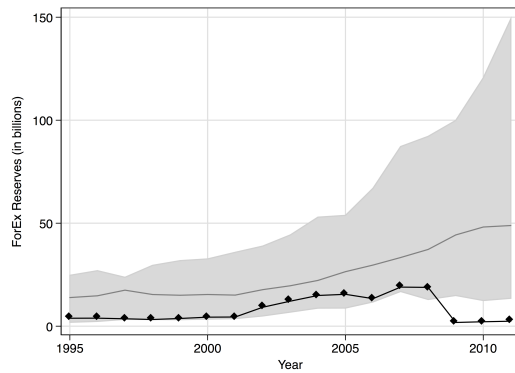
(a) Currency Misalignment, BEER approach



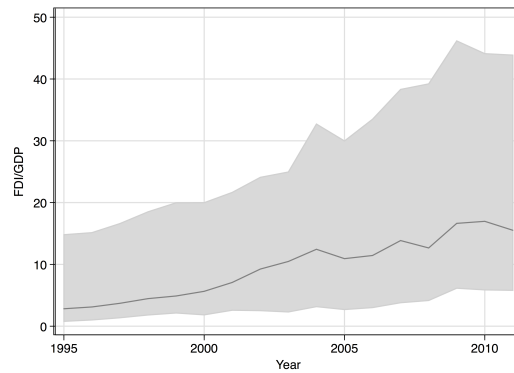
(b) Currency Misalignment, BS approach



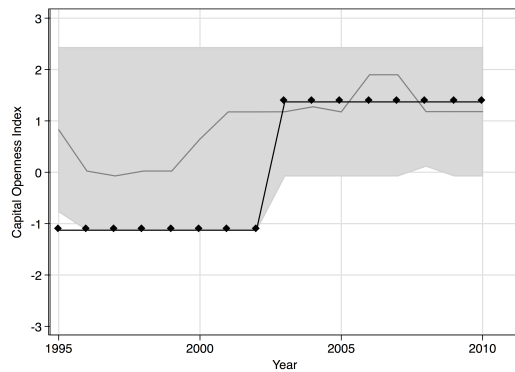
(c) Foreign Exchange Reserves



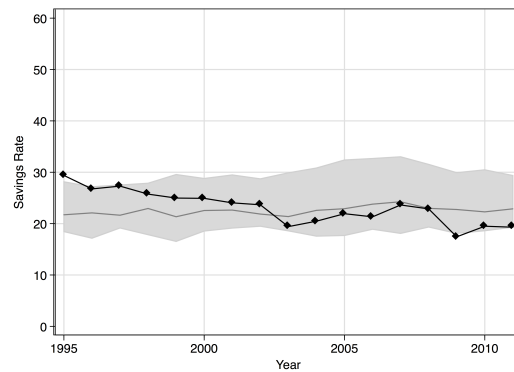
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



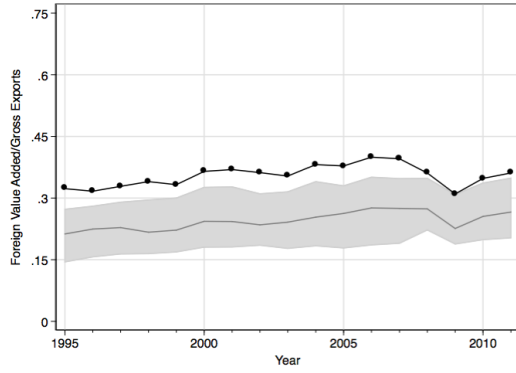
(f) Savings Rate



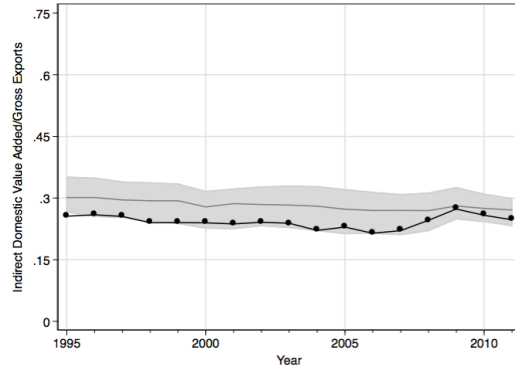
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.81: Slovenia: GVC and Trade Variables

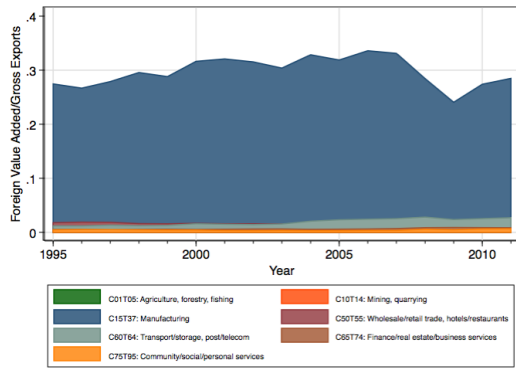
(a) Backward Linkage, all sectors



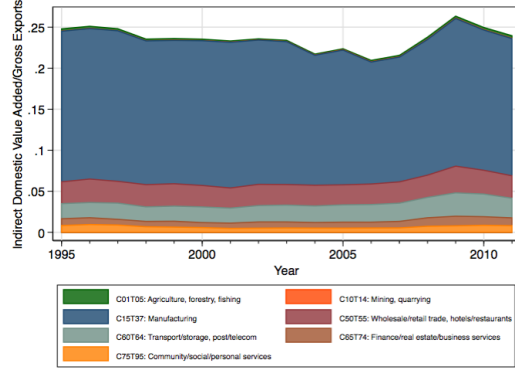
(b) Forward Linkage, all sectors



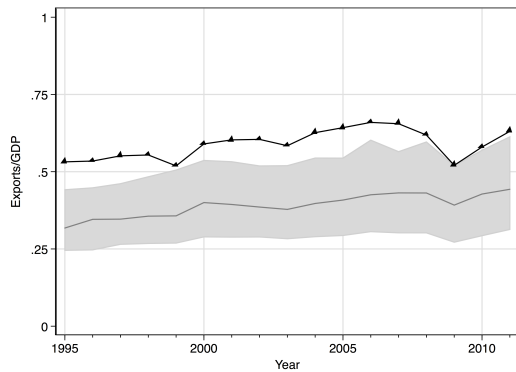
(c) Backward Linkage, by sector



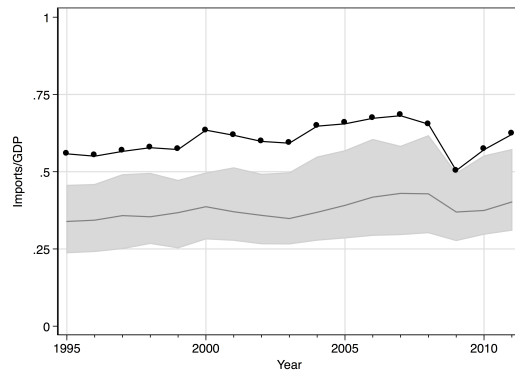
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



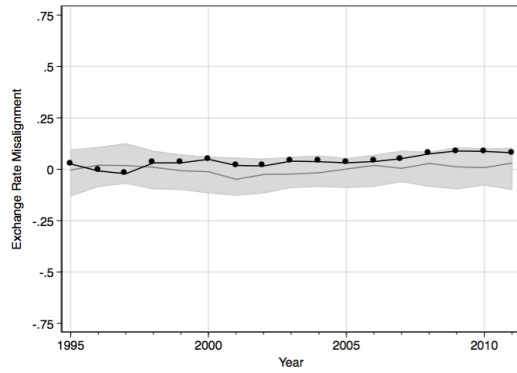
(f) Imports as a share of GDP, all sectors



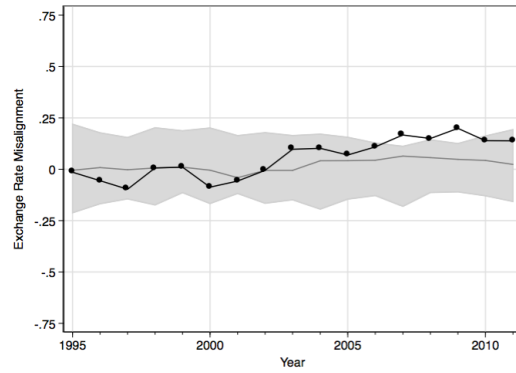
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.82: Slovenia (cont.): Currency Manipulation Variables

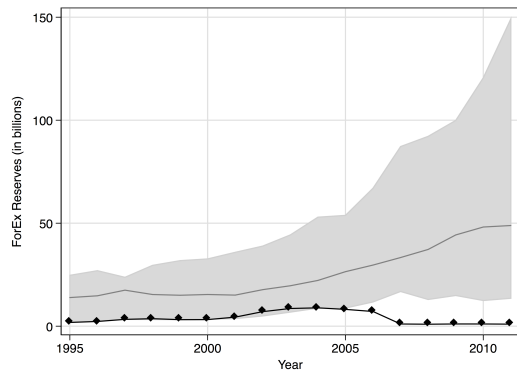
(a) Currency Misalignment, BEER approach



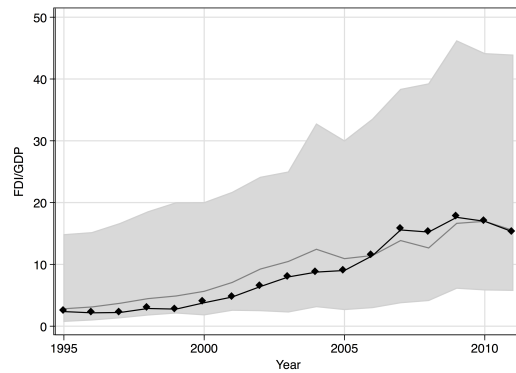
(b) Currency Misalignment, BS approach



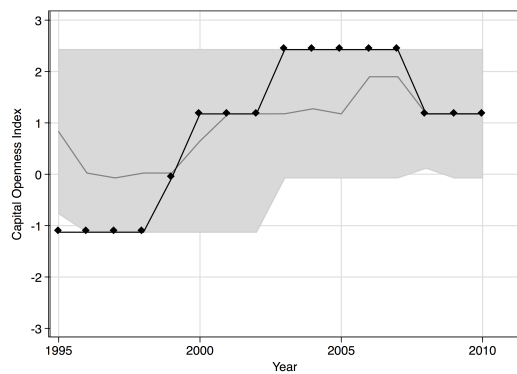
(c) Foreign Exchange Reserves



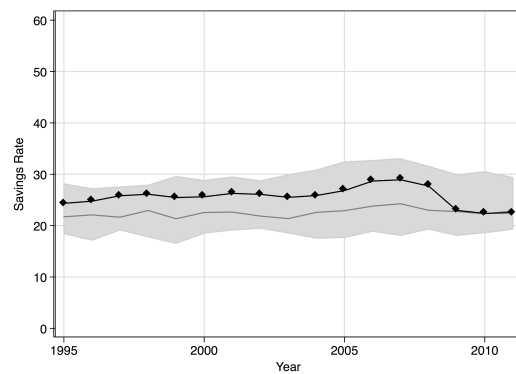
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



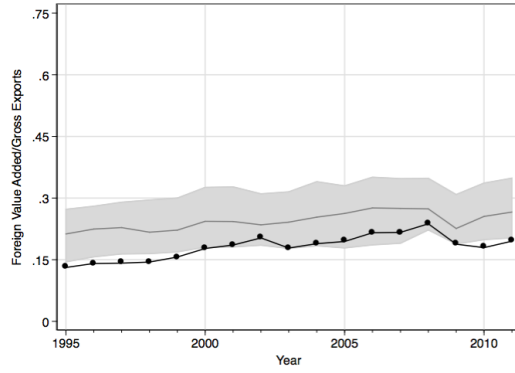
(f) Savings Rate



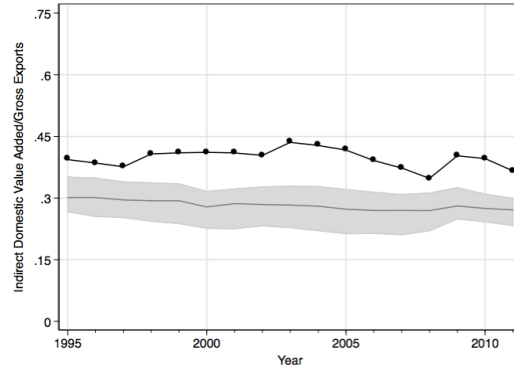
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.83: South Africa: GVC and Trade Variables

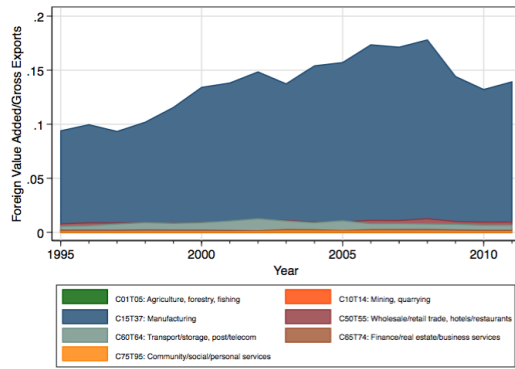
(a) Backward Linkage, all sectors



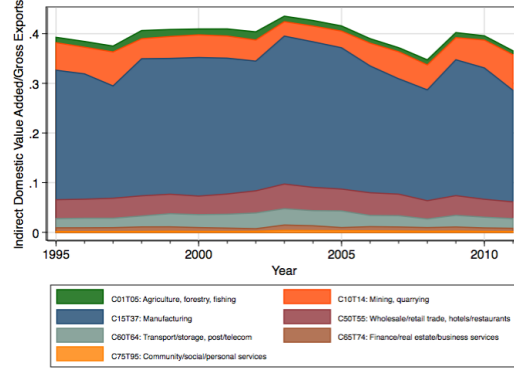
(b) Forward Linkage, all sectors



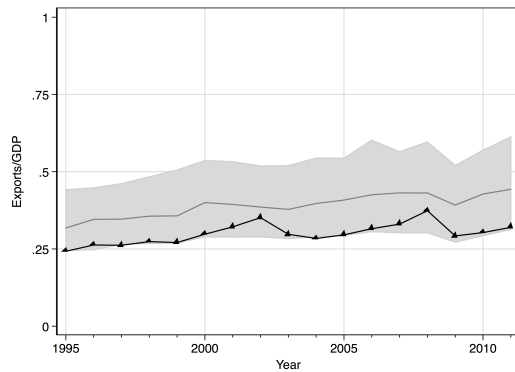
(c) Backward Linkage, by sector



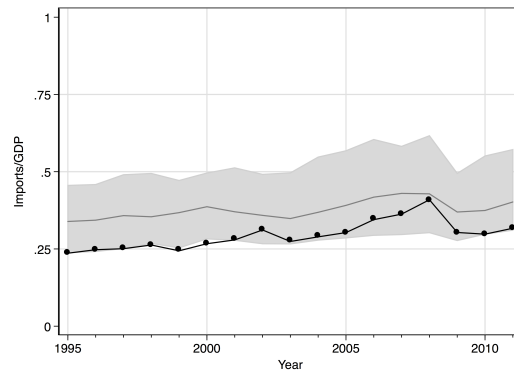
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



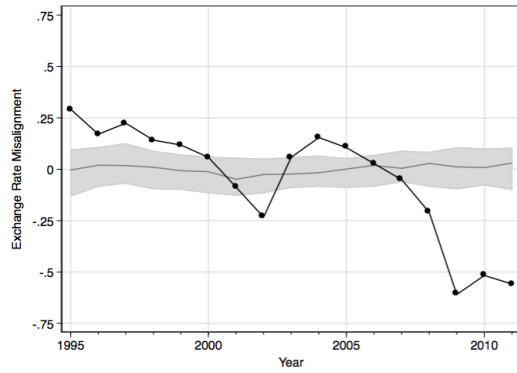
(f) Imports as a share of GDP, all sectors



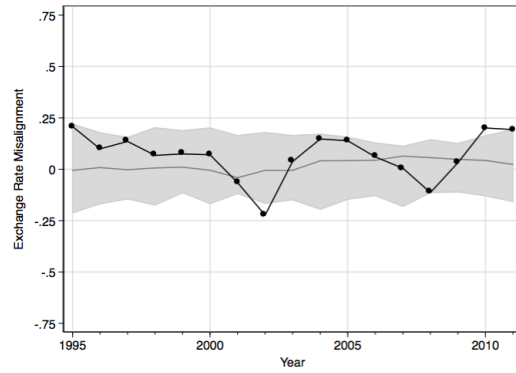
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.84: South Africa (cont.): Currency Manipulation Variables

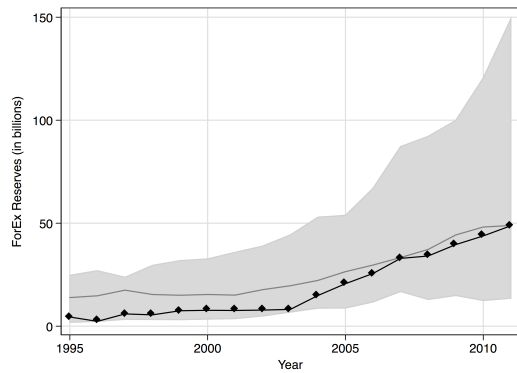
(a) Currency Misalignment, BEER approach



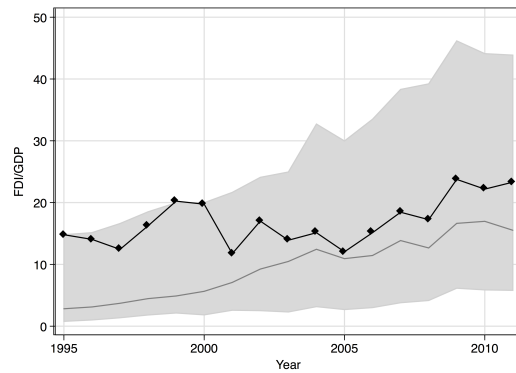
(b) Currency Misalignment, BS approach



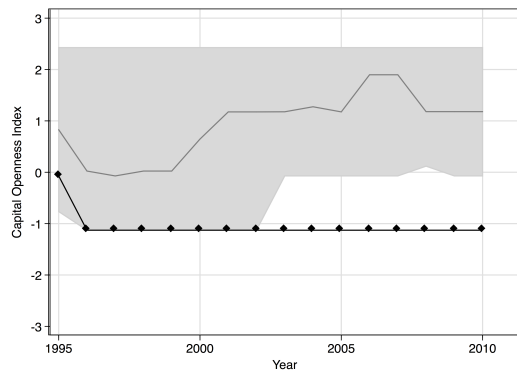
(c) Foreign Exchange Reserves



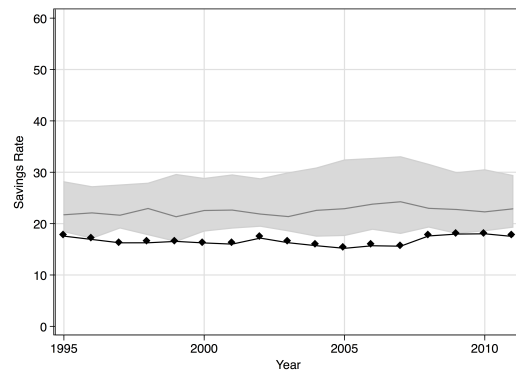
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



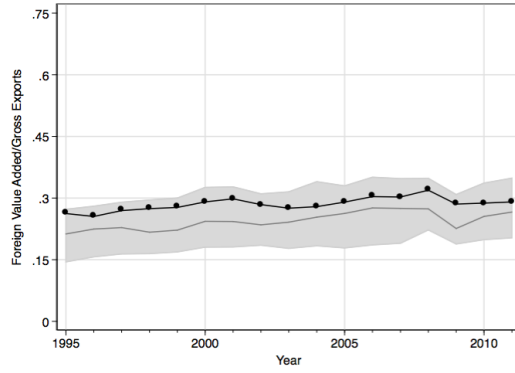
(f) Savings Rate



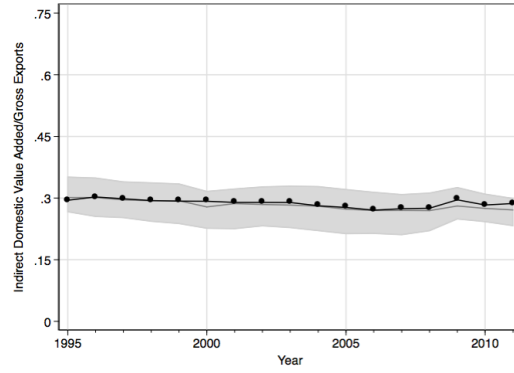
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.85: Sweden: GVC and Trade Variables

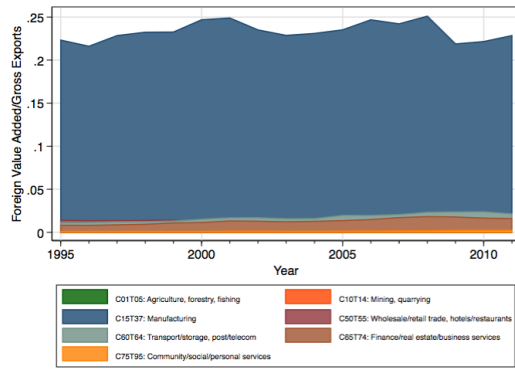
(a) Backward Linkage, all sectors



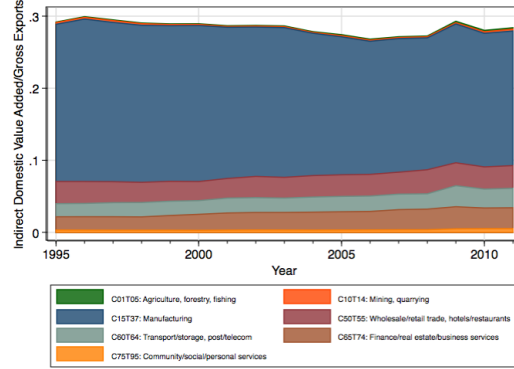
(b) Forward Linkage, all sectors



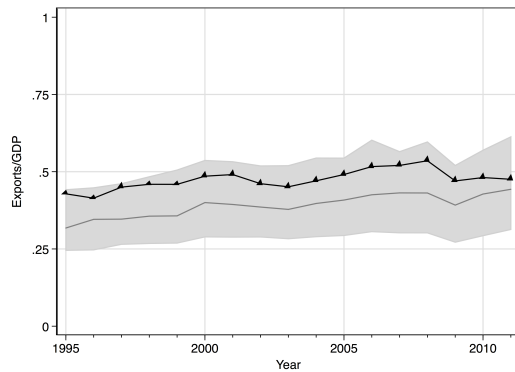
(c) Backward Linkage, by sector



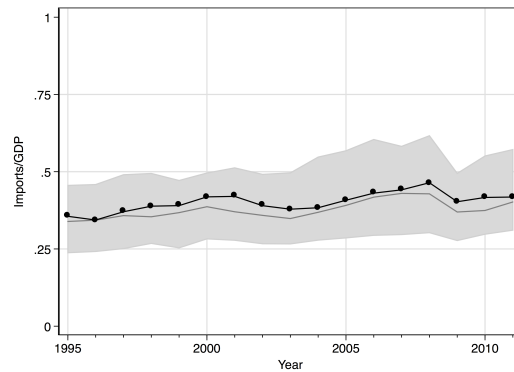
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



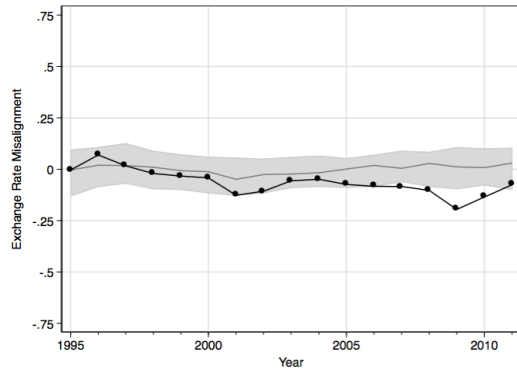
(f) Imports as a share of GDP, all sectors



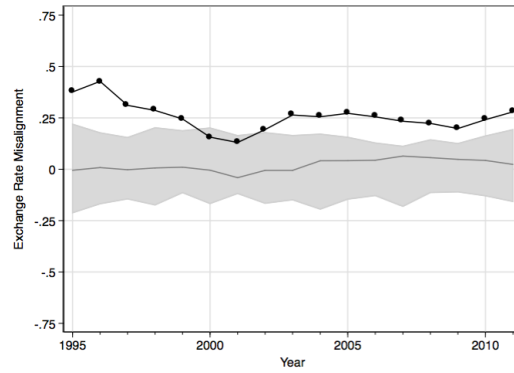
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.86: Sweden (cont.): Currency Manipulation Variables

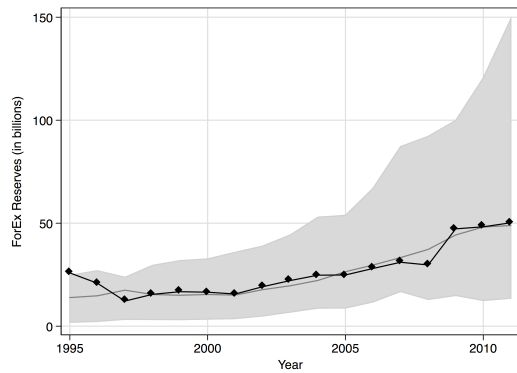
(a) Currency Misalignment, BEER approach



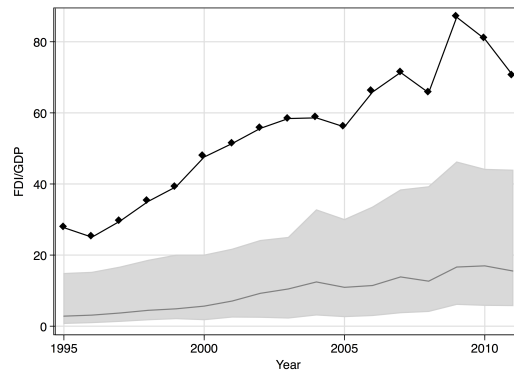
(b) Currency Misalignment, BS approach



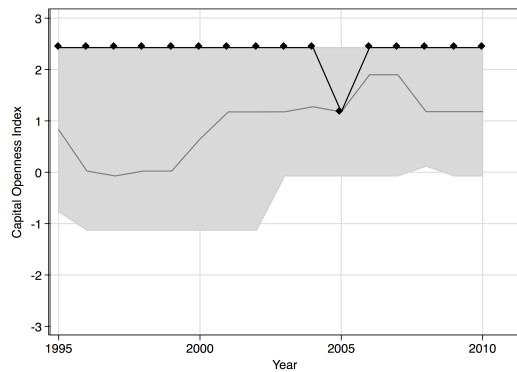
(c) Foreign Exchange Reserves



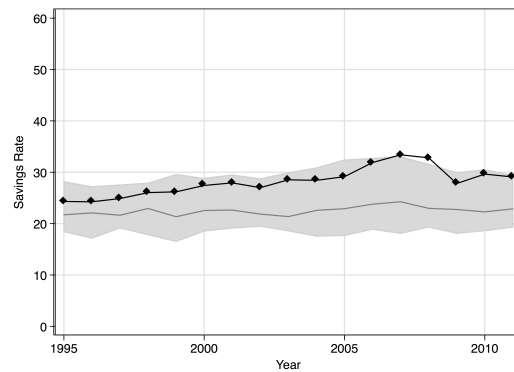
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



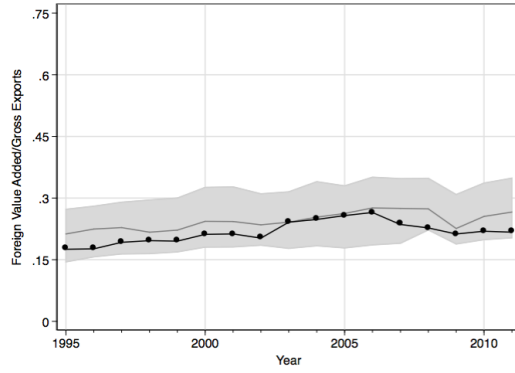
(f) Savings Rate



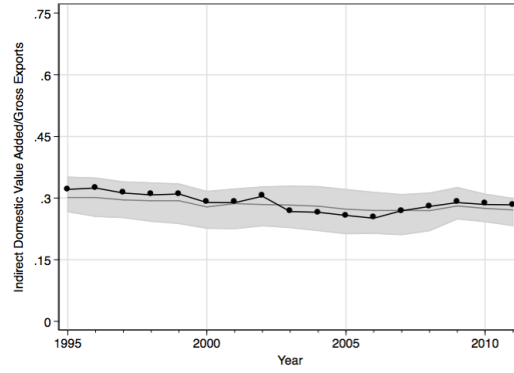
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.87: Switzerland: GVC and Trade Variables

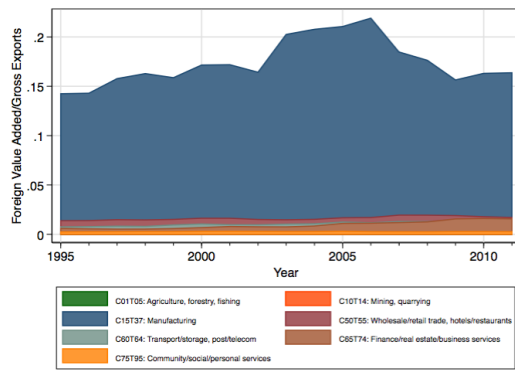
(a) Backward Linkage, all sectors



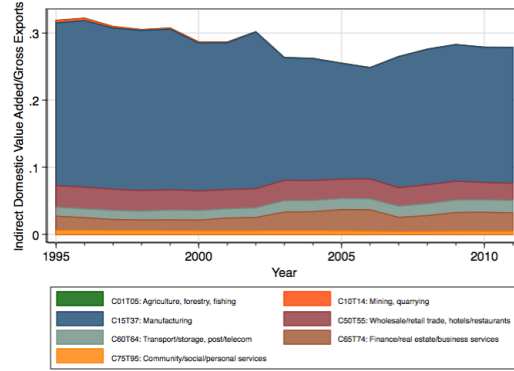
(b) Forward Linkage, all sectors



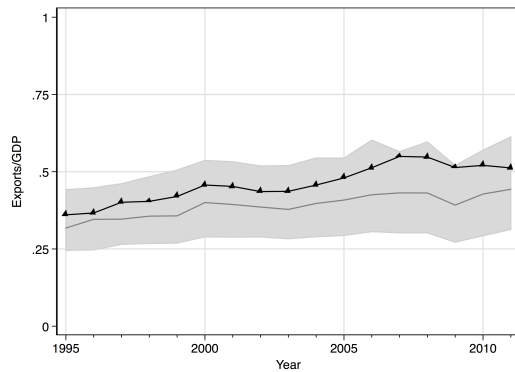
(c) Backward Linkage, by sector



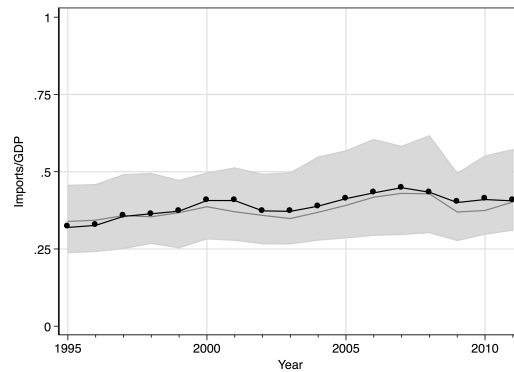
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



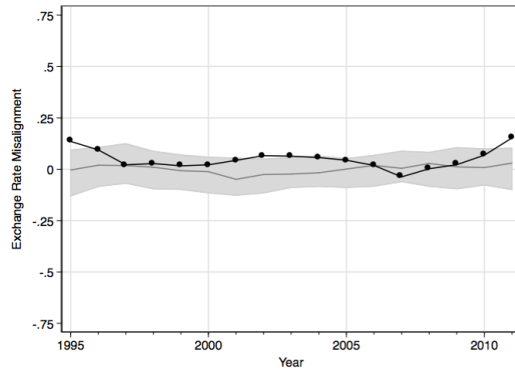
(f) Imports as a share of GDP, all sectors



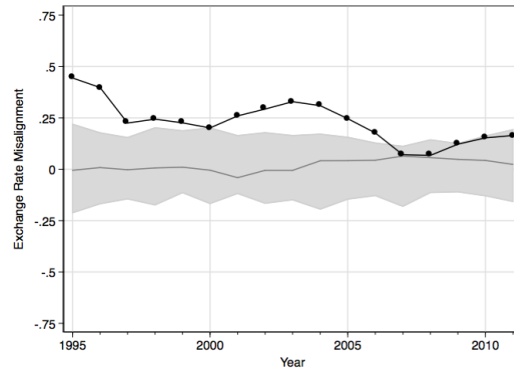
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.88: Switzerland (cont.): Currency Manipulation Variables

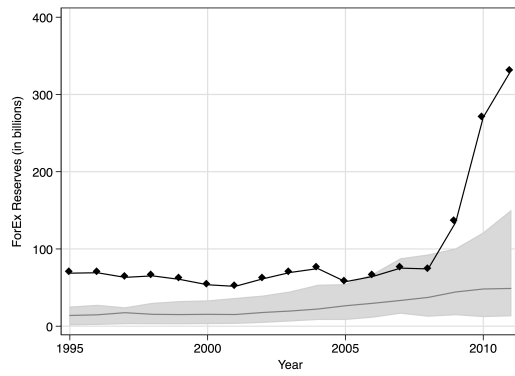
(a) Currency Misalignment, BEER approach



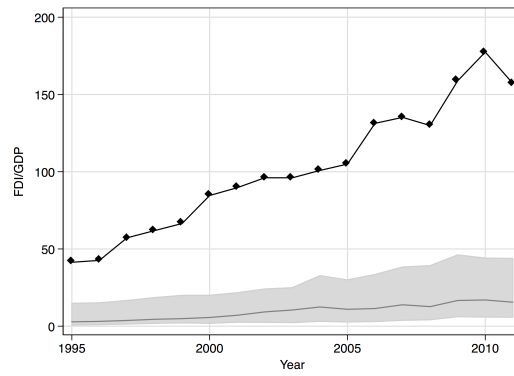
(b) Currency Misalignment, BS approach



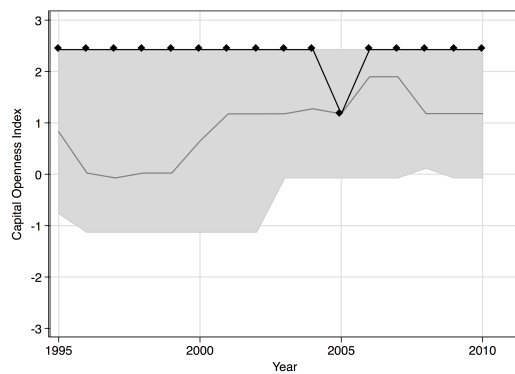
(c) Foreign Exchange Reserves



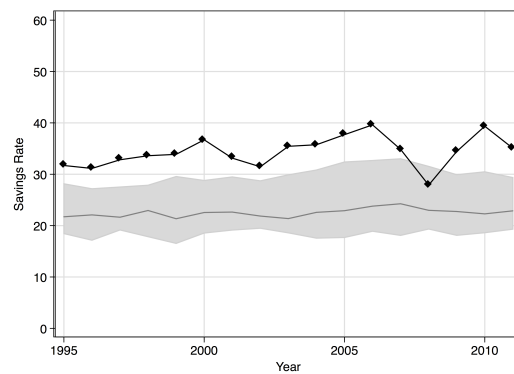
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



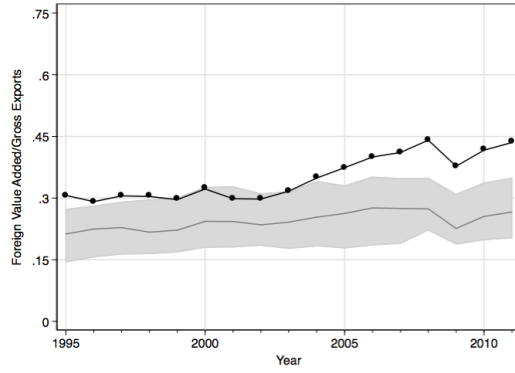
(f) Savings Rate



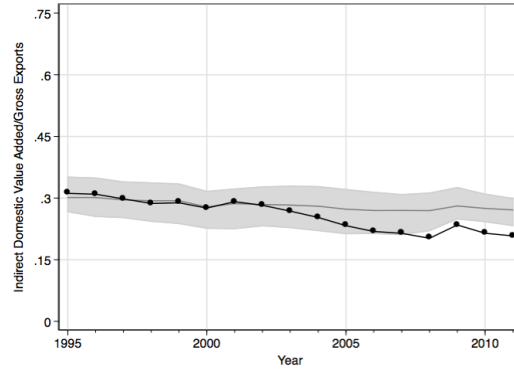
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.89: Taiwan: GVC and Trade Variables

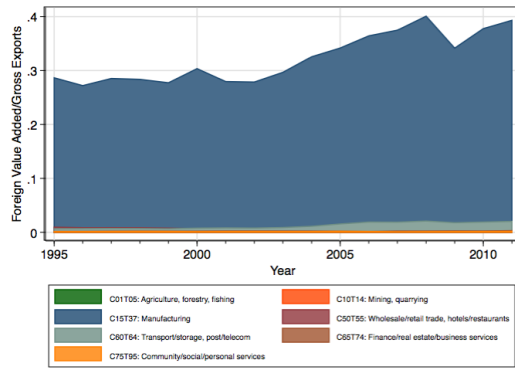
(a) Backward Linkage, all sectors



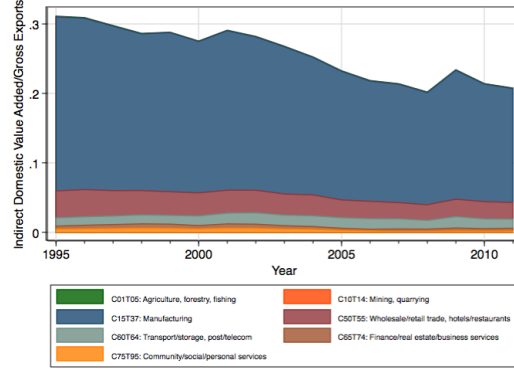
(b) Forward Linkage, all sectors



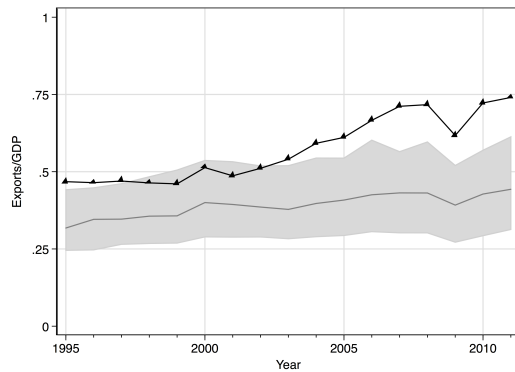
(c) Backward Linkage, by sector



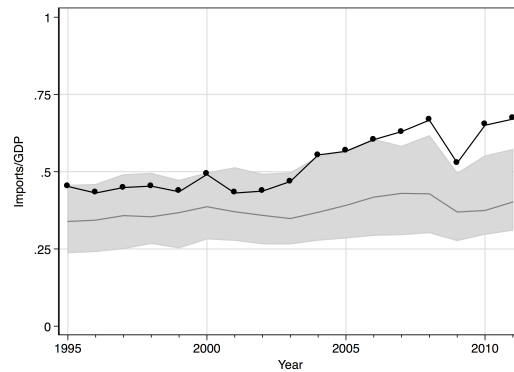
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



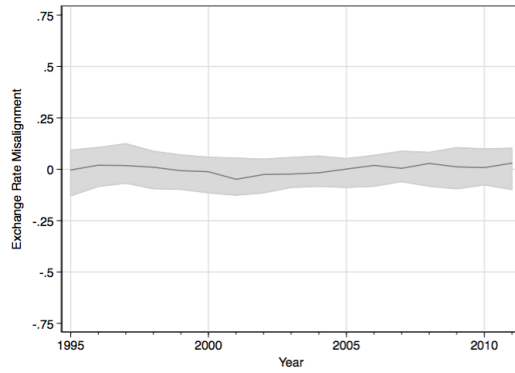
(f) Imports as a share of GDP, all sectors



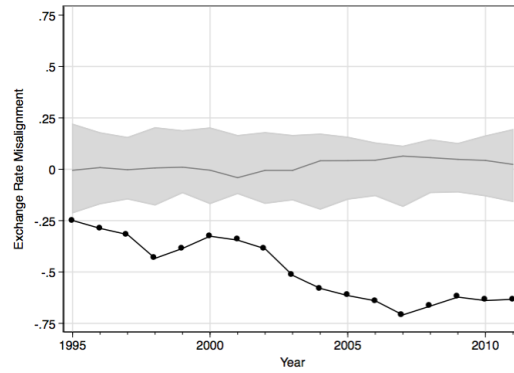
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.90: Taiwan (cont.): Currency Manipulation Variables

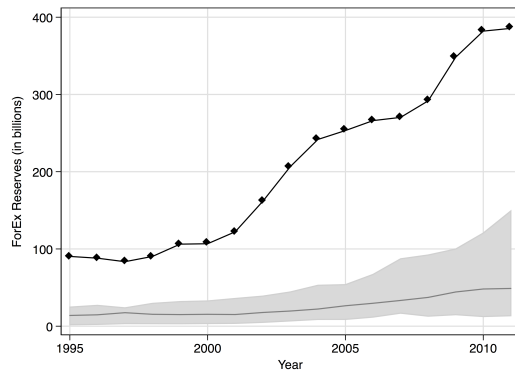
(a) Currency Misalignment, BEER approach



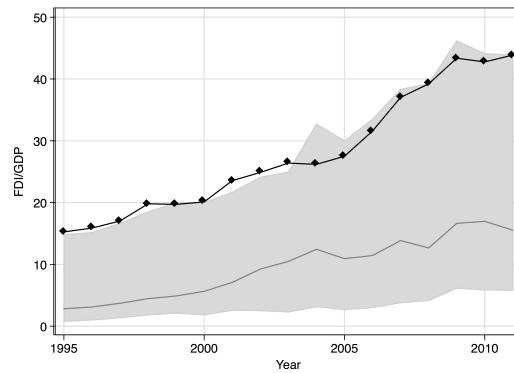
(b) Currency Misalignment, BS approach



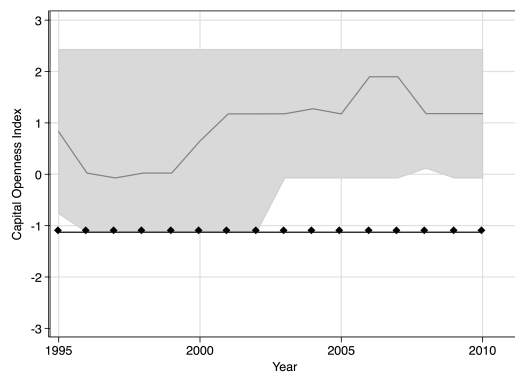
(c) Foreign Exchange Reserves



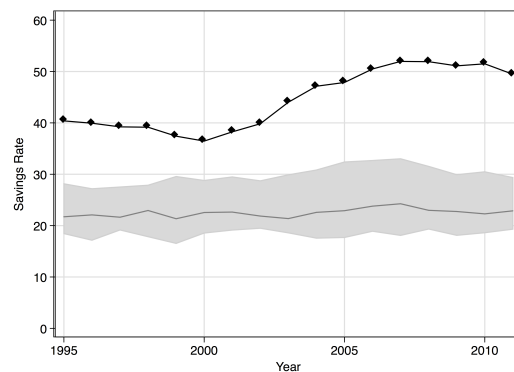
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



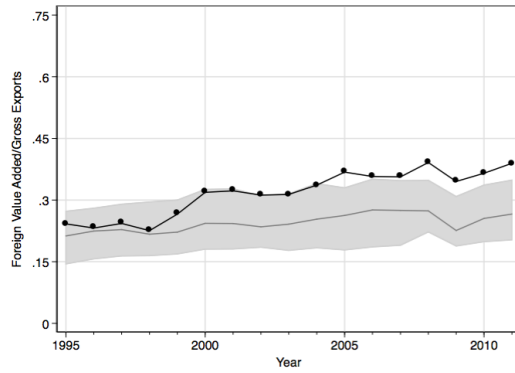
(f) Savings Rate



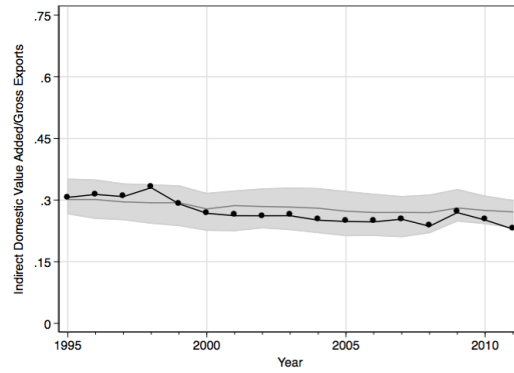
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.91: Thailand: GVC and Trade Variables

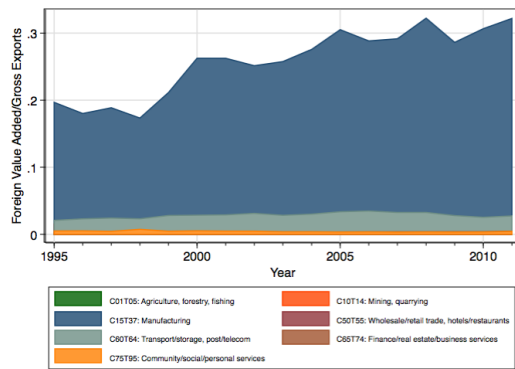
(a) Backward Linkage, all sectors



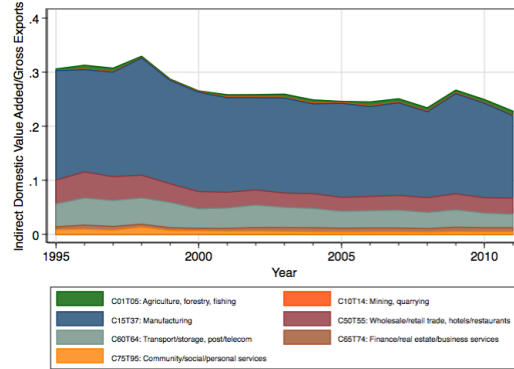
(b) Forward Linkage, all sectors



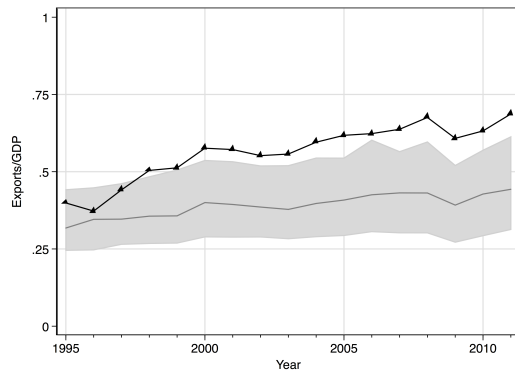
(c) Backward Linkage, by sector



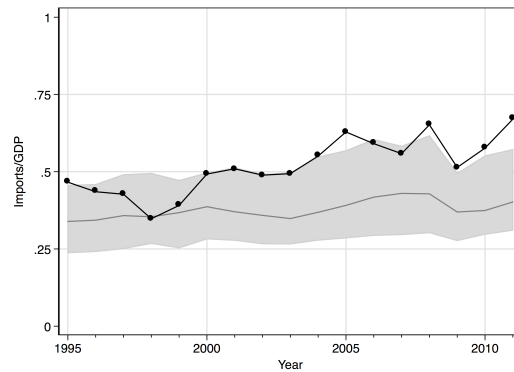
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



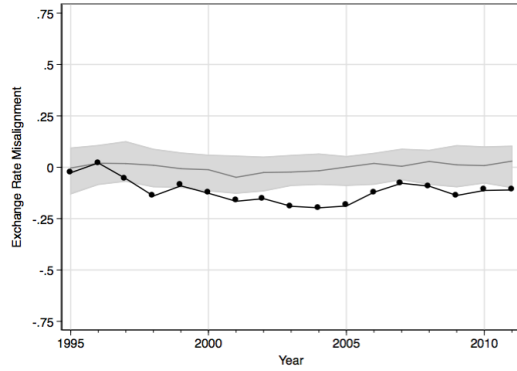
(f) Imports as a share of GDP, all sectors



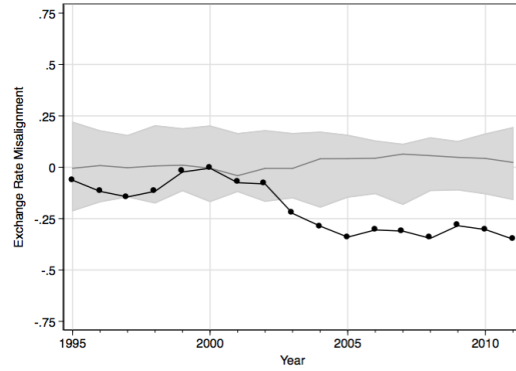
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.92: Thailand (cont.): Currency Manipulation Variables

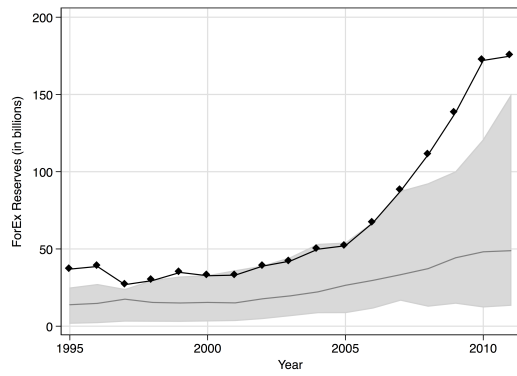
(a) Currency Misalignment, BEER approach



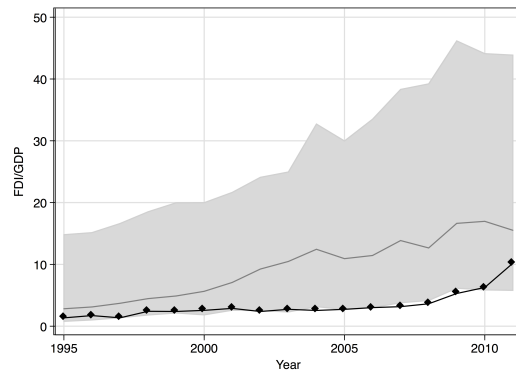
(b) Currency Misalignment, BS approach



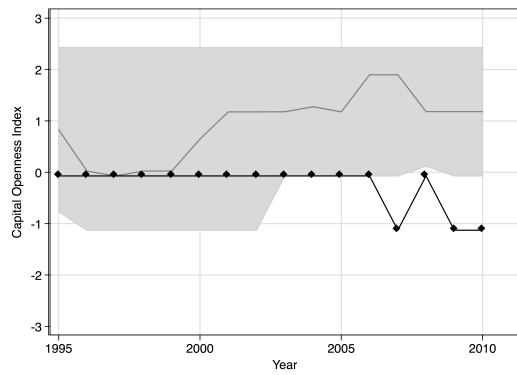
(c) Foreign Exchange Reserves



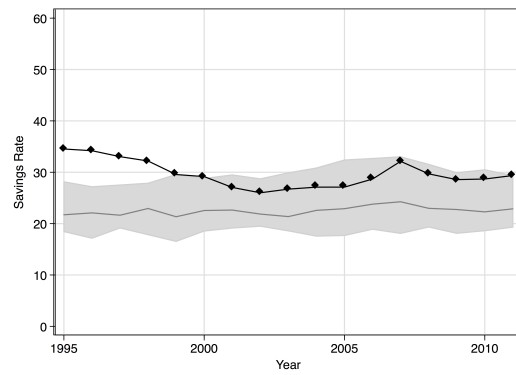
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



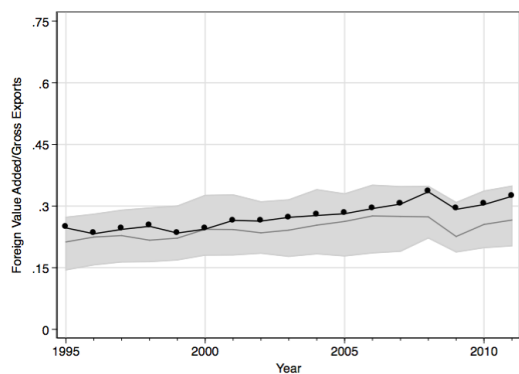
(f) Savings Rate



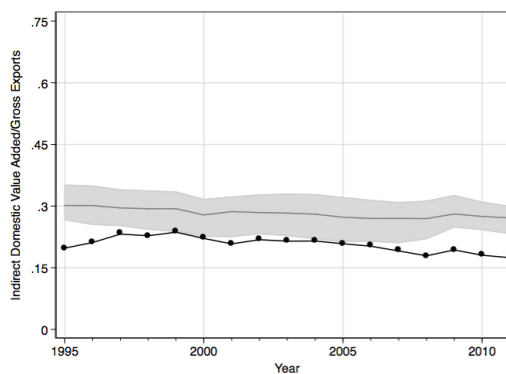
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.93: Tunisia: GVC and Trade Variables

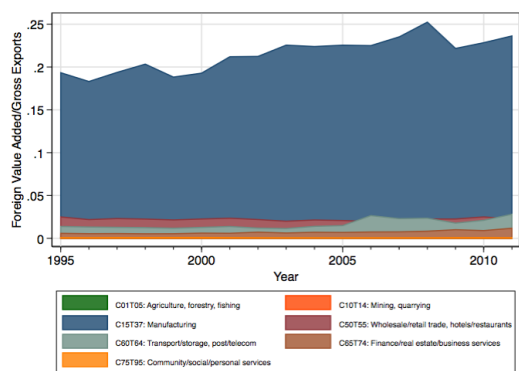
(a) Backward Linkage, all sectors



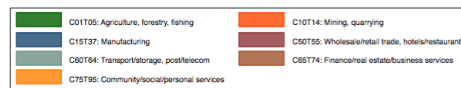
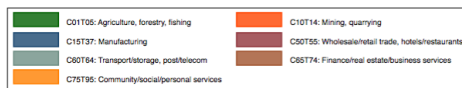
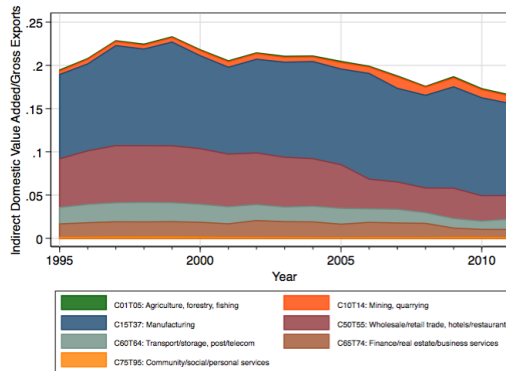
(b) Forward Linkage, all sectors



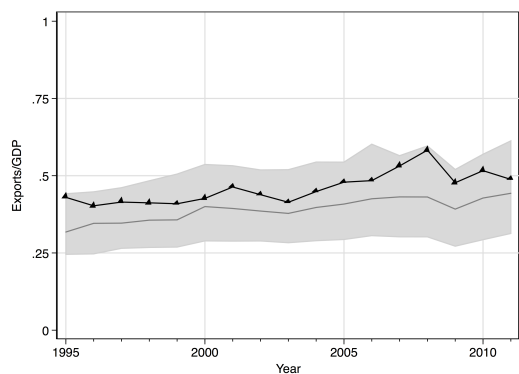
(c) Backward Linkage, by sector



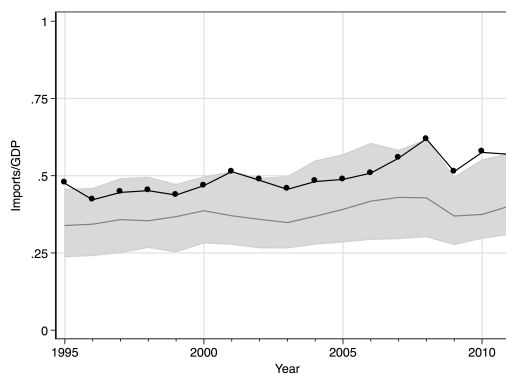
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



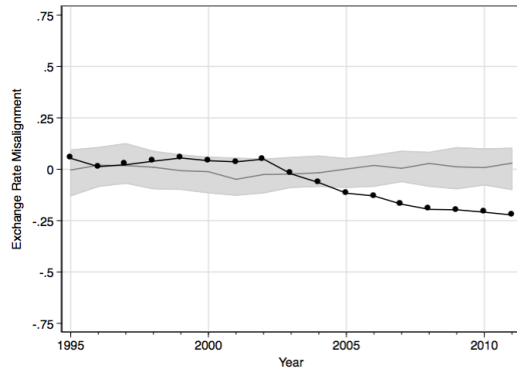
(f) Imports as a share of GDP, all sectors



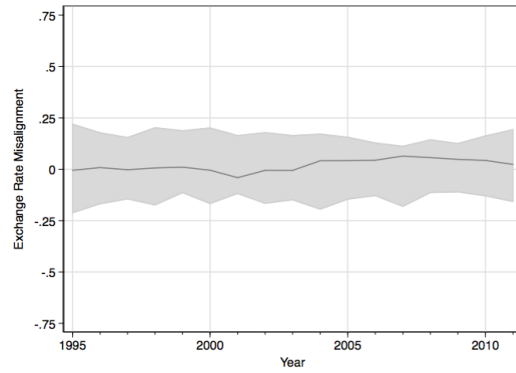
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.94: Tunisia (cont.): Currency Manipulation Variables

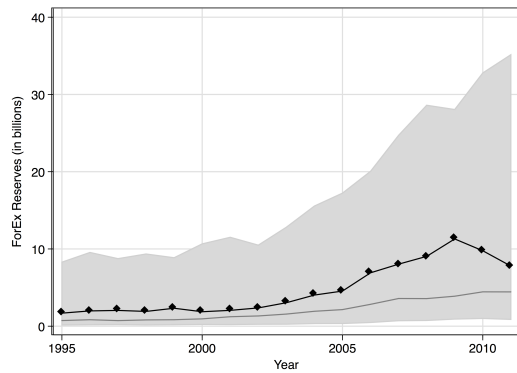
(a) Currency Misalignment, BEER approach



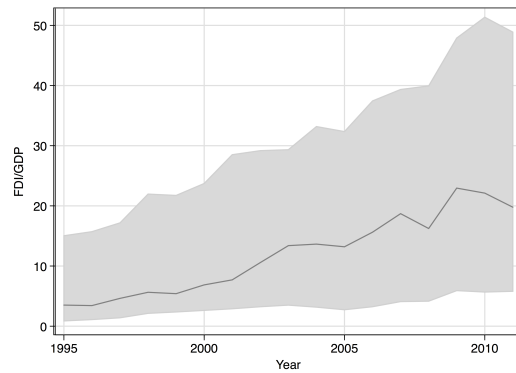
(b) Currency Misalignment, BS approach



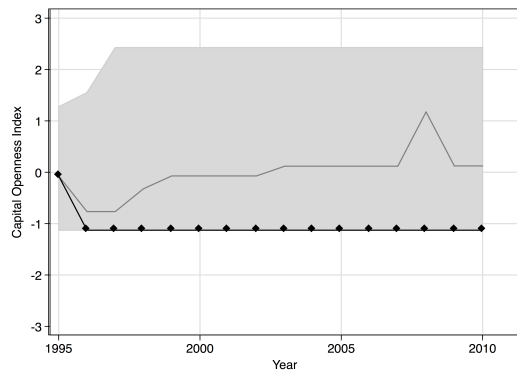
(c) Foreign Exchange Reserves



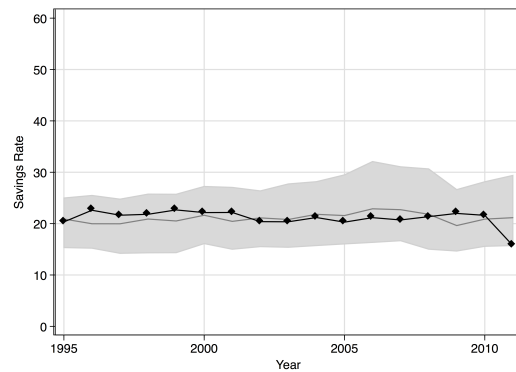
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



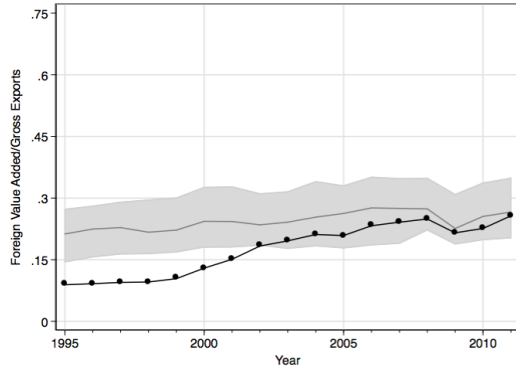
(f) Savings Rate



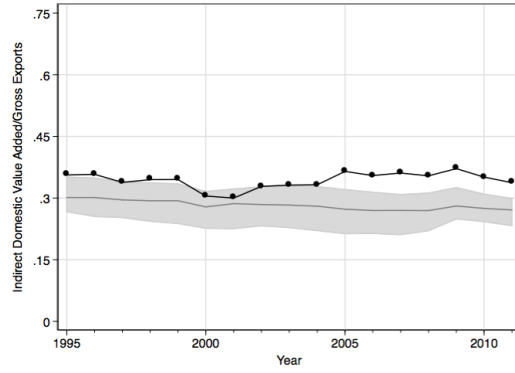
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.95: Turkey: GVC and Trade Variables

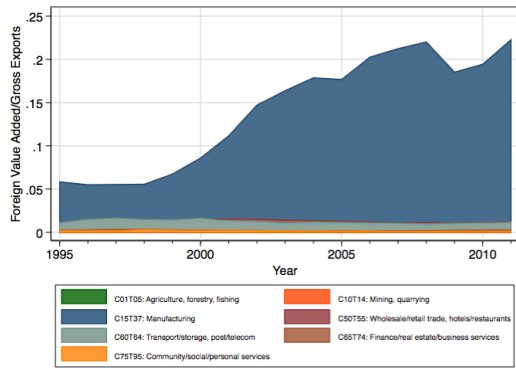
(a) Backward Linkage, all sectors



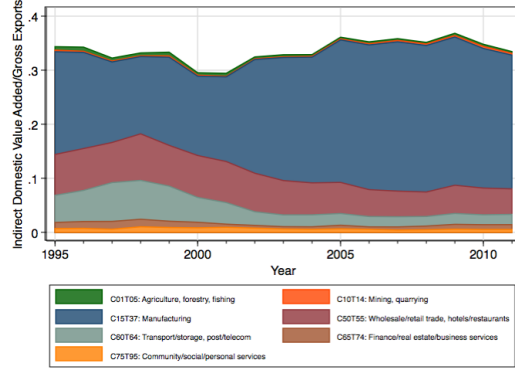
(b) Forward Linkage, all sectors



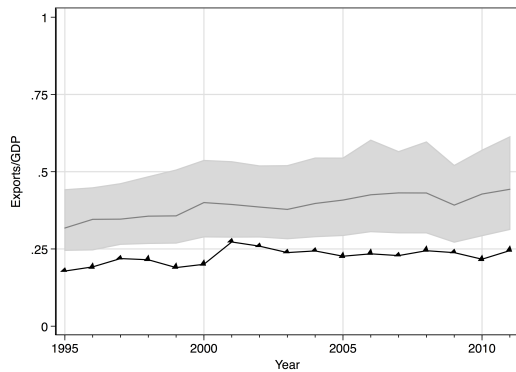
(c) Backward Linkage, by sector



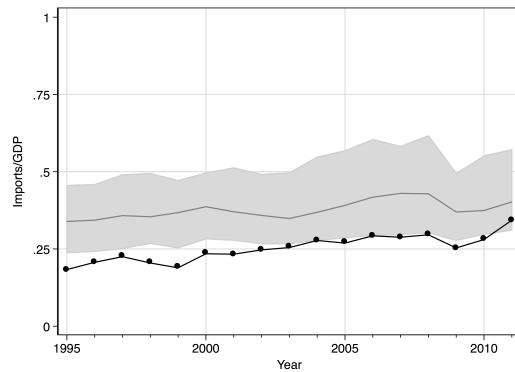
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



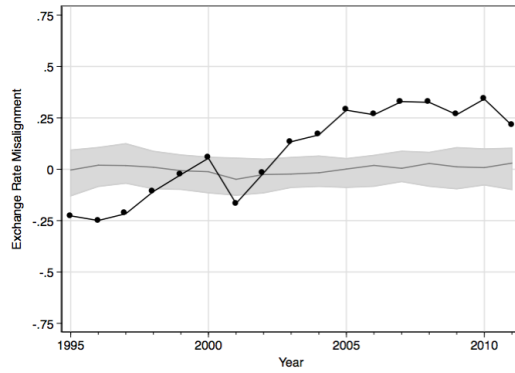
(f) Imports as a share of GDP, all sectors



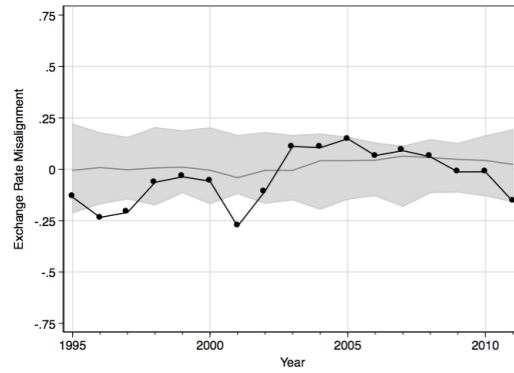
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.96: Turkey (cont.): Currency Manipulation Variables

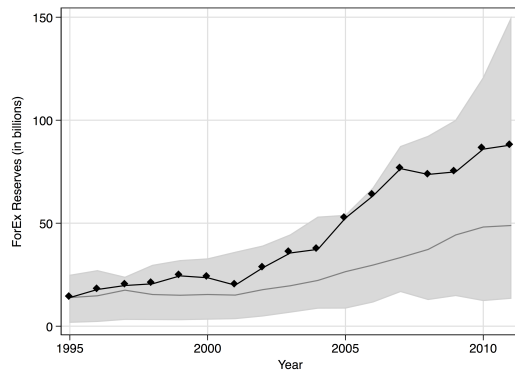
(a) Currency Misalignment, BEER approach



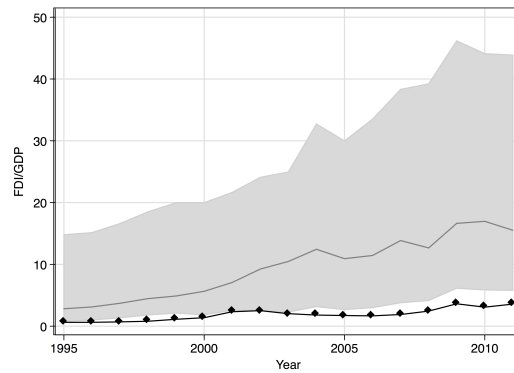
(b) Currency Misalignment, BS approach



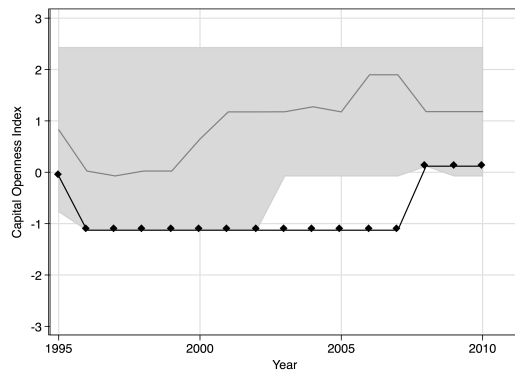
(c) Foreign Exchange Reserves



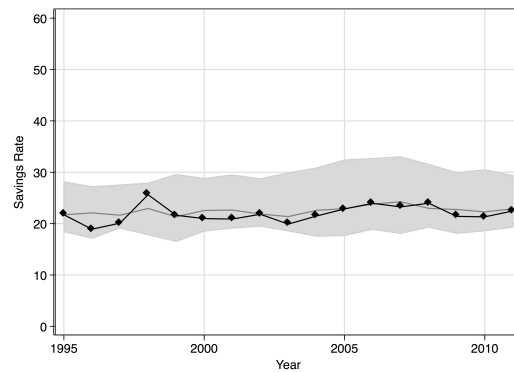
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



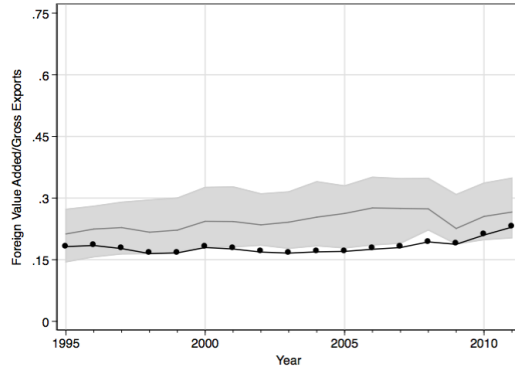
(f) Savings Rate



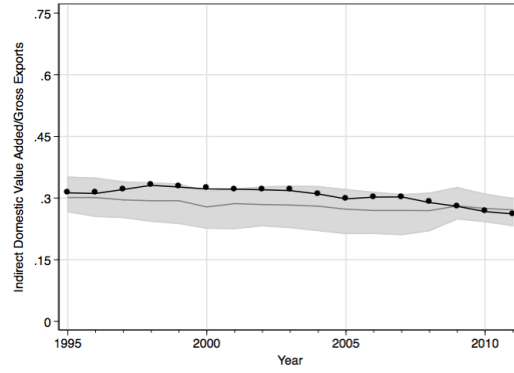
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.97: United Kingdom: GVC and Trade Variables

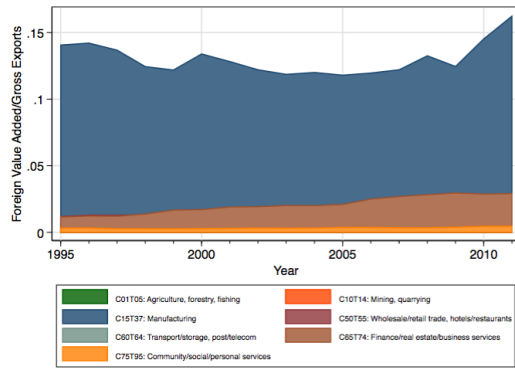
(a) Backward Linkage, all sectors



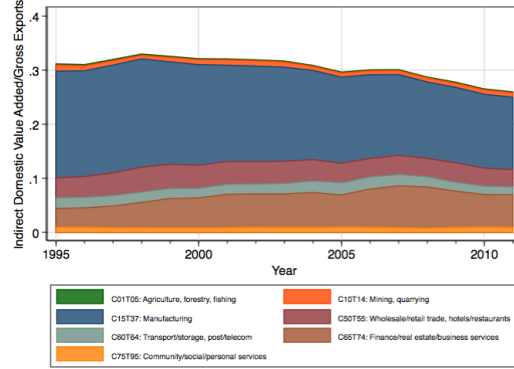
(b) Forward Linkage, all sectors



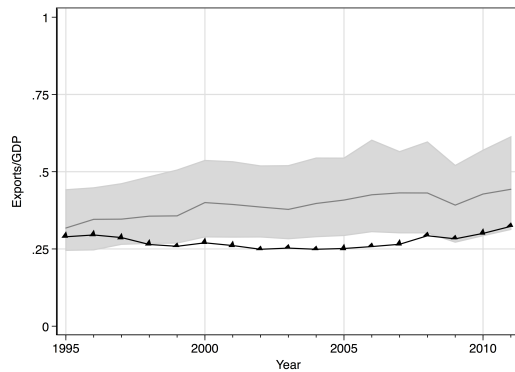
(c) Backward Linkage, by sector



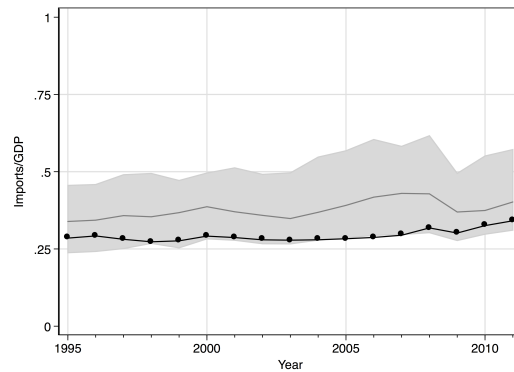
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



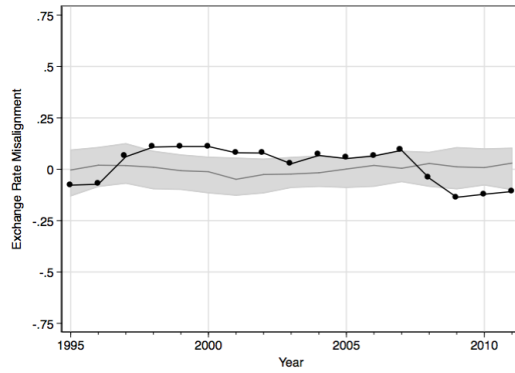
(f) Imports as a share of GDP, all sectors



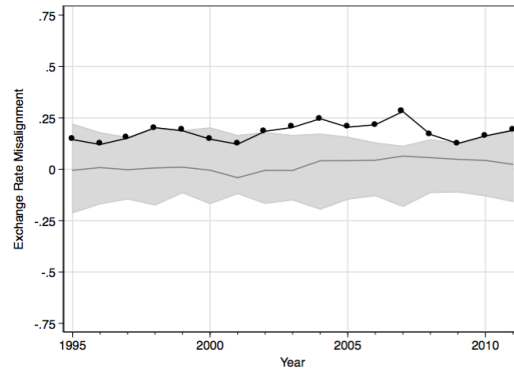
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.98: United Kingdom (cont.): Currency Manipulation Variables

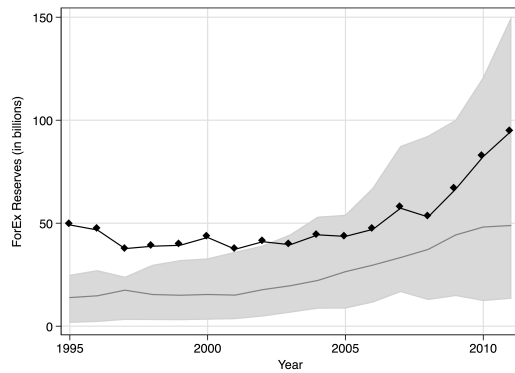
(a) Currency Misalignment, BEER approach



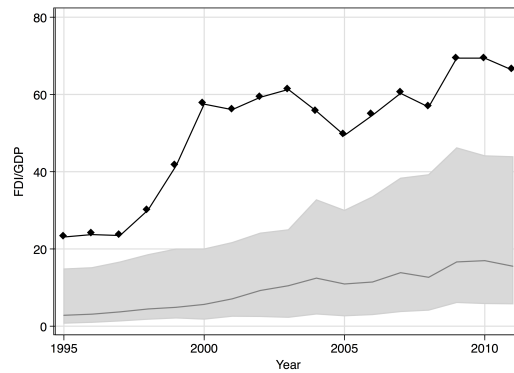
(b) Currency Misalignment, BS approach



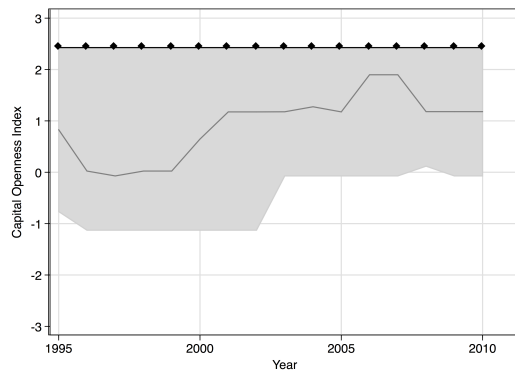
(c) Foreign Exchange Reserves



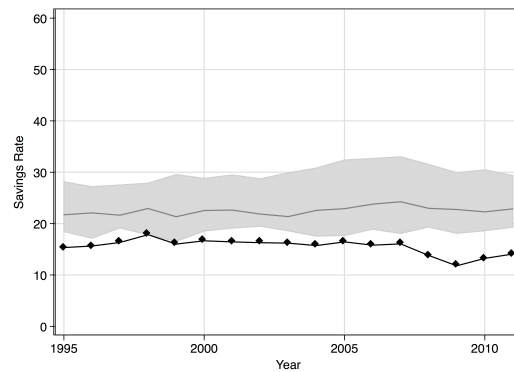
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



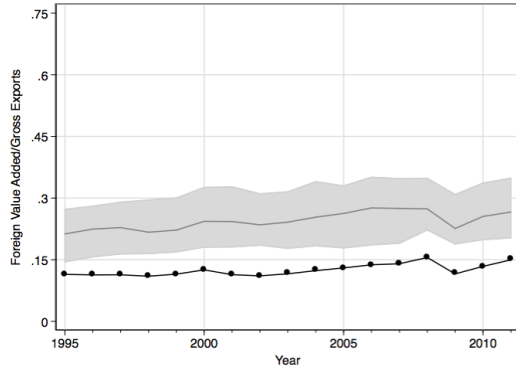
(f) Savings Rate



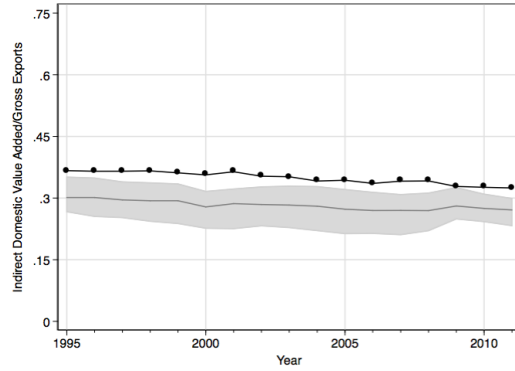
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.99: United States: GVC and Trade Variables

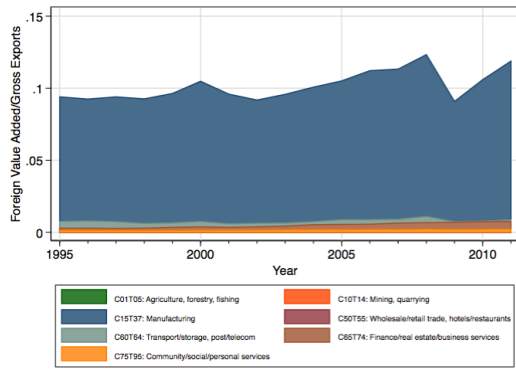
(a) Backward Linkage, all sectors



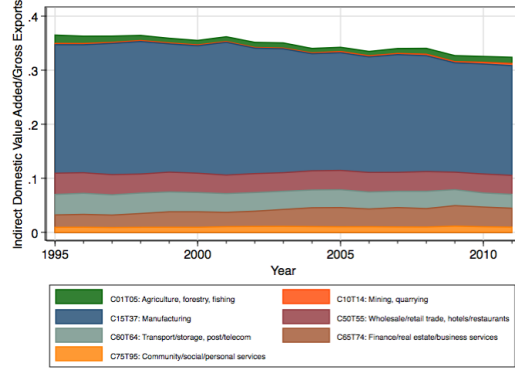
(b) Forward Linkage, all sectors



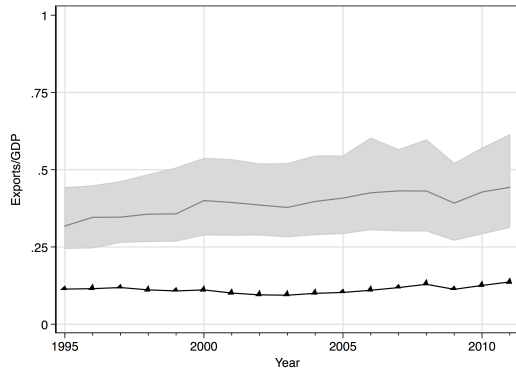
(c) Backward Linkage, by sector



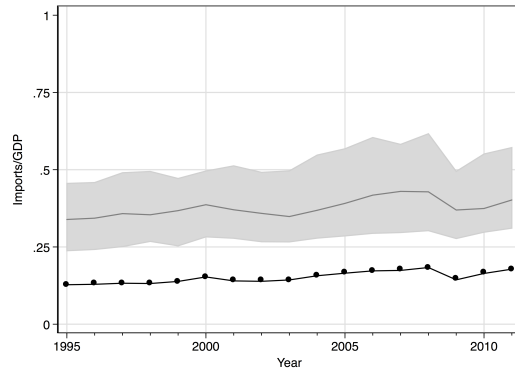
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



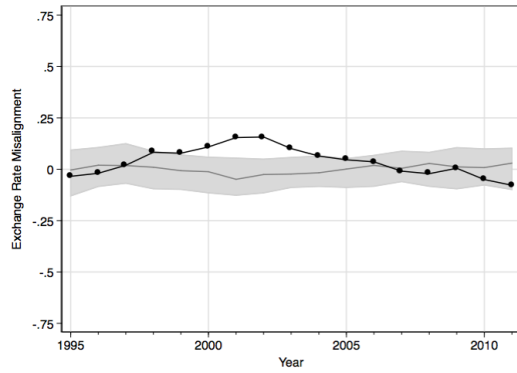
(f) Imports as a share of GDP, all sectors



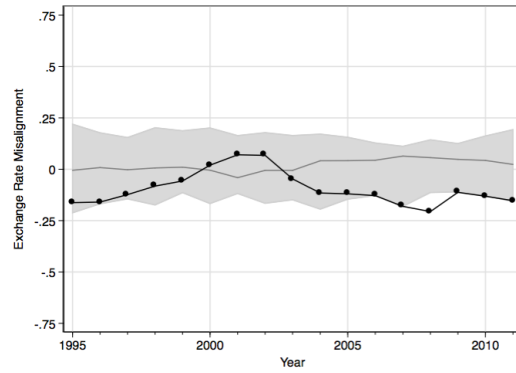
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.100: United States (cont.): Currency Manipulation Variables

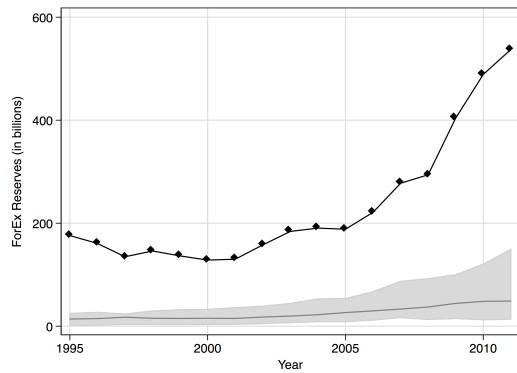
(a) Currency Misalignment, BEER approach



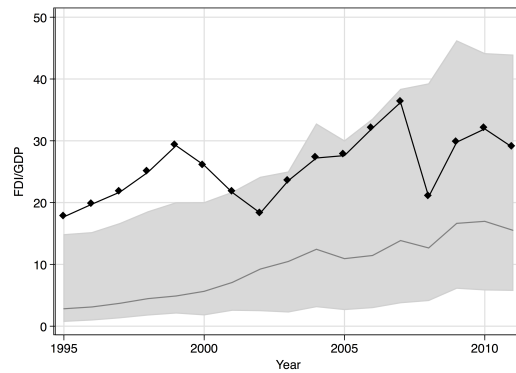
(b) Currency Misalignment, BS approach



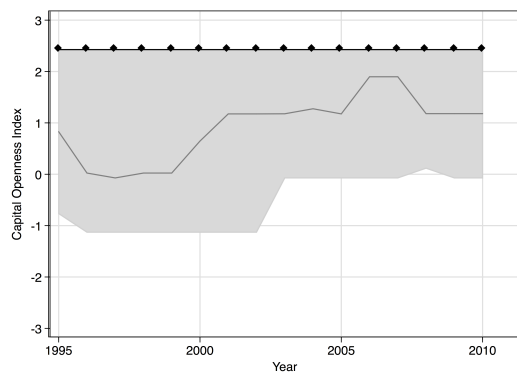
(c) Foreign Exchange Reserves



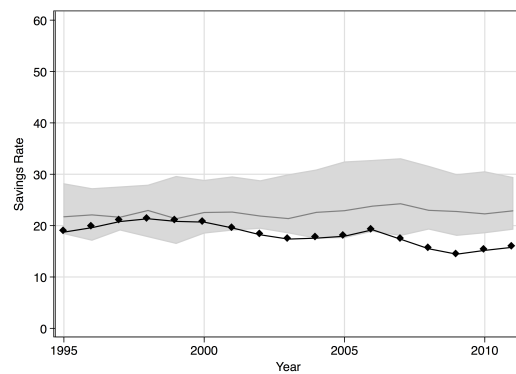
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



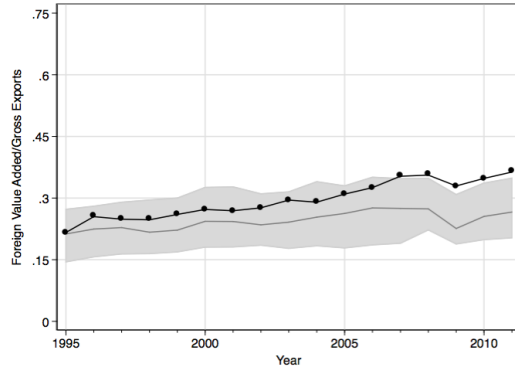
(f) Savings Rate



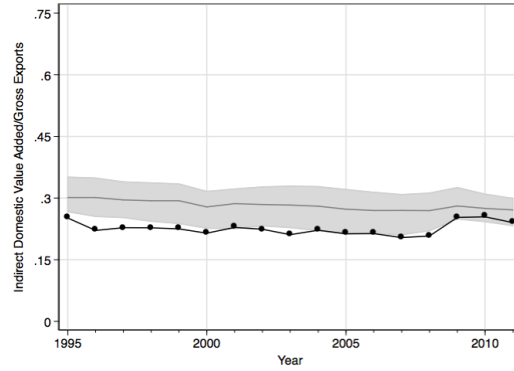
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.101: Viet Nam: GVC and Trade Variables

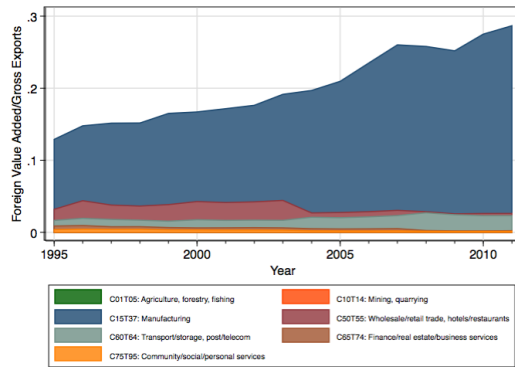
(a) Backward Linkage, all sectors



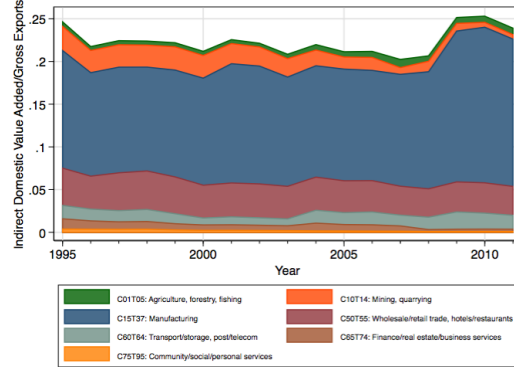
(b) Forward Linkage, all sectors



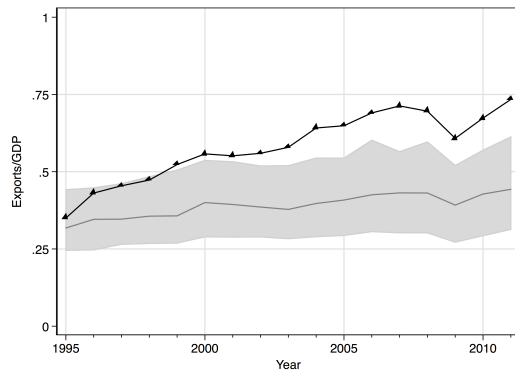
(c) Backward Linkage, by sector



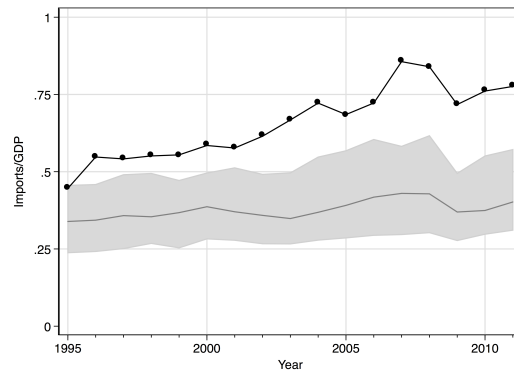
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



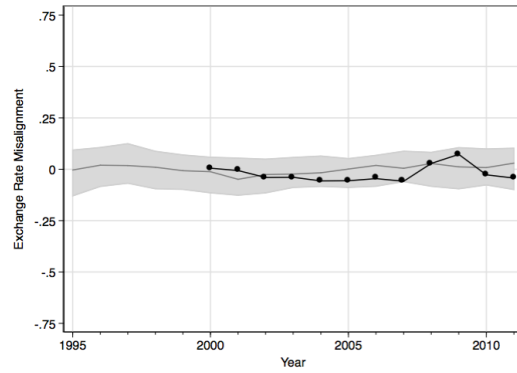
(f) Imports as a share of GDP, all sectors



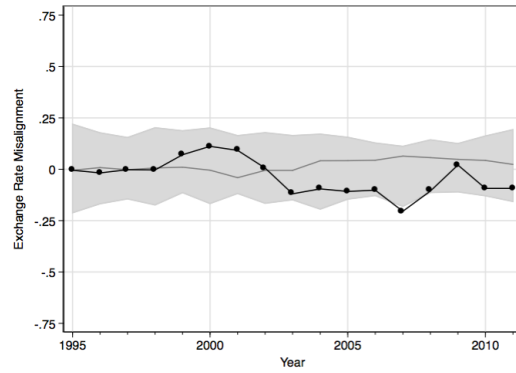
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.102: Viet Nam (cont.): Currency Manipulation Variables

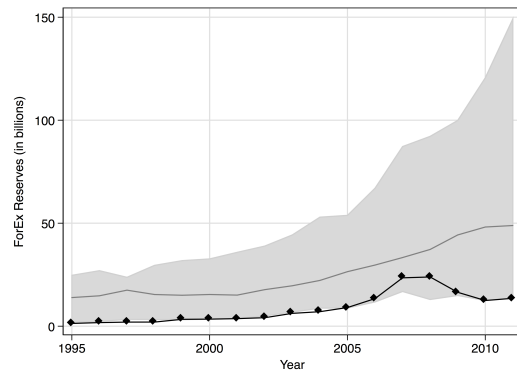
(a) Currency Misalignment, BEER approach



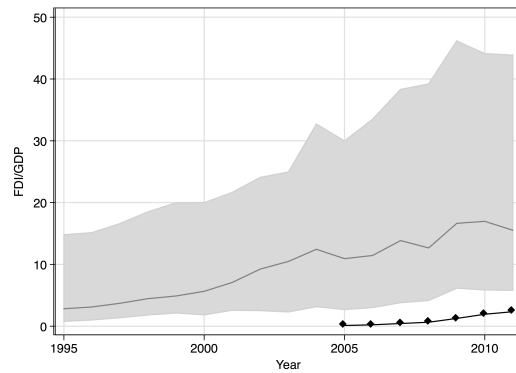
(b) Currency Misalignment, BS approach



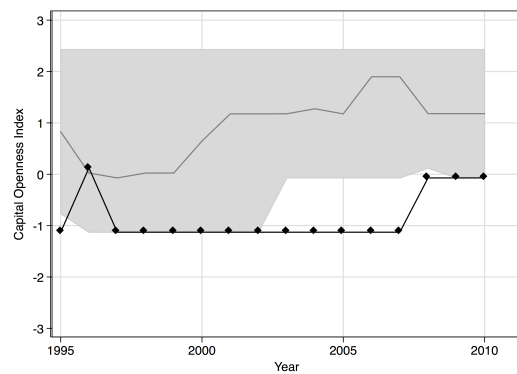
(c) Foreign Exchange Reserves



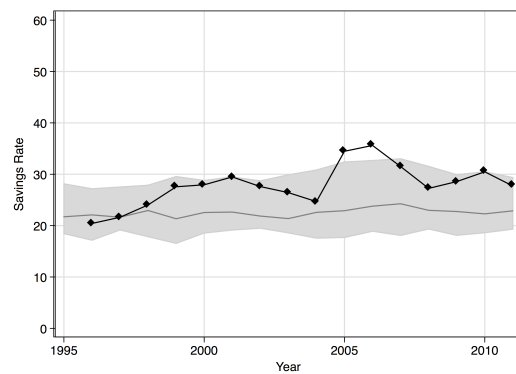
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



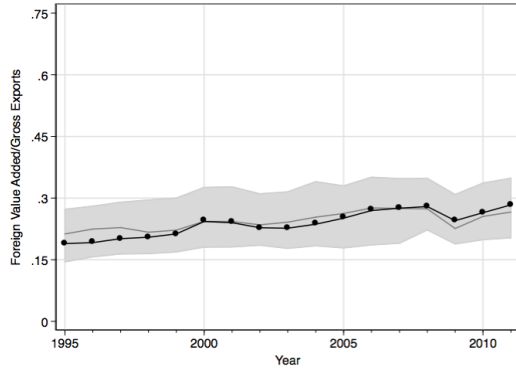
(f) Savings Rate



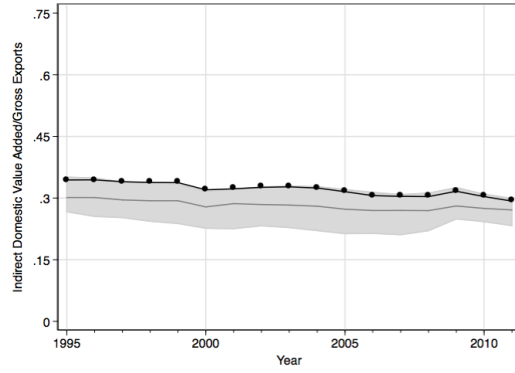
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.103: Euro Area 12: GVC and Trade Variables

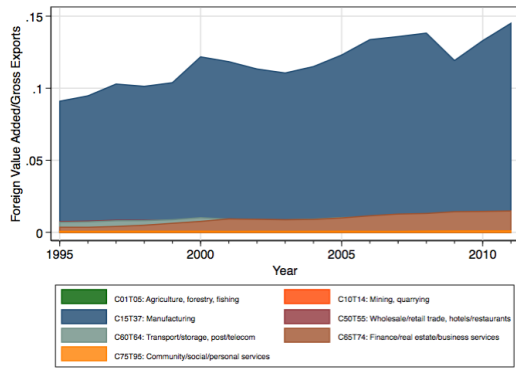
(a) Backward Linkage, all sectors



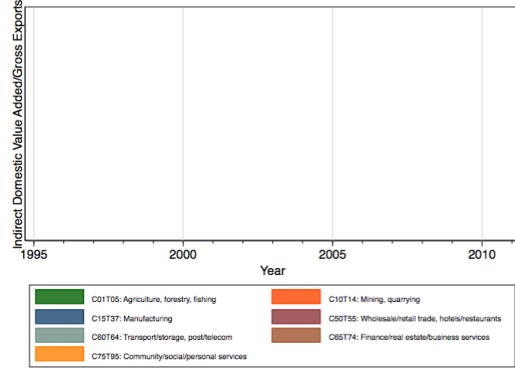
(b) Forward Linkage, all sectors



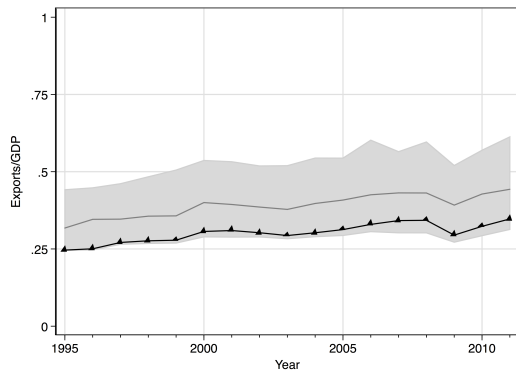
(c) Backward Linkage, by sector



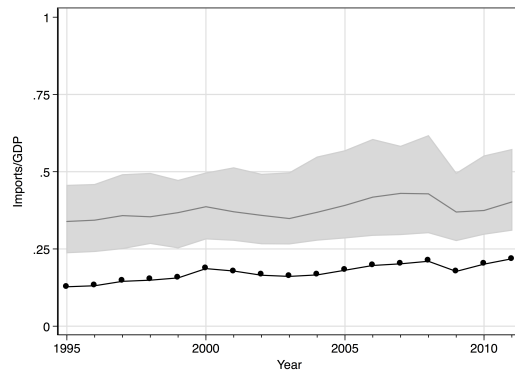
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



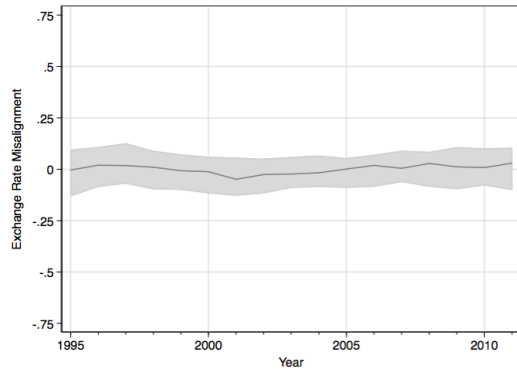
(f) Imports as a share of GDP, all sectors



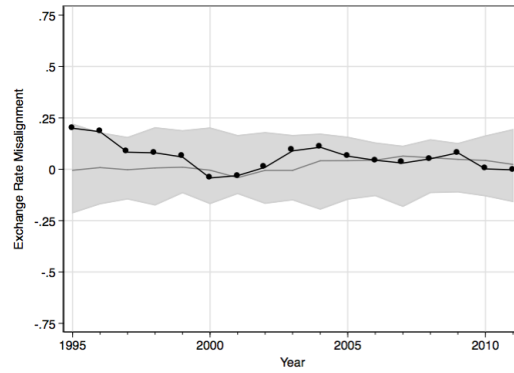
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.104: Euro Area 12 (cont.): Currency Manipulation Variables

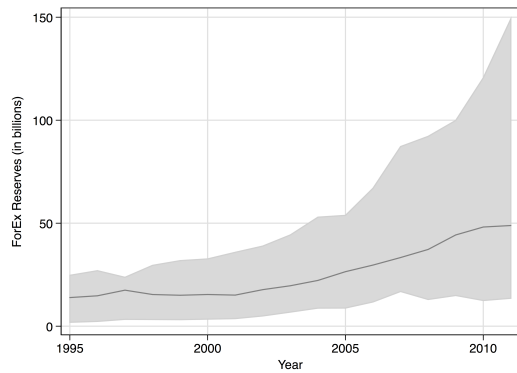
(a) Currency Misalignment, BEER approach



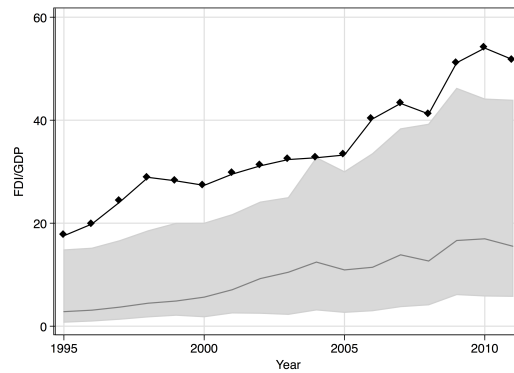
(b) Currency Misalignment, BS approach



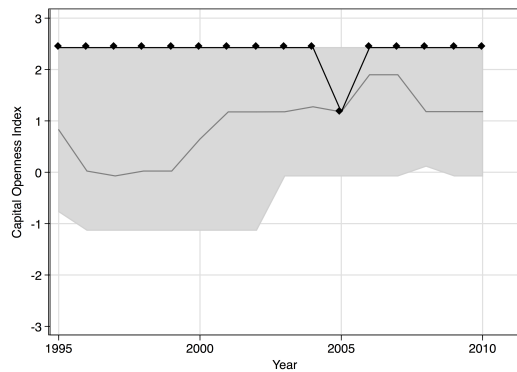
(c) Foreign Exchange Reserves



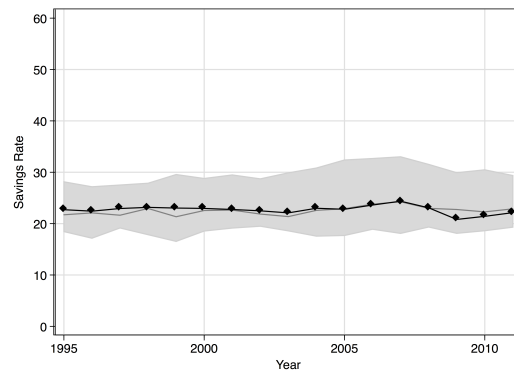
(d) Foreign Direct Investment as share of GDP



(e) Capital Account Openness



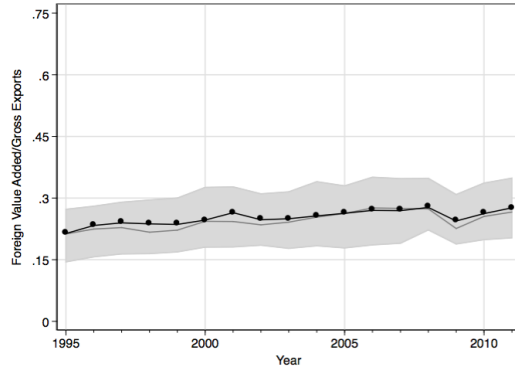
(f) Savings Rate



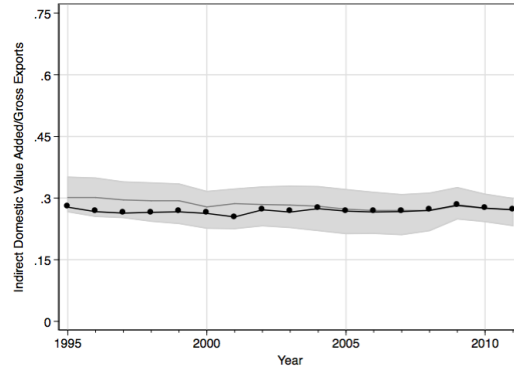
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.105: Austria: GVC and Trade Variables

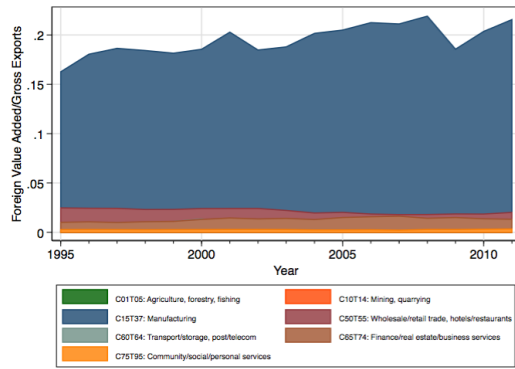
(a) Backward Linkage, all sectors



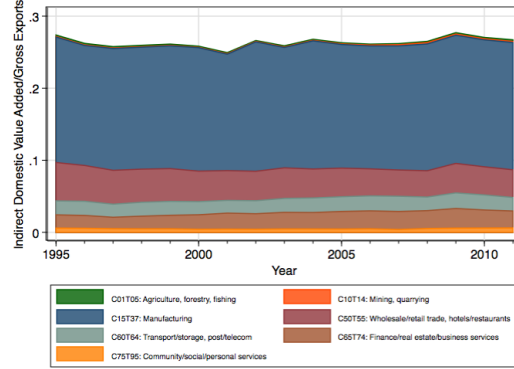
(b) Forward Linkage, all sectors



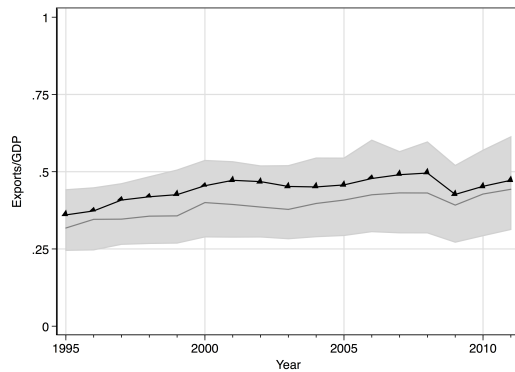
(c) Backward Linkage, by sector



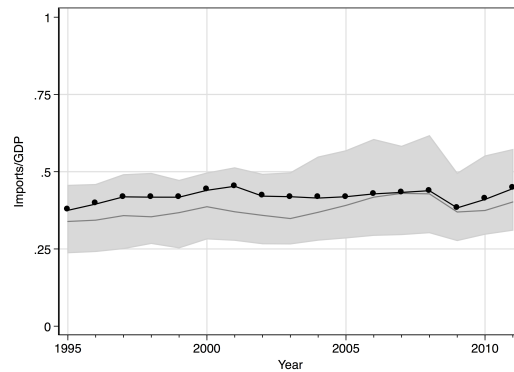
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



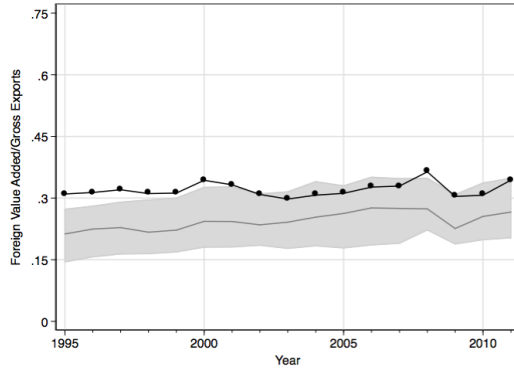
(f) Imports as a share of GDP, all sectors



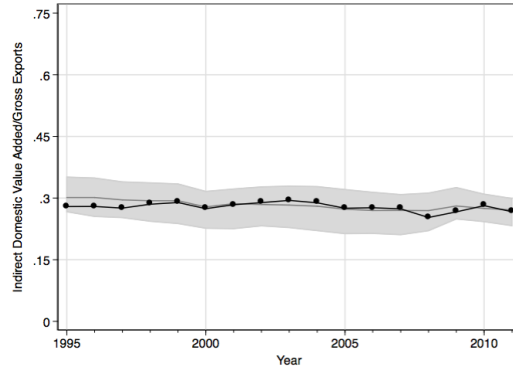
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.106: Belgium: GVC and Trade Variables

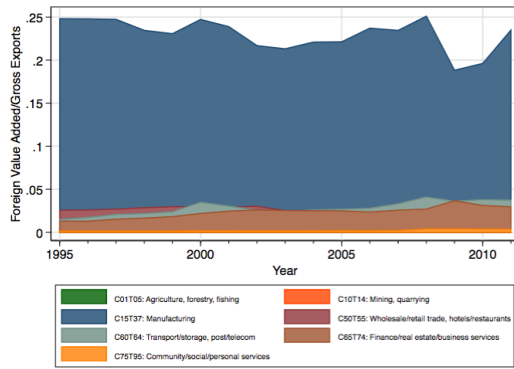
(a) Backward Linkage, all sectors



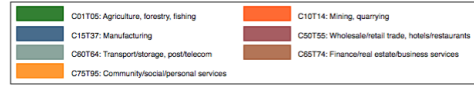
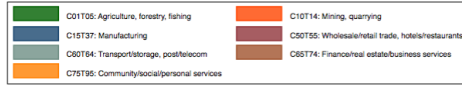
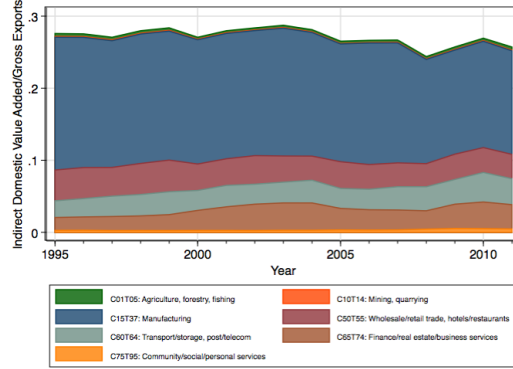
(b) Forward Linkage, all sectors



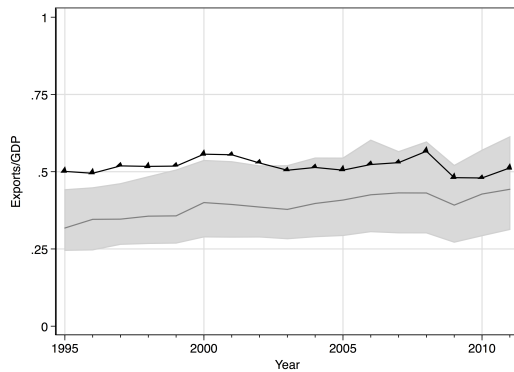
(c) Backward Linkage, by sector



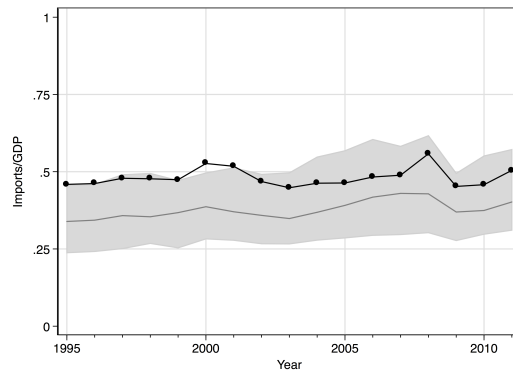
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



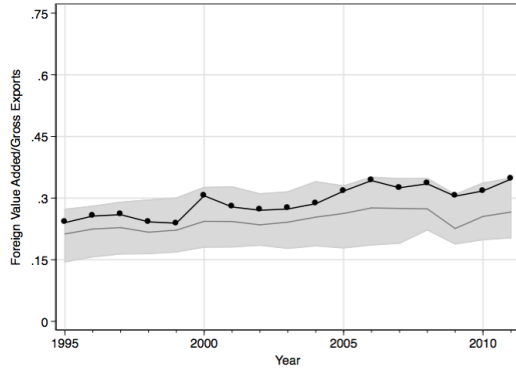
(f) Imports as a share of GDP, all sectors



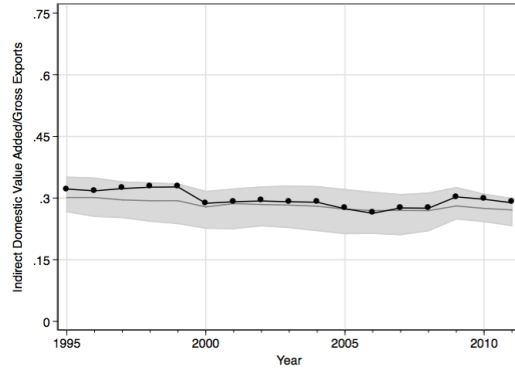
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.107: Finland: GVC and Trade Variables

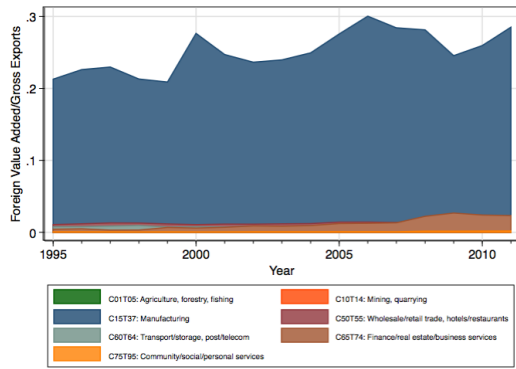
(a) Backward Linkage, all sectors



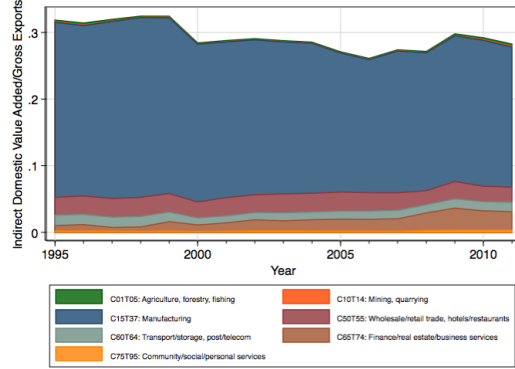
(b) Forward Linkage, all sectors



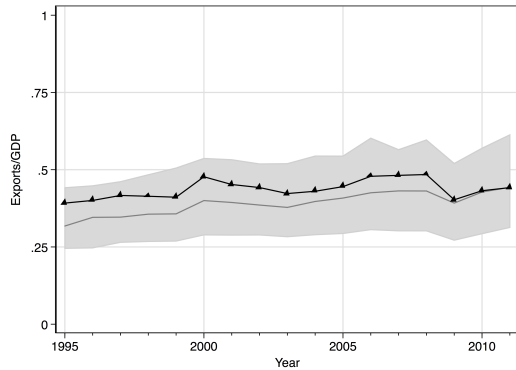
(c) Backward Linkage, by sector



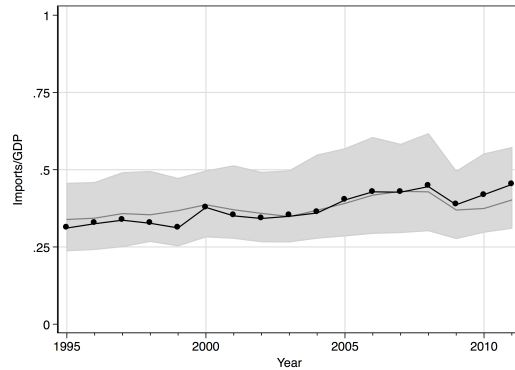
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



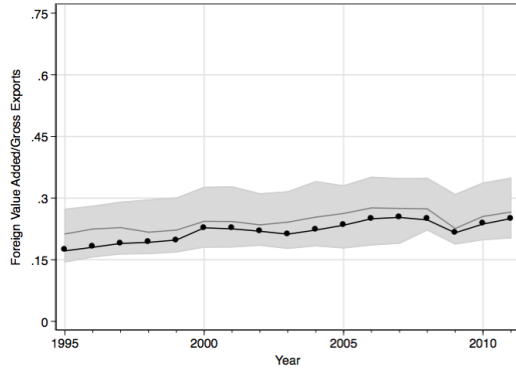
(f) Imports as a share of GDP, all sectors



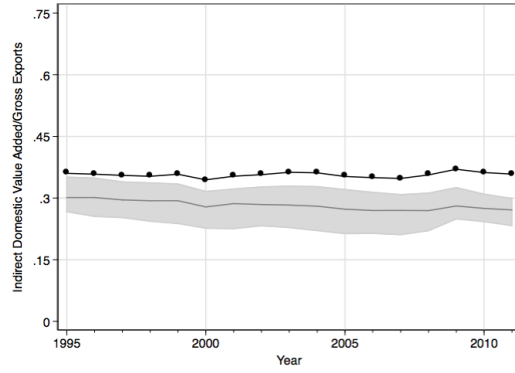
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.108: France: GVC and Trade Variables

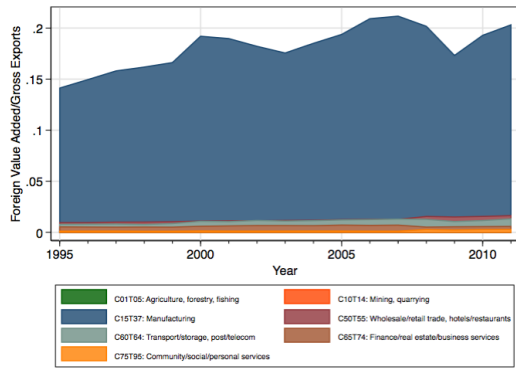
(a) Backward Linkage, all sectors



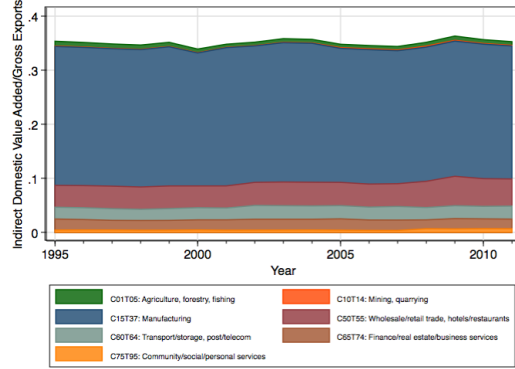
(b) Forward Linkage, all sectors



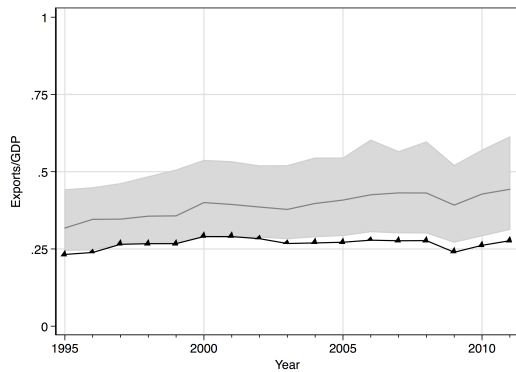
(c) Backward Linkage, by sector



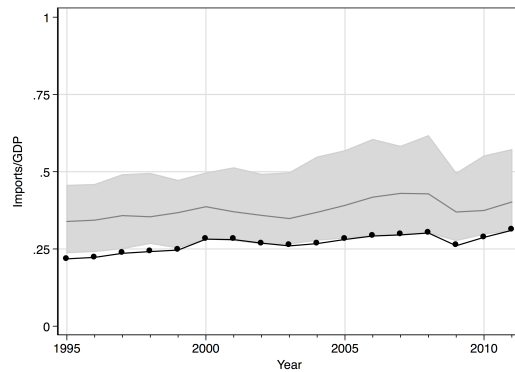
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



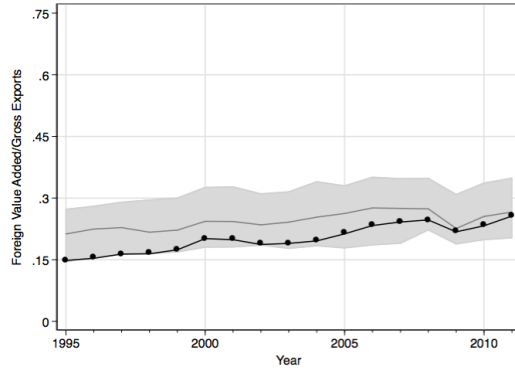
(f) Imports as a share of GDP, all sectors



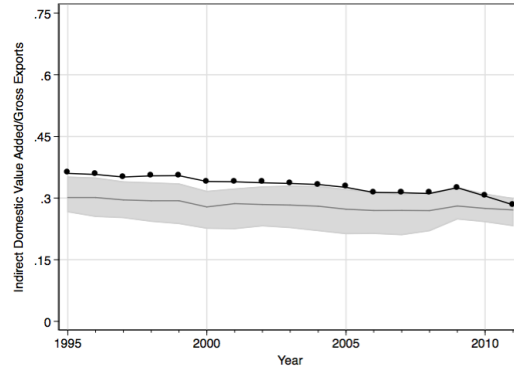
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.109: Germany: GVC and Trade Variables

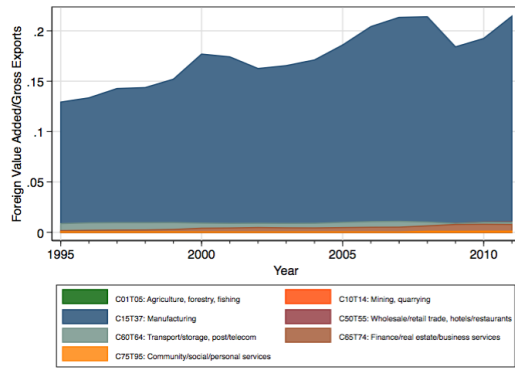
(a) Backward Linkage, all sectors



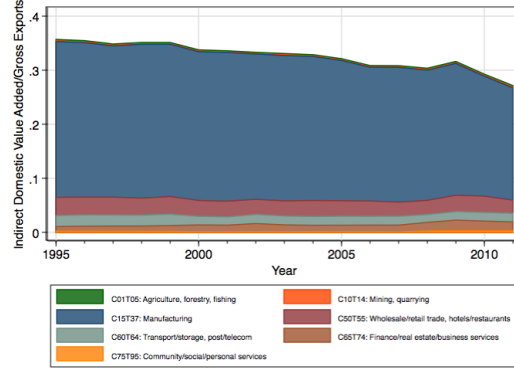
(b) Forward Linkage, all sectors



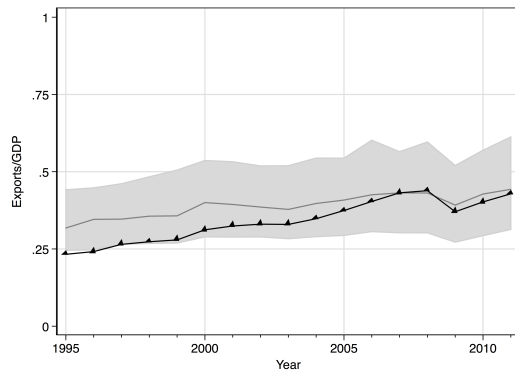
(c) Backward Linkage, by sector



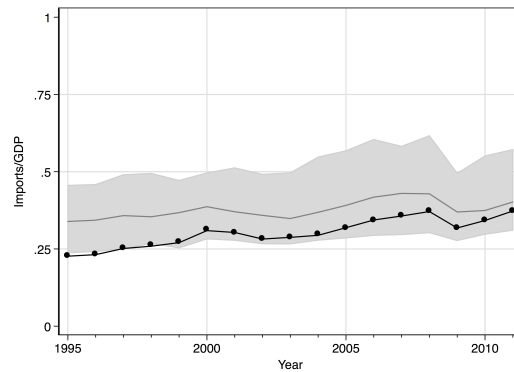
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



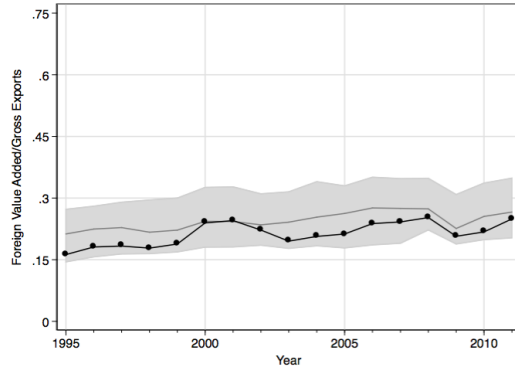
(f) Imports as a share of GDP, all sectors



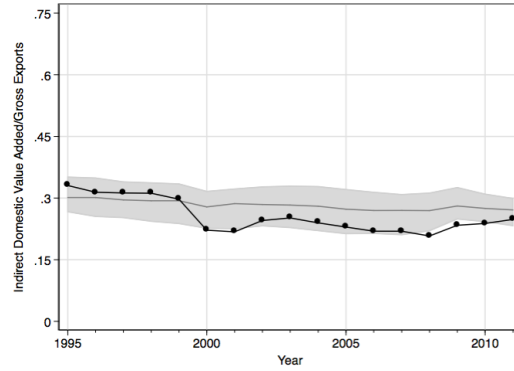
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.110: Greece: GVC and Trade Variables

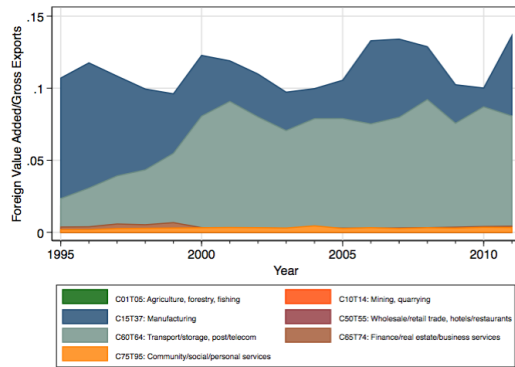
(a) Backward Linkage, all sectors



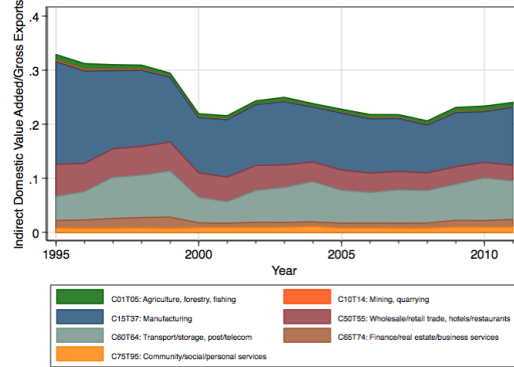
(b) Forward Linkage, all sectors



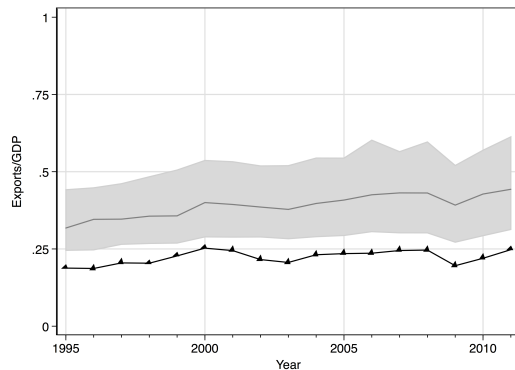
(c) Backward Linkage, by sector



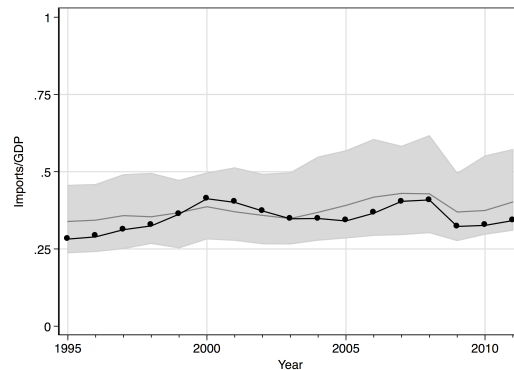
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



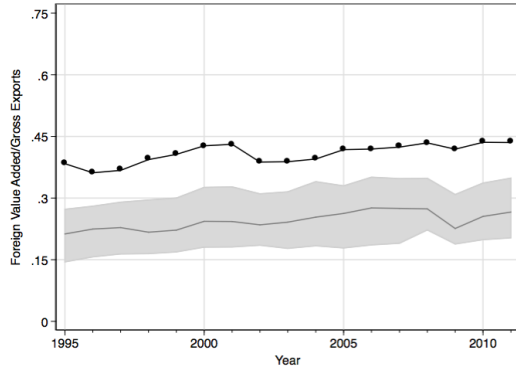
(f) Imports as a share of GDP, all sectors



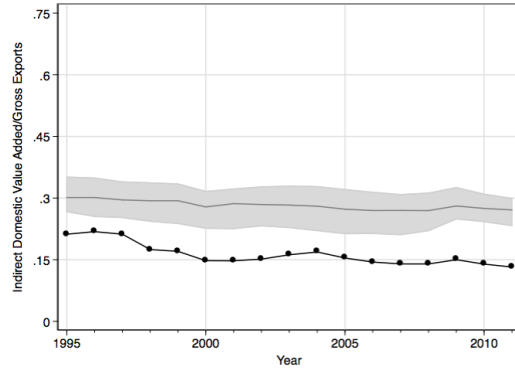
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.111: Ireland: GVC and Trade Variables

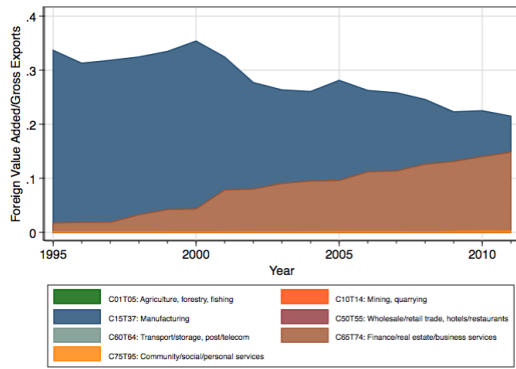
(a) Backward Linkage, all sectors



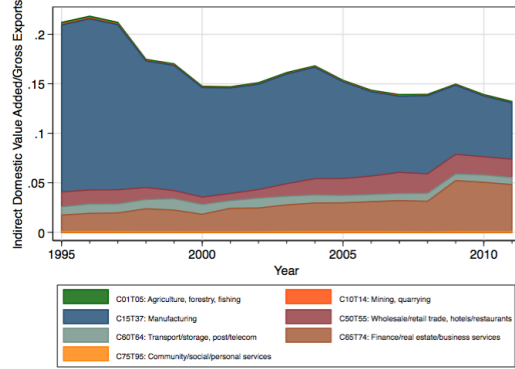
(b) Forward Linkage, all sectors



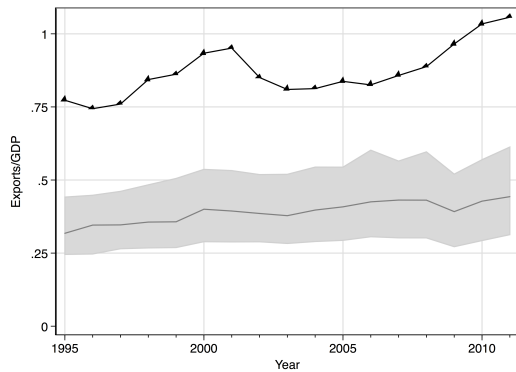
(c) Backward Linkage, by sector



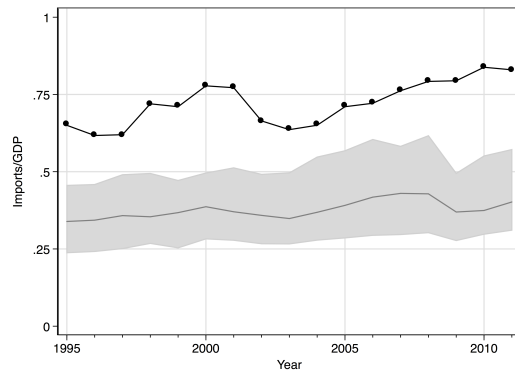
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



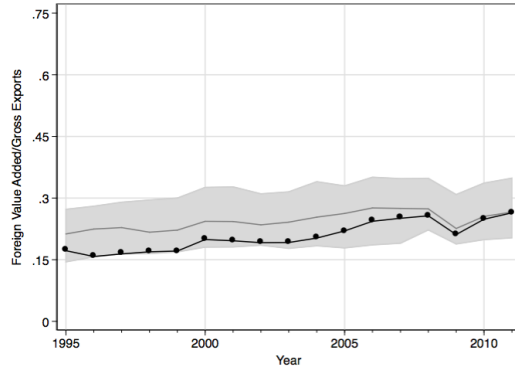
(f) Imports as a share of GDP, all sectors



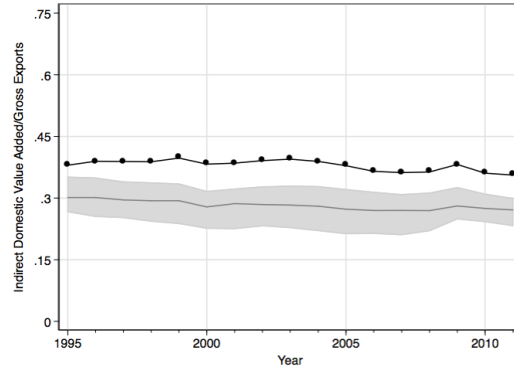
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.112: Italy: GVC and Trade Variables

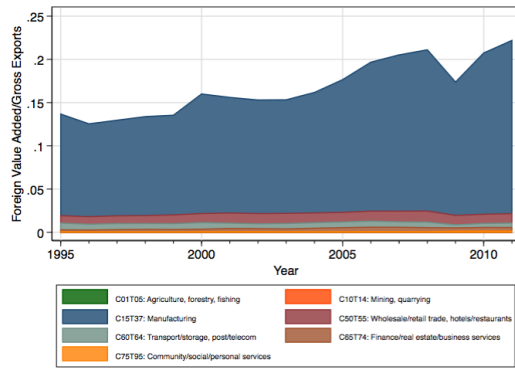
(a) Backward Linkage, all sectors



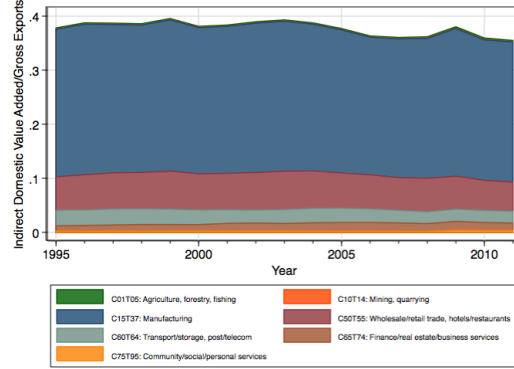
(b) Forward Linkage, all sectors



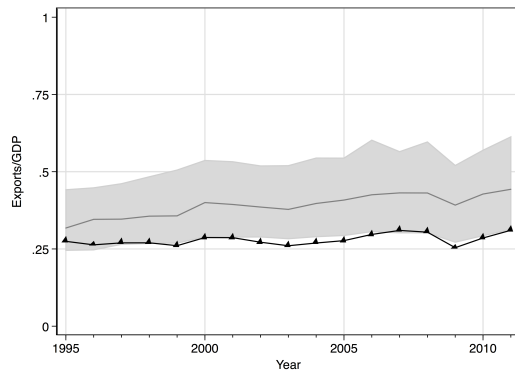
(c) Backward Linkage, by sector



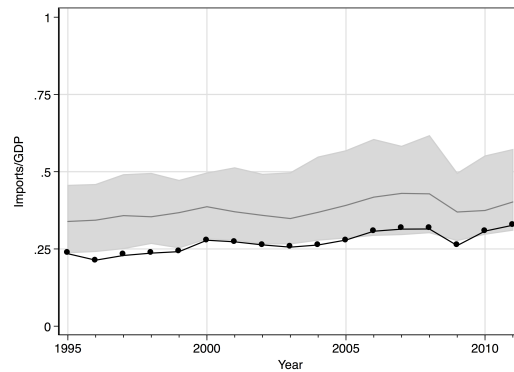
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



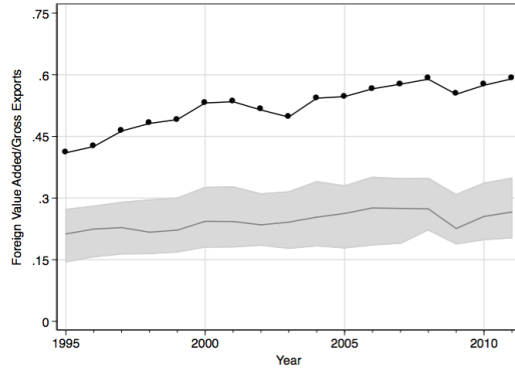
(f) Imports as a share of GDP, all sectors



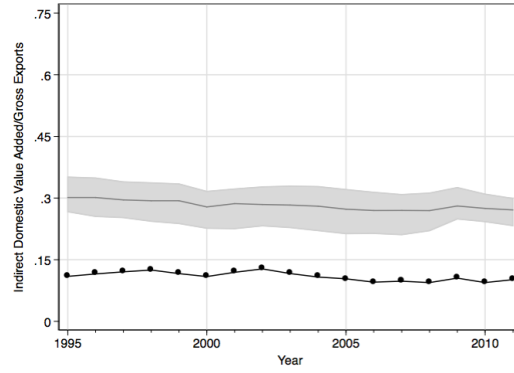
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.113: Luxembourg: GVC and Trade Variables

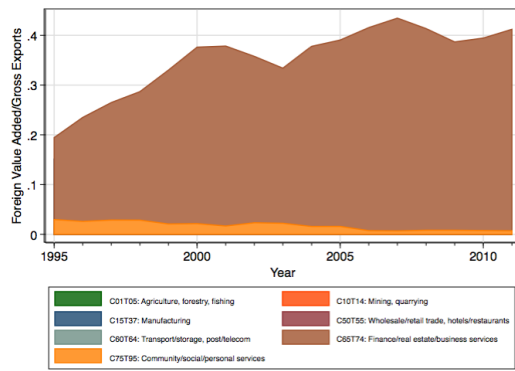
(a) Backward Linkage, all sectors



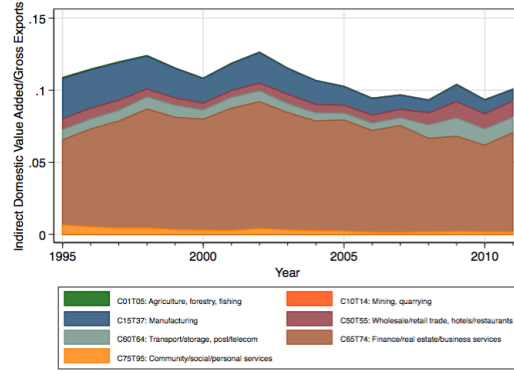
(b) Forward Linkage, all sectors



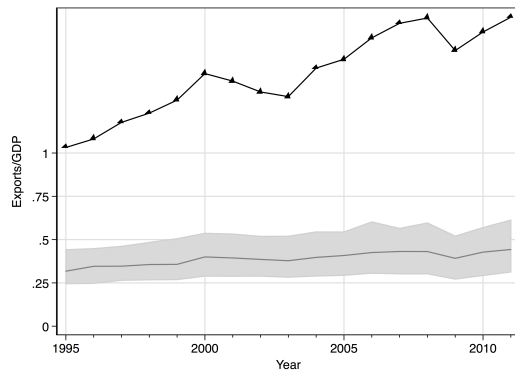
(c) Backward Linkage, by sector



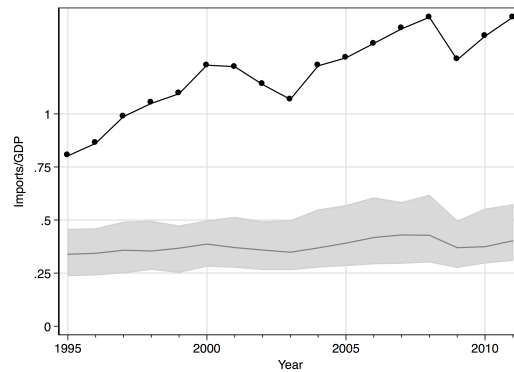
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



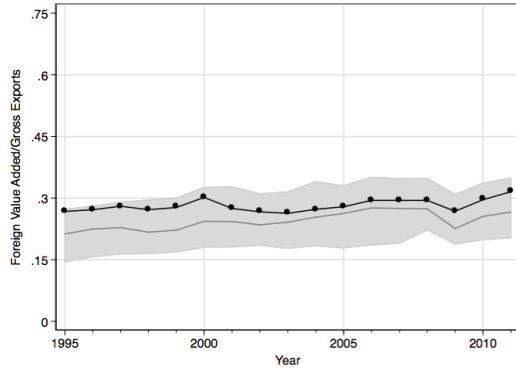
(f) Imports as a share of GDP, all sectors



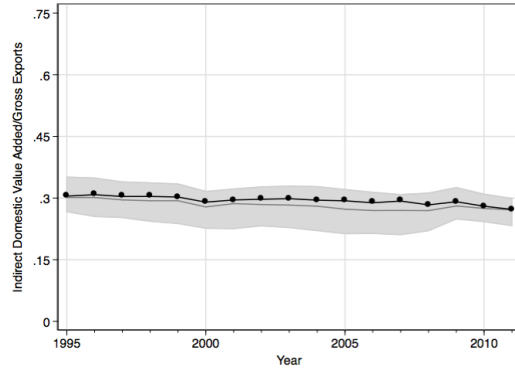
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.114: Netherlands: GVC and Trade Variables

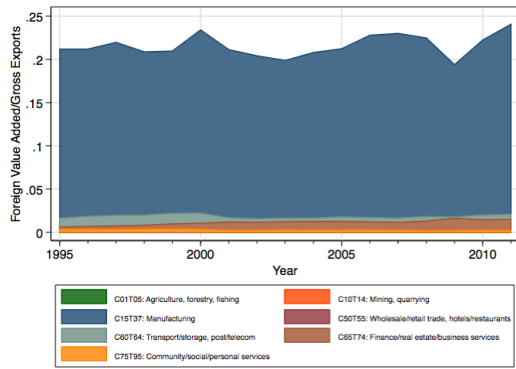
(a) Backward Linkage, all sectors



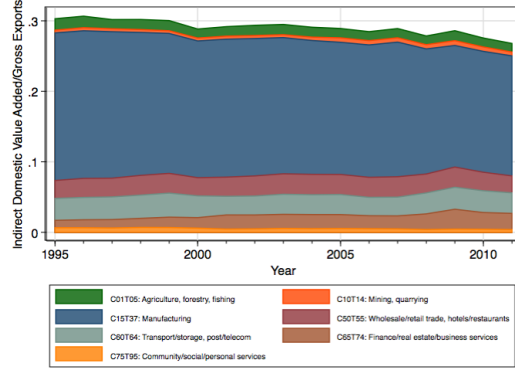
(b) Forward Linkage, all sectors



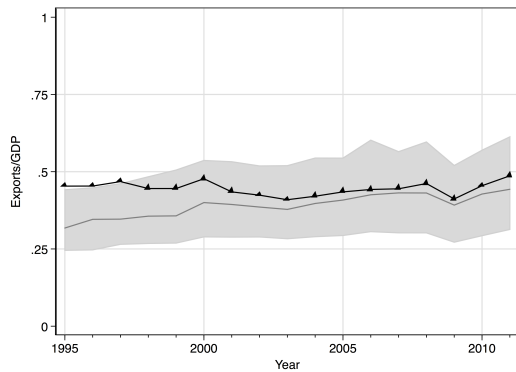
(c) Backward Linkage, by sector



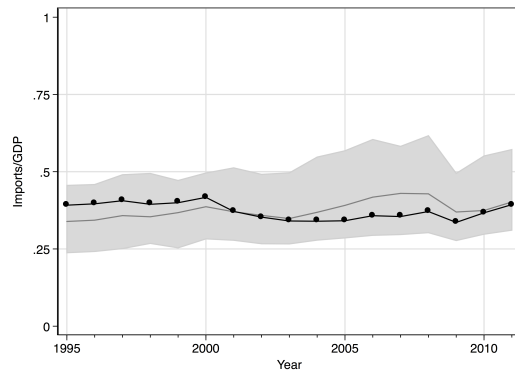
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



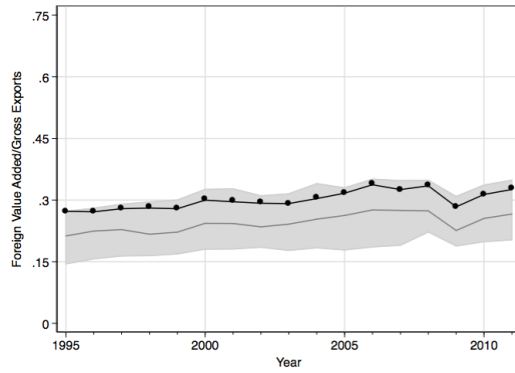
(f) Imports as a share of GDP, all sectors



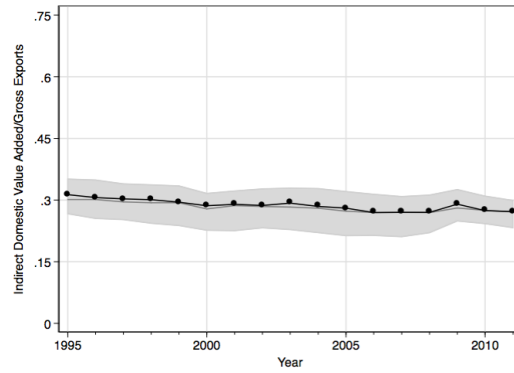
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.115: Portugal: GVC and Trade Variables

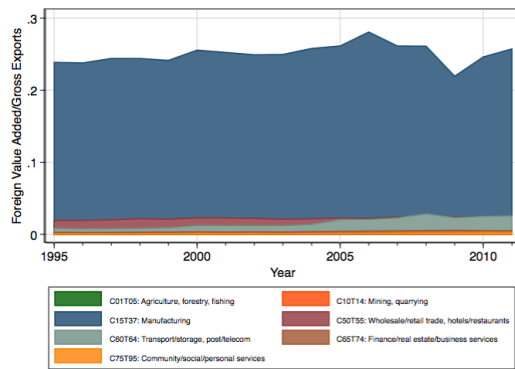
(a) Backward Linkage, all sectors



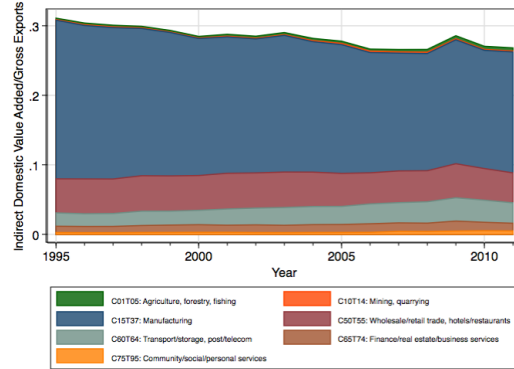
(b) Forward Linkage, all sectors



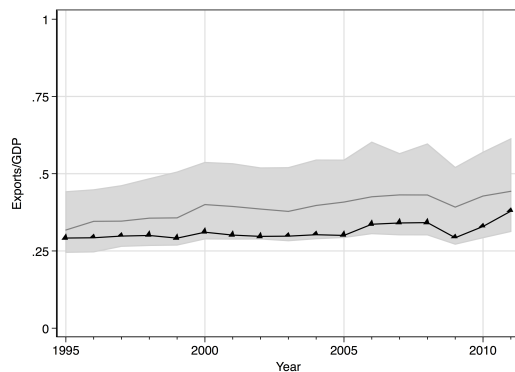
(c) Backward Linkage, by sector



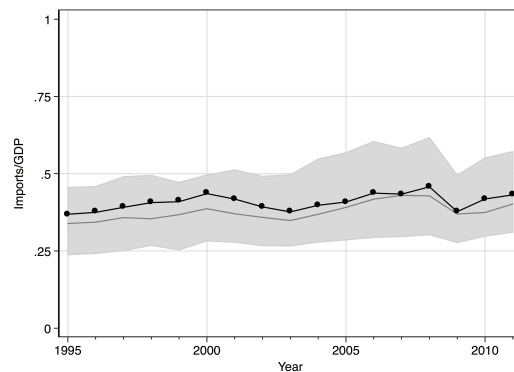
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



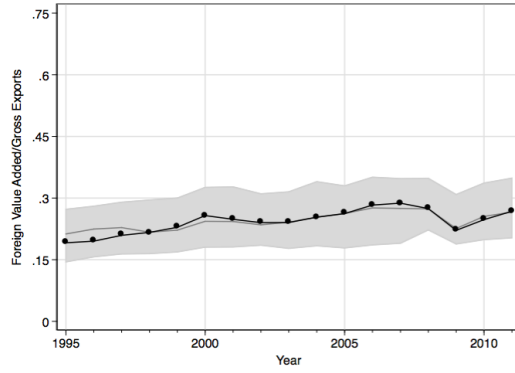
(f) Imports as a share of GDP, all sectors



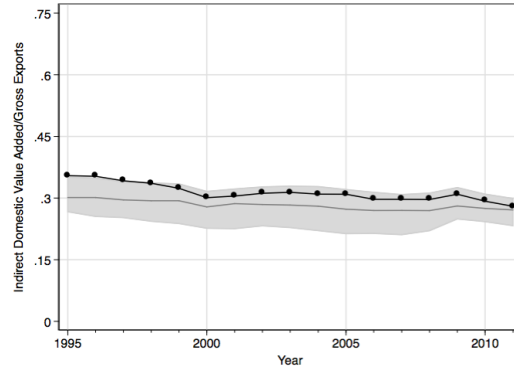
Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

Figure A.116: Spain: GVC and Trade Variables

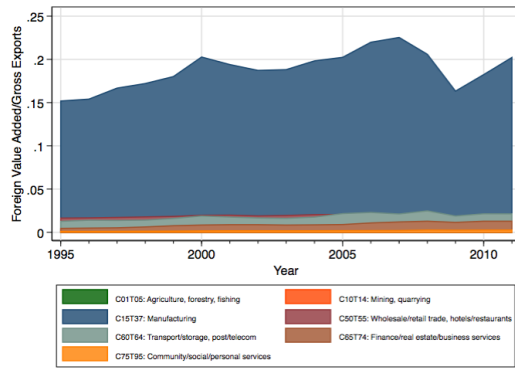
(a) Backward Linkage, all sectors



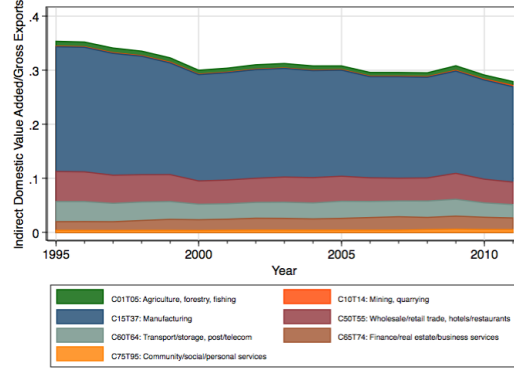
(b) Forward Linkage, all sectors



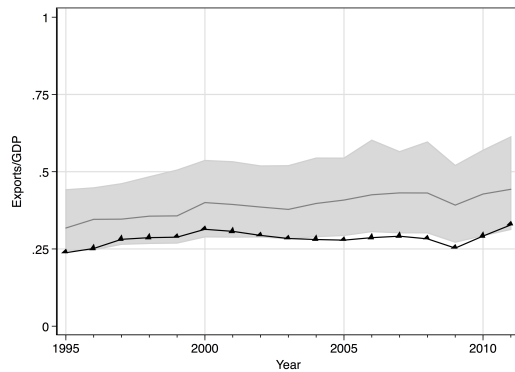
(c) Backward Linkage, by sector



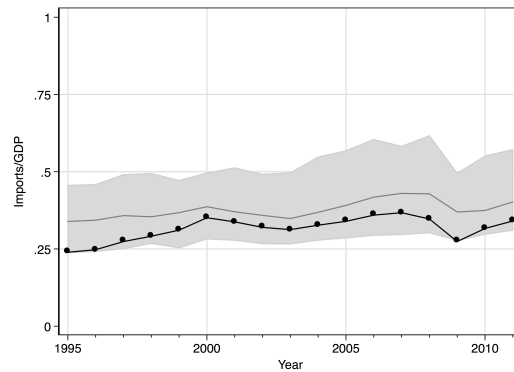
(d) Forward Linkage, by sector



(e) Exports as a share of GDP, all sectors



(f) Imports as a share of GDP, all sectors



Note: The light grey shaded areas cover the 25th to 75th percentiles of the entire sample of 62 countries with the mean denoted by the dark grey line.

BIBLIOGRAPHY

- Achen, Christopher H. 2000. "Why lagged dependent variables can suppress the explanatory power of other independent variables." *Ann Arbor* 1001(2000):48106–1248.
- Ahmed, Swarnali, Maximiliano Appendino and Michele Ruta. 2015. "Depreciations Without fs? Global Value Chains and the Exchange Rate Elasticity of Exports." *World Bank Policy Research Working Paper* (7390).
- Amiti, Mary, Oleg Itskhoki and Jozef Konings. 2014. "Importers, Exporters, and Exchange Rate Disconnect." *The American Economic Review* 104(7):1942–78.
- Andrews, David M. 1994. "Capital mobility and state autonomy: toward a structural theory of international monetary relations." *International Studies Quarterly* 38(2):193–218.
- Baccini, Leonardo. 2012. "Democratization and trade policy: An empirical analysis of developing countries." *European Journal of International Relations* 18(3):455–479.
- Bagwell, Kyle, Chad P Bown and Robert W Staiger. 2016. "Is the WTO passé?" *Journal of Economic Literature* 54(4):1125–1231.
- Baier, Scott L and Jeffrey H Bergstrand. 2004. "Economic determinants of free trade agreements." *Journal of international Economics* 64(1):29–63.
- Balassa, Bela. 1964. "The purchasing-power parity doctrine: a reappraisal." *Journal of political Economy* 72(6):584–596.
- Baldwin, Richard. 1993. A domino theory of regionalism. Technical report National bureau of economic research.

- Baldwin, Richard. 2013. Trade and Industrialization After Globalization's Second Unbundling: How Building and Joining a Supply Chain are Different and Why it Matters. In *Globalization in an Age of Crisis: Multilateral Economic Cooperation in the Twenty-First Century*. University of Chicago Press pp. 165–212.
- Baldwin, Richard. 2016. *The Great Convergence*. Harvard University Press.
- Bearce, David. 2009. *Monetary divergence: domestic policy autonomy in the post-Bretton Woods era*. University of Michigan Press.
- Bearce, David H. 2003. "Societal Preferences, Partisan Agents, and Monetary Policy Outcomes." *International Organization* 57(2):373–410.
- Bearce, David H and Kim-Lee Tuxhorn. 2017. "When are Monetary Policy Preferences Egocentric? Evidence from American Surveys and an Experiment." *American Journal of Political Science* 61(1):178–193.
- Bearce, David H and Mark Hallerberg. 2011. "Democracy and de facto exchange rate regimes." *Economics & Politics* 23(2):172–194.
- Beck, Thorsten, George Clarke, Alberto Groff, Philip Keefer and Patrick Walsh. 2001. "New Tools in Comparative Political Economy: The Database of Political Institutions." *The World Bank Economic Review* 15(1):165–176.
- Bergsten, C Fred and Joseph E Gagnon. 2017. *Currency Conflict and Trade Policy: A New Strategy for the United States*. Columbia University Press.
- Bernard, Andrew B, J Bradford Jensen, Stephen J Redding and Peter K Schott. 2007. "Firms in International Trade." *Journal of Economic perspectives* 21(3):105–130.
- Bernhard, William and David Leblang. 1999. "Democratic Institutions and Exchange-Rate Commitments." *International Organization* 53(1):71–97.

- Bernhard, William, J Lawrence Broz and William Roberts Clark. 2002. "The Political Economy of Monetary Institutions." *International Organization* 56(4):693–723.
- Blackwell, Matthew and Adam Glynn. 2017. How to Make Causal Inferences with Time-Series Cross-Sectional Data under Selection on Observables. Technical report Working Paper.
- Broz, J Lawrence and Jeffrey A Frieden. 2001. "The Political Economy of International Monetary Relations." *Annual Review of Political Science* 4(1):317–343.
- Burstein, Ariel and Gita Gopinath. 2014. International prices and exchange rates. In *Handbook of International Economics*. Vol. 4 Elsevier pp. 391–451.
- Campa, Jose Manuel and Linda S Goldberg. 2005. "Exchange rate pass-through into import prices." *Review of Economics and Statistics* 87(4):679–690.
- Chaney, Thomas. 2018. "The gravity equation in international trade: An explanation." *Journal of Political Economy* 126(1):150–177.
- Chase, Kerry A. 2009. *Trading blocs: States, firms, and regions in the world economy*. University of Michigan Press.
- Cheng, Kevin, Gee Hee Hong, Dulani Seneviratne and Rachel van Elkan. 2016. "Rethinking the Exchange Rate Impact on Trade in a World with Global Value Chains." *International Economic Journal* 30(2):204–16.
- Cohen, Benjamin J. 2002. The triad and the unholy trinity: problems of international monetary cooperation. In *International Political Economy*. Routledge pp. 255–266.
- Cohen, Benjamin J. April 2018. "Will Trump Launch a Currency War, Too?" <https://www.project-syndicate.org/commentary/trump-currency-war-with-china-by-benjamin-j--cohen-2018-04>.

- Cooper, Richard N. 1992. Currency Devaluation in Developing Countries. In *International Economic Policies and their Theoretical Foundations (Second Edition)*. Elsevier pp. 742–770.
- Coudert, Virginie and Cécile Couharde. 2008. Real Equilibrium Exchange Rate in China. Is the Renminbi Undervalued? In *Exchange Rates and Macroeconomic Dynamics*. Springer pp. 94–112.
- Couharde, Cécile, Anne-Laure Delatte, Carl Grekou, Valérie Mignon and Florian Morvillier. 2017. EQCHANGE: A World Database on Actual and Equilibrium Effective Exchange Rates. Working Papers 2017-14 CEPII.
- De Gregorio, Jose and Holger C Wolf. 1994. Terms of trade, productivity, and the real exchange rate. Technical report National Bureau of Economic Research.
- Donnan, Shawn. 21 June 2016. “WTO Warns on Rise of Protectionist Measures by G20 Economies.” *Financial Times* .
- Dornbusch, Rudiger. 1973*a*. “Currency depreciation, hoarding, and relative prices.” *Journal of political Economy* 81(4):893–915.
- Dornbusch, Rudiger. 1973*b*. “Devaluation, money, and nontraded goods.” *The American Economic Review* 63(5):871–880.
- Dornbusch, Rudiger. 1976. “Expectations and exchange rate dynamics.” *Journal of political Economy* 84(6):1161–1176.
- Dür, Andreas, Leonardo Baccini and Manfred Elsig. 2014. “The design of international trade agreements: Introducing a new dataset.” *The Review of International Organizations* 9(3):353–375.
- Edwards, Sebastian. 1996. The determinants of the choice between fixed and flexible exchange-rate regimes. Technical report National Bureau of Economic Research.

- Edwards, Sebastian. 1999. "How effective are capital controls?" *Journal of Economic Perspectives* 13(4):65–84.
- Egger, Hartmut, Peter Egger and David Greenaway. 2008. "The trade structure effects of endogenous regional trade agreements." *Journal of international Economics* 74(2):278–298.
- Egger, Peter, Mario Larch, Kevin E Staub and Rainer Winkelmann. 2011. "The trade effects of endogenous preferential trade agreements." *American Economic Journal: Economic Policy* 3(3):113–43.
- Eichengreen, Barry J. 1992. *Golden Fetters: The Gold Standard and the Great Depression, 1919-1939*. Oxford University Press.
- Eichengreen, Barry J. 1998. *Globalizing capital: a history of the international monetary system*. Princeton University Press.
- Fleming, J Marcus. 1962. "Domestic financial policies under fixed and under floating exchange rates." *Staff Papers* 9(3):369–380.
- Fontagné, Lionel and Gianluca Santoni. 2018. "GVCs and the Endogenous Geography of RTAs." [jhal-01763563j](#).
- Frankel, Jeffrey. 2006. "On the Yuan: The Choice Between Adjustment Under a Fixed Exchange Rate and Adjustment Under a Flexible Rate." *CEifo Economic Studies* 52(2):246–275.
- Frankel, Jeffrey and Andrew Rose. 2002. "An Estimate of the Effect of Common Currencies on Trade and Income." *The Quarterly Journal of Economics* 117(2):437–466.
- Freund, Caroline and Martha Denisse Pierola. 2012. "Export Surges." *Journal of Development Economics* 97(2):387–395.

- Frieden, Jeffrey A. 1991. "Invested Interests: The Politics of National Economic Policies in a World of Global Finance." *International Organization* 45(4):425–451.
- Frieden, Jeffrey A. 2002. "Real sources of European currency policy: Sectoral interests and European monetary integration." *International Organization* 56(4):831–860.
- Frieden, Jeffrey A. 2007. *Global Capitalism: Its Fall and Rise in the Twentieth Century*. WW Norton & Company.
- Frieden, Jeffrey A. 2014. *Currency Politics: The Political Economy of Exchange Rate Policy*. Princeton University Press.
- Gagnon, Joseph E. 2011. *Flexible exchange rates for a stable world economy*. Peterson Institute.
- Garrett, Geoffrey. 1998. "Global markets and national politics: collision course or virtuous circle?" *International organization* 52(4):787–824.
- Garrett, Geoffrey and Peter Lange. 1991. "Political responses to interdependence: what's "left" for the left?" *International Organization* 45(4):539–564.
- Head, Keith, Thierry Mayer and John Ries. 2010. "The erosion of colonial trade linkages after independence." *Journal of international Economics* 81(1):1–14.
- Irwin, Douglas A. 2011. *Trade policy disaster: lessons from the 1930s*. MIT press.
- Jensen, Nathan M. 2003. "Democratic governance and multinational corporations: Political regimes and inflows of foreign direct investment." *International organization* 57(3):587–616.
- Karcher, Sebastian and David A Steinberg. 2013. "Assessing the causes of capital account liberalization: How measurement matters." *International Studies Quarterly* 57(1):128–137.

- Kestenbaum, David. 2015. "Massive Pacific Trade Agreement Ignores One Huge Tariff: Currency Manipulation." <http://www.npr.org/2015/11/12/455797475/massive-pacific-trade-agreement-ignores-one-huge-tariff-currency-manipulation>.
- Kim, In Song. 2017. "Political Cleavages Within Industry: Firm-Level Lobbying for Trade Liberalization." *American Political Science Review* 111(1):1–20.
- Knight, Sarah Cleeland. 2010. "Divested Interests: Globalization and the New Politics of Exchange Rates." *Business and Politics* 12(2):1–28.
- Koopman, Robert, William Powers, Zhi Wang and Shang-Jin Wei. 2010. Give Credit Where Credit is Due: Tracing Value Added in Global Production Chains. Technical report National Bureau of Economic Research.
- Leblang, David A. 1999. "Domestic political institutions and exchange rate commitments in the developing world." *International Studies Quarterly* 43(4):599–620.
- Levy-Yeyati, Eduardo, Federico Sturzenegger and Pablo Alfredo Gluzmann. 2013. "Fear of Appreciation." *Journal of Development Economics* 101:233–247.
- Limão, Nuno. 2016. Preferential Trade Agreements. In *Handbook of commercial policy*. Vol. 1 Elsevier pp. 279–367.
- Ma, Guonan and Robert N McCauley. 2008. "Efficacy of China's capital controls: Evidence from price and flow data." *Pacific Economic Review* 13(1):104–123.
- Mansfield, Edward D, Helen V Milner and B Peter Rosendorff. 2002. "Why democracies cooperate more: Electoral control and international trade agreements." *International Organization* 56(3):477–513.

- Mansfield, Edward D, Helen V Milner and Jon C Pevehouse. 2008. "Democracy, veto players and the depth of regional integration." *World Economy* 31(1):67–96.
- Melitz, Marc J. 2003. "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity." *Econometrica* 71(6):1695–1725.
- Milner, Helen V and Robert O Keohane. 1996. Internationalization and domestic politics: A Conclusion. In *Internationalization and domestic politics*. Cambridge University Press pp. 243–58.
- Mundell, Robert A. 1960. "The monetary dynamics of international adjustment under fixed and flexible exchange rates." *The Quarterly Journal of Economics* 74(2):227–257.
- Mundell, Robert A. 1961. "A Theory of Optimum Currency Areas." *The American Economic Review* 51(4):657–665.
- Mundell, Robert A. 1963. "Capital mobility and stabilization policy under fixed and flexible exchange rates." *Canadian Journal of Economics and Political Science/Revue canadienne de economiques et science politique* 29(4):475–485.
- Obstfeld, Maurice and Kenneth Rogoff. 1995. "The mirage of fixed exchange rates." *Journal of Economic perspectives* 9(4):73–96.
- Ollivaud, Patrice, Elena Rusticelli and Cyrille Schwellnus. 2015. "The Changing Role of the Exchange Rate for Macroeconomic Adjustment." *OECD Economics Department Working Papers* (1190).
- Osgood, Iain. 2017. "The Breakdown of Industrial Opposition to Trade: Firms, Product Variety, and Reciprocal Liberalization." *World Politics* 69(1):184–231.
- Ricardo, David. 1817. *On the Principles of Political Economy and Taxation: London*.

- Ro, Sam. 10 October 2013. "Boeing's 787 Dreamliner is made of parts from all over the world." *Business Insider* .
- Rodrik, Dani. 2008. "The real exchange rate and economic growth." *Brookings papers on economic activity* 2008(2):365–412.
- Samuelson, Paul A. 1964. "Theoretical notes on trade problems." *The Review of Economics and Statistics* pp. 145–154.
- Simmons, Beth, Jens Hainmueller et al. 2005. "Can domestic institutions explain exchange rate regime choice? The political economy of monetary institutions reconsidered." *International Finance* 505011.
- Steinberg, David. 2015. *Demanding devaluation: Exchange rate politics in the developing world*. Cornell University Press.
- Steinberg, David and Stefanie Walter. 2012. "The Political Economy of Exchange Rate Policy." *Encyclopedia of Financial Globalization, Elsevier* .
- UNCTAD. 2013. *Global Value Chains and Development: Investment and Value Added Trade in the Global Economy*. Geneva: UNCTAD.
- Walter, Stefanie. 2008. "A new approach for determining exchange-rate level preferences." *International Organization* 62(3):405–438.
- Weiss, Jessica Chen and Amber Wichowsky. 2013. "More than Cheap Talk: US Campaign Rhetoric and China's Currency Reform." Working Paper.
- Wheatley, Jonathan and Peter Garnham. 27 September 2010. "Brazil in "Currency War" Alerts." *Financial Times* .
- World Bank Group. 2017. *Jobs in Global Value Chains*. Jobs notes; Issue no. 1. Washington, D.C.: World Bank Group.

World Trade Organization. 2011. *World Trade Report*. Geneva: World Trade Organization.

World Trade Organization. 2018. "Regional Trade Agreement Information System (RTA-IS)." <http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx>. data retrieved 5 June 2018.