Appendix for

The End of Currency Manipulation?
Global Production Networks & Exchange Rate Outcomes

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A1 Country-Level Variables

Appendix A1 provides details on all data used in our analysis.

A1.1 Outcome Variable: Currency Manipulation

Foreign Exchange Intervention:

I obtain foreign exchange (`forex`) data from the IMF for the years 2000-2018. Foreign exchange includes total international reserves, excluding gold valued in current US dollars. I convert all variables in current USD to constant 2010 USD using the consumer price index from the World Development Indicators. The main outcome variable, `forex/gdp`, is the annual amount of foreign exchange reserves as a share of gross domestic product (from the World Development Indicators).

I also include a second measure of foreign exchange intervention: `forex_intensity` measures how excessive a state's intervention in foreign exchange markets is beyond the 2 percent of

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GDP criteria set forth by the Treasury Department and the Peterson Institute for International Economics, i.e., Δ`forex` /(GDP$\times$0.02). I subtract one from `forex_intensity` to center the variable on zero, meaning a positive value meets the criterion for currency manipulation.

Currency Misalignment:

I utilize four different measures of currency misalignment by estimating exchange rate deviations from their market-determined rate ($\widehat{\texttt{xr}}$). The equilibrium exchange rate data come from the EQCHANGE database for the years 1973-2018 (Couharde et al., 2017). The authors estimate the equilibrium real exchange rate (ERER) using different weighting schemes and subtract this number from the real effective exchange rate (REER) to generate the currency misalignment value. The database allows the user to choose between four different weighting schemes:

1. `mis_n_tv`: a time-varying (tv) weighting scheme based on non-overlapping five-year average weights relative to a narrow (n) group of top-30 trading partners. This is my primary measure of currency misalignment.

2. `mis_b_tv`: a time-varying (tv) weighting scheme based on non-overlapping five-year average weights relative to a broad (b) group of 186 trading partners (all countries in sample). Used for robustness checks.

3. `mis_n_fw`: a time-invariant, fixed weighting (fw) scheme relative to a narrow (n) group of top-30 trading partners. Used for robustness checks.

4. `mis_b_fw`: a time-invariant, fixed weighting (fw) scheme relative to a broad (b) group of 186 trading partners (all countries in sample). Used for robustness checks.

A1.2 Treatment and Moderating Variables

Export Dependence (treatment):

Data on exports of goods (not services) as a share of total GDP (`exp/gdp`) originate from the World Development Indicators.

Global Production Network Dependence (moderating):

I follow convention in deriving an index of global production network participation (Koopman et al., 2010), utilizing data from the UNCTAD-Eora database (Casella et al., 2019). The components of this index include the foreign value added (`fva`) utilized in the production of exported goods and the indirect value added (`dvx`) that foreign countries use in the production of their exported goods. Each is taken as a share of total exports: `fva/exp` and `dvx/exp`. The sum of these two components creates the global production network index: `gpn/exp`.

A1.3 Control Variables

- `fdi_out/gdp`: outward foreign direct investment as a share of GDP. Source: WDI.
- `save/gdp`: gross domestic savings as a share of GDP. Source: WDI.
- `ckaopen`: capital account openness. Source: Karcher and Steinberg (2013). This data only runs through 2010; I use the 2010 measure for all years through 2018 with no impact on the results. I also use the original measure `kaopen` from Chinn and Ito (2006), which has the same null effect.
- `polity`: the Polity score on a country's level of democracy. Source: Marshall, Gurr, and Jaggers (2019).

A2 Supplemental Results

A2.1 Regression Tables from Main Paper

In the main paper, I present all regression results in coefficient plots and conditional marginal effects plots. For the curious reader, I provide the full regression results for each model (with and without controls) in the following tables. I also include which figures (coefficient plots or conditional marginal effects plots) correspond to which models.

A2.1.1 Model 1, outcome variable: `forex/gdp` (restricted sample)

Table A1: Relationship Between Export Dependence and Global Production Network Dependence on Currency Manipulation, $\ln(\texttt{forex/gdp})_t$

	1	2	3	4	5	6	7	8
$\ln(\texttt{exports/gdp})_{t-1}$	0.28^{**}	-0.41	-0.32	-0.41	0.26^{*}	-0.66	-0.53	-0.79
	(0.10)	(0.33)	(0.35)	(0.37)	(0.11)	(0.37)	(0.42)	(0.41)
$\ln(\texttt{gpn/exp})_{t-1}$		-2.78^{**}				-3.45^{**}		
		(0.92)				(1.16)		
$\ln(\texttt{exp/gdp}\times\texttt{gpn/exp})_{t-1}$		-0.90^{*}				-1.20^{**}		
		(0.39)				(0.45)		
$\ln(\texttt{fva/exp})_{t-1}$			-1.03^{*}				-1.39^{*}	
			(0.44)				(0.61)	
$\ln(\texttt{exp/gdp}\times\texttt{fva/exp})_{t-1}$			-0.40				-0.53^{*}	
			(0.21)				(0.26)	
$\ln(\texttt{dvx/exp})_{t-1}$				-0.94				-1.34^{*}
				(0.54)				(0.59)
$\ln(\texttt{exp/gdp}\times\texttt{dvx/exp})_{t-1}$				-0.47^{*}				-0.72^{**}
				(0.23)				(0.26)
$\ln(\texttt{fdi_out/gdp})_{t-1}$					0.04^{*}	0.04^{*}	0.04^{*}	0.04^{*}
					(0.01)	(0.02)	(0.02)	(0.01)
$(\texttt{polity})_{t-1}$					-0.00	-0.01	-0.01	-0.00
					(0.02)	(0.01)	(0.01)	(0.01)
$\ln(\texttt{save/gdp})_{t-1}$					0.00	0.00	-0.00	0.01
					(0.01)	(0.01)	(0.01)	(0.01)
$\ln(\texttt{ckaopen})_{t-1}$					0.02	0.05	0.05	0.00
					(0.06)	(0.06)	(0.06)	(0.06)
Figure in paper					3(a)	4(a);5(a)	6(a);7(a)	8(a);9(a)
Num. obs.	1132	1132	1132	1132	1016	1016	1016	1016
Num. countries	63	63	63	63	63	63	63	63
R^2	0.84	0.85	0.84	0.84	0.84	0.86	0.85	0.85
Adj. R^2	0.82	0.82	0.84	0.83	0.83	0.82	0.84	0.83

Notes: $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. The outcome variable used in all models is log-transformed foreign exchange intervention as a share of GDP.

A2.1.2 Model 2, outcome variable: `forex_intensity` (restricted sample)

Table A2: Relationship Between Export Dependence and Global Production Network Dependence on Currency Manipulation, $(\texttt{forex_intensity})_t$

	1	2	3	4	5	6	7	8
$\ln(\texttt{exports/gdp})_{t-1}$	0.20	−0.78	−0.29	−1.54*	0.28	−0.76	0.15	−2.86**
	(0.22)	(0.43)	(0.50)	(0.74)	(0.24)	(0.48)	(0.59)	(1.01)
$\ln(\texttt{gpn/exp})_{t-1}$		−1.86				−0.39		
		(1.73)				(1.60)		
$\ln(\texttt{exp/gdp}\times\texttt{gpn/exp})_{t-1}$		−1.22**				−1.30*		
		(0.44)				(0.50)		
$\ln(\texttt{fva/exp})_{t-1}$			−0.72				0.55	
			(0.77)				(0.79)	
$\ln(\texttt{exp/gdp}\times\texttt{fva/exp})_{t-1}$			−0.32				−0.04	
			(0.25)				(0.28)	
$\ln(\texttt{dvx/exp})_{t-1}$				−0.87				−3.44*
				(1.03)				(1.41)
$\ln(\texttt{exp/gdp}\times\texttt{dvx/exp})_{t-1}$				−1.22*				−2.16**
				(0.52)				(0.73)
$\ln(\texttt{fdi_out/gdp})_{t-1}$					−0.01	−0.02	−0.01	−0.02
					(0.03)	(0.03)	(0.03)	(0.03)
$(\texttt{polity})_{t-1}$					−0.02	−0.03	−0.03	−0.02
					(0.02)	(0.02)	(0.02)	(0.02)
$\ln(\texttt{save/gdp})_{t-1}$					0.02	0.02	0.02	0.03*
					(0.01)	(0.01)	(0.01)	(0.02)
$\ln(\texttt{ckaopen})_{t-1}$					−0.13	−0.13	−0.13	−0.18
					(0.09)	(0.09)	(0.09)	(0.10)
Figure in paper					3(b)	4(b);5(b)	6(b);7(b)	8(b);9(b)
Num. obs.	1132	1132	1132	1132	1016	1016	1016	1016
Num. countries	63	63	63	63	63	63	63	63
R^2	0.84	0.19	0.20	0.19	0.20	0.21	0.22	0.22
0.23								
Adj. R^2	0.82	0.13	0.14	0.13	0.14	0.14	0.15	0.14
0.16								

Notes: $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. The outcome variable used in all models is the intensity of foreign exchange intervention over the 2 percent of GDP cutoff set by Treasury.

A2.1.3 Model 3, outcome variable: $\widehat{xr}$ (restricted sample)

Table A3: Relationship Between Export Dependence and Global Production Network Dependence on Currency Manipulation, $(\widehat{xr})_t$

	1	2	3	4	5	6	7	8
$\ln(\texttt{exports/gdp})_{t-1}$	0.02	−0.05	0.05	−0.10	0.02	−0.03	0.03	−0.06
	(0.04)	(0.08)	(0.09)	(0.11)	(0.04)	(0.08)	(0.09)	(0.12)
$\ln(\texttt{gpn/exp})_{t-1}$		−0.59**				−0.65**		
		(0.18)				(0.21)		
$\ln(\texttt{exp/gdp}\times\texttt{gpn/exp})_{t-1}$		−0.09				−0.07		
		(0.08)				(0.08)		
$\ln(\texttt{fva/exp})_{t-1}$			−0.26*				−0.31*	
			(0.11)				(0.13)	
$\ln(\texttt{exp/gdp}\times\texttt{fva/exp})_{t-1}$			0.00				−0.01	
			(0.05)				(0.05)	
$\ln(\texttt{dvx/exp})_{t-1}$				0.05				0.07
				(0.17)				(0.20)
$\ln(\texttt{exp/gdp}\times\texttt{dvx/exp})_{t-1}$				−0.09				−0.06
				(0.07)				(0.07)
$\ln(\texttt{fdi_out/gdp})_{t-1}$					0.02**	0.02**	0.02**	0.02**
					(0.01)	(0.01)	(0.01)	(0.01)
$(\texttt{polity})_{t-1}$					−0.00	0.00	0.00	0.00
					(0.00)	(0.00)	(0.00)	(0.00)
$\ln(\texttt{save/gdp})_{t-1}$					−0.00	−0.00	−0.00	−0.00
					(0.00)	(0.00)	(0.00)	(0.00)
$\ln(\texttt{ckaopen})_{t-1}$					−0.02	−0.01	−0.02	−0.02
					(0.03)	(0.03)	(0.03)	(0.03)
Figure in paper					3(c)	4(c);5(c)	6(c);7(c)	8(c);9(c)
Num. obs.	1130	1130	1130	1130	1014	1014	1014	1014
Num. countries	63	63	63	63	63	63	63	63
R^2	0.51	0.52	0.54	0.52	0.53	0.54	0.55	0.54
Adj. R^2	0.47	0.49	0.50	0.48	0.49	0.50	0.51	0.49

Notes: $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. The outcome variable used in all models is the deviation of the real effective exchange rate from the estimated real exchange rate.

A2.2 Regression Tables with Full Sample

A2.2.1 Model 1, outcome variable: `forex/gdp` (full sample)

Table A4: Relationship Between Export Dependence and Global Production Network Dependence on Currency Manipulation, $\ln(\texttt{forex/gdp})_t$ (Full Country Sample)

	1	2	3	4	5	6	7	8
$\ln(\texttt{exports/gdp})_{t-1}$	0.21^{*}	-0.38	-0.62^{**}	0.72^{**}	0.20	-0.71^{*}	-0.83^{**}	0.53
	(0.09)	(0.27)	(0.23)	(0.24)	(0.11)	(0.32)	(0.30)	(0.37)
$\ln(\texttt{gpn/exp})_{t-1}$		-1.59^{*}				-2.94^{**}		
		(0.76)				(1.01)		
$\ln(\texttt{exp/gdp}\times\texttt{gpn/exp})_{t-1}$		-0.74^{*}				-1.23^{**}		
		(0.32)				(0.39)		
$\ln(\texttt{fva/exp})_{t-1}$			-1.07^{***}				-1.49^{***}	
			(0.28)				(0.38)	
$\ln(\texttt{exp/gdp}\times\texttt{fva/exp})_{t-1}$			-0.50^{***}				-0.63^{***}	
			(0.13)				(0.16)	
$\ln(\texttt{dvx/exp})_{t-1}$				0.81^{*}				0.81
				(0.38)				(0.64)
$\ln(\texttt{exp/gdp}\times\texttt{dvx/exp})_{t-1}$				0.38^{*}				0.24
				(0.16)				(0.28)
$\ln(\texttt{fdi_out/gdp})_{t-1}$					-0.01	-0.00	0.01	-0.01
					(0.02)	(0.02)	(0.02)	(0.02)
$(\texttt{polity})_{t-1}$					0.01	0.01	0.01	0.01
					(0.02)	(0.02)	(0.02)	(0.02)
$\ln(\texttt{save/gdp})_{t-1}$					0.01	0.01^{*}	0.00	0.01
					(0.00)	(0.01)	(0.01)	(0.00)
$\ln(\texttt{ckaopen})_{t-1}$					-0.05	-0.02	-0.00	-0.04
					(0.08)	(0.08)	(0.07)	(0.08)
Num. obs.	2569	2223	2223	2223	1766	1649	1649	1649
Num. countries	154	154	154	154	120	120	120	120
R^2	0.83	0.83	0.84	0.83	0.81	0.83	0.83	0.82
Adj. R^2	0.81	0.82	0.83	0.82	0.80	0.81	0.82	0.80

Notes: $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. The outcome variable used in all models is log-transformed foreign exchange intervention as a share of GDP. Sample includes all countries.

A2.2.2 Model 2, outcome variable: `forex_intensity` (full sample)

Table A5: Relationship Between Export Dependence and Global Production Network Dependence on Currency Manipulation, $(\texttt{forex_intensity})_t$ (Full Country Sample)

	1	2	3	4	5	6	7	8
$\ln(\texttt{exports/gdp})_{t-1}$	0.34	−0.11	−0.03	−0.07	0.23	−0.38	−0.10	−0.69
	(0.23)	(0.55)	(0.52)	(0.87)	(0.23)	(0.57)	(0.50)	(1.12)
$\ln(\texttt{gpn/exp})_{t-1}$		−1.16				0.18		
		(1.30)				(1.25)		
$\ln(\texttt{exp/gdp}\times\texttt{gpn/exp})_{t-1}$		−0.72				−0.93		
		(0.55)				(0.57)		
$\ln(\texttt{fva/exp})_{t-1}$			−0.01				0.46	
			(0.55)				(0.55)	
$\ln(\texttt{exp/gdp}\times\texttt{fva/exp})_{t-1}$			−0.28				−0.22	
			(0.27)				(0.25)	
$\ln(\texttt{dvx/exp})_{t-1}$				−0.83				−1.16
				(1.12)				(1.42)
$\ln(\texttt{exp/gdp}\times\texttt{dvx/exp})_{t-1}$				−0.32				−0.72
				(0.55)				(0.75)
$\ln(\texttt{fdi_out/gdp})_{t-1}$					−0.04	−0.03	−0.03	−0.03
					(0.03)	(0.03)	(0.03)	(0.03)
$(\texttt{polity})_{t-1}$					−0.02	−0.02	−0.02	−0.01
					(0.02)	(0.02)	(0.02)	(0.02)
$\ln(\texttt{save/gdp})_{t-1}$					0.03*	0.03**	0.03*	0.04**
					(0.01)	(0.01)	(0.01)	(0.01)
$\ln(\texttt{ckaopen})_{t-1}$					−0.16	−0.16	−0.15	−0.19*
					(0.09)	(0.09)	(0.08)	(0.09)
Num. obs.	2568	2222	2222	2222	1766	1649	1649	1649
Num. countries	154	154	154	154	120	120	120	120
R^2	0.84	0.13	0.15	0.15	0.14	0.23	0.19	0.19
0.19								
Adj. R^2	0.82	0.07	0.08	0.08	0.08	0.17	0.12	0.12
0.12								

Notes: $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. The outcome variable used in all models is the intensity of foreign exchange intervention over the 2 percent of GDP cutoff set by Treasury. Sample includes all countries.

A2.2.3 Model 3, outcome variable: $\widehat{xr}$ (full sample)

Table A6: Relationship Between Export Dependence and Global Production Network Dependence on Currency Manipulation, $(\widehat{xr})_t$ (Full Country Sample)

	1	2	3	4	5	6	7	8
$\ln(\texttt{exports/gdp})_{t-1}$	−0.00	0.02	0.10*	0.00	0.04	0.04	0.09	0.03
	(0.03)	(0.05)	(0.05)	(0.07)	(0.02)	(0.06)	(0.05)	(0.08)
$\ln(\texttt{gpn/exp})_{t-1}$		−0.25				−0.38*		
		(0.17)				(0.17)		
$\ln(\texttt{exp/gdp}\times\texttt{gpn/exp})_{t-1}$		−0.02				−0.01		
		(0.06)				(0.07)		
$\ln(\texttt{fva/exp})_{t-1}$			−0.13*				−0.21**	
			(0.06)				(0.07)	
$\ln(\texttt{exp/gdp}\times\texttt{fva/exp})_{t-1}$			0.04				0.02	
			(0.03)				(0.03)	
$\ln(\texttt{dvx/exp})_{t-1}$				0.04				0.14
				(0.12)				(0.14)
$\ln(\texttt{exp/gdp}\times\texttt{dvx/exp})_{t-1}$				−0.03				−0.02
				(0.05)				(0.05)
$\ln(\texttt{fdi_out/gdp})_{t-1}$					0.01	0.01*	0.01*	0.01*
					(0.01)	(0.01)	(0.01)	(0.01)
$(\texttt{polity})_{t-1}$					−0.00	0.00	0.00	0.00
					(0.00)	(0.00)	(0.00)	(0.00)
$\ln(\texttt{save/gdp})_{t-1}$					−0.00**	−0.00*	−0.00**	−0.00*
					(0.00)	(0.00)	(0.00)	(0.00)
$\ln(\texttt{ckaopen})_{t-1}$					−0.01	−0.00	−0.01	−0.01
					(0.02)	(0.02)	(0.02)	(0.02)
Num. obs.	2393	2119	2119	2119	1772	1656	1656	1656
Num. countries	140	140	140	140	119	119	119	119
R^2	0.53	0.55	0.56	0.55	0.57	0.58	0.59	0.58
Adj. R^2	0.50	0.52	0.53	0.51	0.53	0.54	0.56	0.54

Notes: $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$. The outcome variable used in all models is the deviation of the real effective exchange rate from the estimated real exchange rate. Sample includes all countries.

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