Online Appendix for "Assessing the Causes of Capital Account Liberalization: How Measurement Matters"

The purpose of this appendix is to present additional materials. We first present six tables with additional statistical analyses. Next, we describe the results of two simulation analyses. Finally, we present several figures that display the predicted values from our replication analyses.

Brief Explanation of Results Presented in this Addendum

Table A1: Replication of Brooks & Kurtz

- A1: Replication of model 1 of Table 2 from Brooks and Kurtz (2007) using *CKAOPEN* as a dependent variable.
- A2: Replication of model 2 of Table 2 from Brooks and Kurtz (2007) using *CKAOPEN* as a dependent variable.
- A3: Replication of model 3 of Table 2 from Brooks and Kurtz (2007) using GMM (Arellano-Bond).
- A4: GMM estimation using *CKAOPEN* as a dependent variable.

Table A2: Replication of Chwieroth

- A5: Replication of model 2 of Table 2 from Chwieroth (2007) using *CKAOPEN* as a dependent variable.
- A6: Replication of model 1 of Table 2 from Chwieroth (2007) using GMM (Arellano-Bond).
- A7: GMM estimation using *CKAOPEN* as a dependent variable.

Table A3: Replication of Grieco, Gelpi & Warren

- A8: Replication of Grieco et al's (2009) third model in Table 3. The dependent variable in this model is the first-difference of *KAOPEN*. The coefficients are not identical to the coefficients presented in Grieco et al's article because multiple imputation inevitably produces somewhat different results in each iteration.
- A9: Replication of Grieco et al's (2009) third model in Table 3 using the first-difference of *CKAOPEN* as a dependent variable. Trade dependence, which we would classify as an economic variable, decreases in size and significance compared to model A4. The coefficients for *USE IMF CREDITS* and *REGIONAL NORMS OF RESTRICTIONS*, which are indicators of external political pressures for capital liberalization, increase by one-third and one-quarter, respectively, from model A4.

Table A4: Replication of Mosley & Singer

- A10: Replication of model 1 of Table 3 from Mosley and Singer (2008).
- A11: Replication of model 1 of Table 3 from Mosley and Singer (2008) using *CKAOPEN* as a dependent variable.

Table A5: Replication of Pepinsky (Cross-Section)

- A12: Replication of Pepinsky's (2009) model 1 of Table 8.3.
- A13: Replication of Pepinsky's (2009) model 1 of Table 8.3 using *CKAOPEN* in place of *KAOPEN*.

Table A6: Replication of Pepinsky (Panel)

- A14: Replication of Pepinsky's (2009) model 1 of Table 8.5.
- A15: Replication of Pepinsky's (2009) model 1 of Table 8.5 using *CKAOPEN* in place of *KAOPEN*.

Table A7: Simulation of Systematic Bias

Motivation: We developed some simple simulations to illustrate the nature and potential consequences of *KAOPEN*'s systematic measurement error. Our objective is to examine the potential problems with using *KAOPEN* as a dependent variable in two highly stylized, but empirically plausible, scenarios.

Setup: We use the full Chinn-Ito dataset with 182 countries from 1965 to 2006 (including a good amount of missing country/years) to generate two variables: one that changes after the capital account is liberalized, thus simulating reverse causality; and a second variable whose lagged values are correlated with *CKAOPEN*, as in a causal relationship. These simulated variables are then used as regressors on the two measures of capital account openness to assess whether and how our causal inferences may be influenced by different measures of capital account openness.

The first variable, *REVERSE*, is constructed to show how *KAOPEN* overstates the effects of some variables that are not true causes of capital account openness. More specifically, we need a variable that does not cause capital account opening, but rather capital account opening *causes* improvements in an independent variable. We construct *REVERSE* as a variable that increases by one unit during each of the three years after k_3 increases.[1]

$$\text{REVERSE}_t = \text{REVERSE}_{t-1} + (k3_{t-1} - k3_{t-4})$$

We create a second variable to assess our claim that *KAOPEN* underestimates the effects

[1] We set $\text{REVERSE}_0 = 0$. In order for this variable to be defined over the entire time span, we use the change since period one for $t<4$: $\text{REVERSE}_t = \text{REVERSE}_{t-1} + (k3_{t-1} - k3_0)$.

of certain causal variables. This time the increase of the dependent variable is "caused" by an independent variable, *SHOCK*. We derive SHOCK from the model

$$\text{CKAOPEN}_t = a + b_1 \times \text{SHOCK}_{(t-1)} + b_2 \times \text{CKAOPEN}_{(t-1)}$$

For illustrative purposes we set $a = 1$, $b_1 = 2$, and $b_2 = .1$. Since *CKAOPEN* is given in our case, we re-write this equation in the following way to solve for SHOCK

$$\text{SHOCK}_{(t-1)} = (\text{CKAOPEN}_t - 0.1 \times \text{CKAOPEN}_{(t-1)} - 1)/2$$

Analysis: The second step of this simulation is to use these constructed variables in a regression, using a set-up typical of studies of capital account policy: a fixed-effects panel model with a lagged dependent variable and a single lagged independent variable.

$$Y_{it} = \beta_0 + \beta_1 \times REVERSE_{i(t-1)} + \beta_2 \times Y_{i(t-1)} + X_i + \delta_{it}$$
$$Y_{it} = \beta_0 + \beta_1 \times SHOCK_{i(t-1)} + \beta_2 \times Y_{i(t-1)} + X_i + \delta_{it}$$

In this setup, Y is the dependent variable—either *KAOPEN* or *CKAOPEN*—and X_i are country fixed effects.

Table A7 displays the results of these regressions. Models A16 and A17 show that *REVERSE* has a statistically significant relationship with both measures of capital account openness, but the effect is much stronger for *KAOPEN* than for *CKAOPEN*. The fact that *CKAOPEN* decreases the coefficient on *REVERSE* by two-thirds, and the coefficient goes from highly significant ($p<0.0001$) to only slightly significant ($p=0.049$) shows that *KAOPEN* can substantially raise the risk of reverse causality problems.

The next two models investigate the effects of *SHOCK*, a variable that increases in value prior to rises in capital account openness. The coefficient of *SHOCK* in model A18, using *CKAOPEN*, is equal to two—the exact value that we defined as its true value (b_1) when constructing this relationship. *SHOCK* remains a highly significant determinant of *KAOPEN* but the coefficient of 1.41 is thirty percent below its true value. This confirms that *KAOPEN* can bias the effects variables that precede episodes of capital account liberalization downward to a noticeable degree.

Table A8: Simulation of Random Measurement Error
We run simulations of the regression from Singer and Mosley (2008), Table 3 model 1. To demonstrate the effect of random measurement error, we add a random error term to the *KAOPEN* variable. The error term is normally distributed around zero ($E(\delta)=0$) and a standard deviation σ. We run three simulations, each with 1000 repetitions, with different size errors: σ is set to 0.16, 0.32, and 0.8, representing one-tenth, one-fifth, and one-half of the total standard deviation of *KAOPEN*.

The coefficients should be compared to the coefficient and SE of *KAOPEN* in table A4, which is 1.16 (.42). Adding a random error term with a standard deviation of 0.16, which is one-tenth of the standard deviation of *KAOPEN* (1.6), leads to a median coefficient of 1.06, and the coefficient is statistically significant with $p < 0.05$ in 99.6% of cases. When the additional random measurement error is 0.32, the median coefficient is 0.87, which is close to the coefficient for *CKAOPEN*, as can be seen in Model A7.

Figures A1-A4: Predicted Values
These figures compare the fitted values with the actual values of *KAOPEN* and *CKAOPEN*. The figures illustrate that the fitted values tend to follow the time path of *KAOPEN* more closely than that of *CKAOPEN*. The predicted values of the models tend to change at the more gradual pace of *KAOPEN*, helping account for the lower standard errors and higher R-squared in the *KAOPEN* models.

- A1: This figure compares the predicted value of *CKAOPEN*, obtained from model 2, Table 2 of the paper, with the actual values of *CKAOPEN* and *KAOPEN*.
- A2: This figure compares the predicted value of *KAOPEN*, obtained from model 1, Table 2 of the paper, with the actual values of *CKAOPEN* and *KAOPEN*.
- A3: This figure compares the predicted value of *CKAOPEN*, obtained from model 2, Table 3 of the paper, with the actual values of *CKAOPEN* and *KAOPEN*.
- A4: This figure compares the predicted value of *KAOPEN*, obtained from model 1, Table 3 of the paper, with the actual values of *CKAOPEN* and *KAOPEN*.

Table A1: Additional Replication Analyses of Brooks & Kurtz (2007)

	(A1)	(A2)	(A3)	(A4)
Partisanship of Executive	0.101*	0.104*	.0255	.145*
	(0.055)	(0.054)	(.0688)	(.0849)
Legislative Fragmentation	-0.799	-0.873*	-1.130	-849
	(0.526)	(0.516)	(.795)	(.933)
Current Account (%GDP)	0.010	0.011	.0163	.0134
	(0.012)	(0.011)	(.0118)	(.0137)
External Debt/GDP	-0.646**	-0.638**	-.496	-.0047
	(0.264)	(0.256)	(.406)	(.456)
Investment/GDP_{t-1}	-0.004	-0.004	-.0194	-.0153
	(0.013)	(0.013)	(.0171)	(.0198)
GDP Growth $Rate_{t-1}$	0.001	0.001	-.0050	-.0194
	(0.013)	(0.013)	(.0131)	(.0152)
GDP (natural log)	-2.080***	-2.024	-1.710	-.336
	(0.727)	(0.691)	(1.198)	(1.43)
GDP per capita	0.178	0.167	.536*	.565*
	(0.257)	(0.249)	(.287)	(.331)
World Bank Flows/GDP_{t-1}	-2.086	-2.248	8.49	-.0767
	(9.338)	(9.377)	(10.51)	(12.39)
IMF Flows/GDP_{t-1}	-5.170	-5.577	.874	-.246
	(5.503)	(5.515)	(6.52)	(7.66)
Year 1995		0.061	.306**	.131
		(0.121)	(.130)	(.151)
Trade/GDP_{t-1}			.00287	-.0105
			(.00627)	(.00726)
LDV	0.563***	0.570***	.327**	.228***
	(0.099)	(0.098)	(.0586)	(.059)
Time Trend	0.141***	0.139***	.139***	.177***
	(0.035)	(0.035)	(.0396)	(.0470)
Trade $Liberalization_{t-1}$	-0.449	-0.468	.284	.214
	(0.352)	(0.347)	(.478)	(.553)
Constant	51.881***	50.554***	38.90	5.96
	(18.096)	(17.222)	(28.01)	(33.51)
N	221	221	200	200
R-Squared	0.82	0.83	-	-

Table A2: Additional Replication Analysis of Chwieroth (2007)

	(A5)	(A6)	(A7)
Neoliberal Team	0.003*	.0018	.0038*
	(0.002)	(.0017)	(.0020)
Neoliberal Chief of Government	0.215	.091	.196
	(0.220)	(.260)	(.299)
International Borrowing	0.0006	.0096**	.00094**
	(0.0006)	(.00040)	(.00046)
Average Private Interest Rate	0.063	.0687*	.091**
	(0.039)	(.0394)	(.046)
Debt Service/Exports	0.0004	-.0052	.0026
	(0.006)	(.0076)	(.0086)
Reserves/Imports	0.027	.124***	.151***
	(0.029)	(.0351)	(.040)
Trade/GDP	-0.002	-.0056	-.012
	(0.004)	(.0064)	(.007)
Domestic Money Bank Assets/GDP	-0.633	-1.36**	-1.63**
	(0.412)	(.569)	(.655)
Leftist Government	-0.221	-.290	-.388*
	(0.218)	(.183)	(.206)
Rightist Government	0.111	-.610	-.019
	(0.153)	(.150)	(.166)
Central Bank Independence (CBI)	-0.117	-.359	-.129
	(0.241)	(.366)	(.413)
Democracy	0.010	.0362***	.037**
	(0.010)	(.0121)	(.015)
Mean Capital Account Policy	0.117	-.033	.197
	(0.367)	(.238)	(.267)
U.S. Trade/GDP	-1.207	.045	-.0069
	(1.004)	(1.50)	(1.75(
U.S. Bilateral Investment Treaty (BIT)	-0.251	-.575**	-.736**
	(0.220)	(.257)	(.291)
IMF Program	0.189**	.190**	.284***
	(0.075)	(.078)	(.088)
Fixed Exchange Rate	0.145	-.126	-.034
	(0.113)	(.105)	(.117)
GDP Per Capita	-0.012	-.0079	-.0055
	(0.016)	(.017)	(.019)
Gross Domestic Savings/GDP	-0.017	-1.36**	-1.63**
	(0.013)	(.579)	(.655)
Currency Crisis	-0.048	-.138	-.055
	(0.116)	(.145)	(.164)
U.S. Interest Rate	0.009	.0055	-.0018
	(0.025)	(.020)	(.023)
Finance Minister Selection Instrument	-0.236	-.061	-.323
	(0.259)	.150	(.377)
Central Banker Selection Instrument	0.468	.241	.467
	(0.434)	(.455)	(.518)
Constant	0.450	.463	
	(0.717)	(.849)	
N	448	426	426
R-Squared	0.83	-	-

Note: *p< .1 **p< .05 ***p< .01. Robust standard errors are in parentheses.

Table A3: Replication Analysis of Grieco et al (2009)

	(A8)	(A9)
Shiftright	0.056**	0.055*
	(0.028)	(0.033)
Balance of Payments	0.001	0.001
	(0.001)	(0.001)
Reserves	0.442***	0.487***
	(0.172)	(0.112)
GDP Growth	-0.0001	0.0001
	(0.0003)	(0.0004)
Use IMF Credits	-0.077***	-0.102***
	(0.026)	(0.033)
GNP Per Capita	8.0e-6	9.4e-6
	(0.00001)	(0.00001)
IMF Surveillance	-0.025	-0.004
	(0.042)	(0.056)
Regional Norm of Restrictions	-0.005**	-0.005**
	(0.002)	(0.002)
Exchange Rate Flexibility	0.026	0.040
	(0.022)	(0.031)
Trade Dependence	0.0011**	0.0009
	(0.0006)	(0.0006)
Proportion of States Signing Article VIII	-0.005	-0.002
	(0.003)	(0.004)
Military	0.013	0.005
	(0.038)	(0.044)
Term Limitations	-0.013	0.002
	(0.030)	(0.037)
Parliamentary	0.027	0.057
	(0.052)	(0.056)
Constant	0.027	0.026
	(0.006)	(0.006)
N	3908	3908

Note: *p< .1 **p< .05 ***p< .01. Robust standard errors are in parentheses.

Table A4: Replication Analysis of Mosley & Singer (2008)

	(A10)	(A11)
Fiscal Balance	-0.10	-0.08
	(0.09)	(0.10)
Stock-Market Capitalization	8.70***	8.87***
	(1.15)	(1.14)
KAOPEN	1.16***	
	(0.42)	
CKAOPEN		0.80**
		(0.39)
Dividend Yield	-1.86***	-1.82***
	(0.26)	(0.25)
Income Per Capital (Log)	-9.48***	-9.54***
	(3.60)	(3.56)
Inflation	0.08	0.07
	(0.07)	(0.07)
Real Interest Rate	-0.12*	-0.13*
	(0.07)	(0.07)
Constant	105.29***	106.36***
	(32.09)	(31.79)
N	521	521
R-Squared	0.64	0.64

Note: *p< .1 **p< .05 ***p< .01. Panel-corrected standard errors are in parentheses.

Table A5: Replication of Pepinsky's (2009) Cross-Sectional Analysis

	(A12)	(A13)
Polityons	-0.348**	-0.353**
	(0.168)	(0.171)
Military	-2.693	-2.689
	(1.995)	(1.980)
Civilian	-3.311*	-3.433*
	(1.881)	(1.902)
GDPPC	-1.610	-1.680*
	(1.020)	(1.009)
ΔGDP	-0.052	-0.049
	(0.104)	(0.105)
Age	-0.092*	-0.089
	(0.056)	(0.055)
Kaopenons	1.687**	
	(0.700)	
Dkaopen	1.840**	
	(0.799)	
Ckaopenons		1.756**
		(0.720)
Dckaopenons		1.729**
		(0.872)
Constant	3.244	3.281
	(2.407)	(2.414)
N	34	34
Pseudo R-Squared	0.51	0.52

Note: *p< .1 **p< .05 ***p< .01. Standard errors are in parentheses.

Table A6: Replication of Pepinsky's (2009) Panel Analysis

	(A14)	(A15)
Polity	0.073***	0.071***
	(0.018)	(0.019)
Military	0.708	0.698
	(0.529)	(0.529)
Civilian	0.007	-0.014
	(0.527)	(0.527)
GDPPC	0.00003	0.00003
	(0.00003)	(0.0003)
ΔGDP	-0.017	-0.016
	(0.014)	(0.014)
Age	-0.009	-0.009
	(0.009)	(0.009)
Crisis	0.653**	0.726**
	(0.291)	(0.293)
Kaopen	-0.098	
	(0.088)	
Crisis×Kaopen	0.375*	
	(0.198)	
Ckaopen		-0.117
		(0.090)
Crisis×Ckaopen		0.475**
		(0.196)
Constant	-2.082***	-2.349
	(0.757)	(0.850)
N	699	715
Pseudo R-Squared	0.17	0.17

Note: *p< .1 **p< .05 ***p< .01. Standard errors are in parentheses.

Table A7: Results of Simulations of Systematic Measurement Error

	(A16) *CKAOPEN*	(A17) *KAOPEN*	(A18) *CKAOPEN*	(A19) *KAOPEN*
Reverse(t-1)	0.021**	0.059***		
	(0.011)	(0.0095)		
Shock(t-1)			2.0***	1.41***
			(<.0001)	(0.0090)
Y(t-1)	0.87***	0.88***	0.10***	0.36***
	(0.0094)	(0.0089)	(4.5e-18)	(0.0044)
N	5574	5079	5576	5080

Note: *p< .1 **p< .05 ***p< .01. Standard errors are in parentheses.

Table A8: Simulation of Random Measurement Error (Mosley & Singer)

	Median Coefficient (SE)	Share of coefficients significant at p<.05 (p<.01)
$\sigma = 0$ (SD_{KAOPEN})	1.16 (0.42)	p = 0.006
$\sigma = .16$ ($SD_{KAOPEN}/10$)	1.06 (0.402)	0.996 (0.596)
$\sigma = .32$ ($SD_{KAOPEN}/5$)	0.865 (0.357)	0.829 (0.381)
$\sigma = .8$ ($SD_{KAOPEN}/2$)	0.374 (0.224)	(0.362) (0.133)

Figure A1: Predicted Values of CKAOPEN (Brooks & Kurtz)

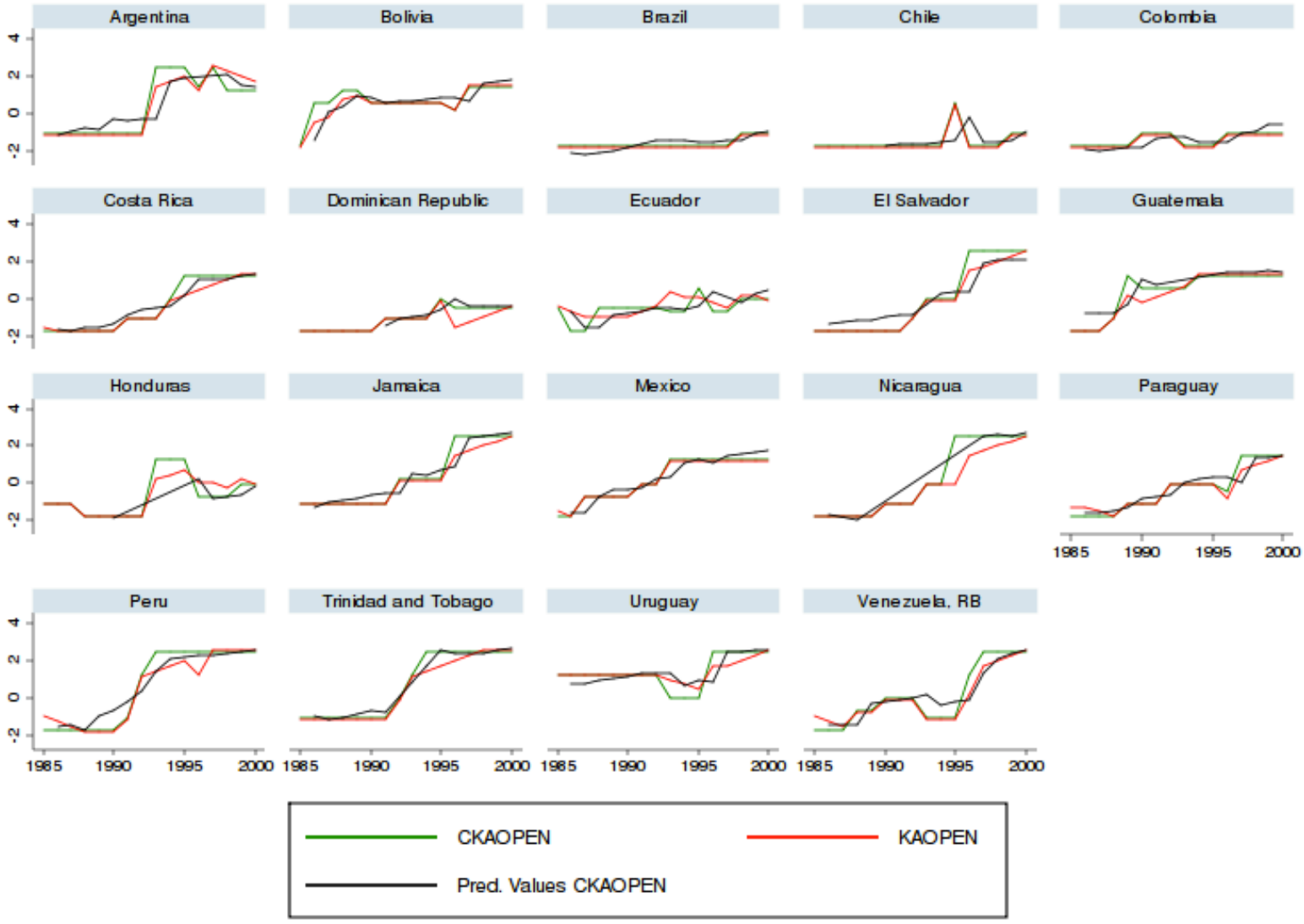


Figure A2: Predicted Values of KAOPEN (Brooks & Kurtz)

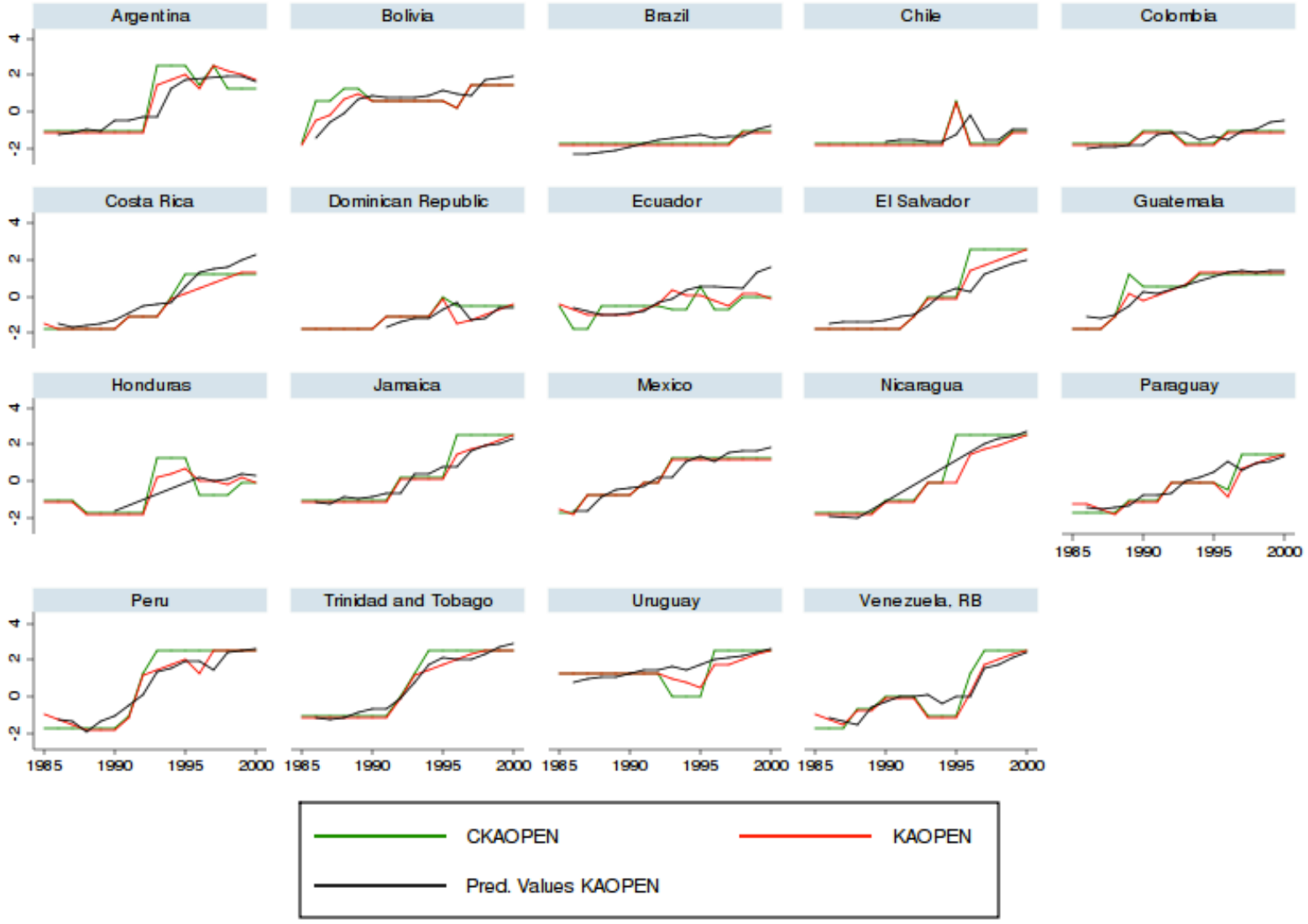


Figure A3: Predicted Values of CKAOPEN (Chwieroth)

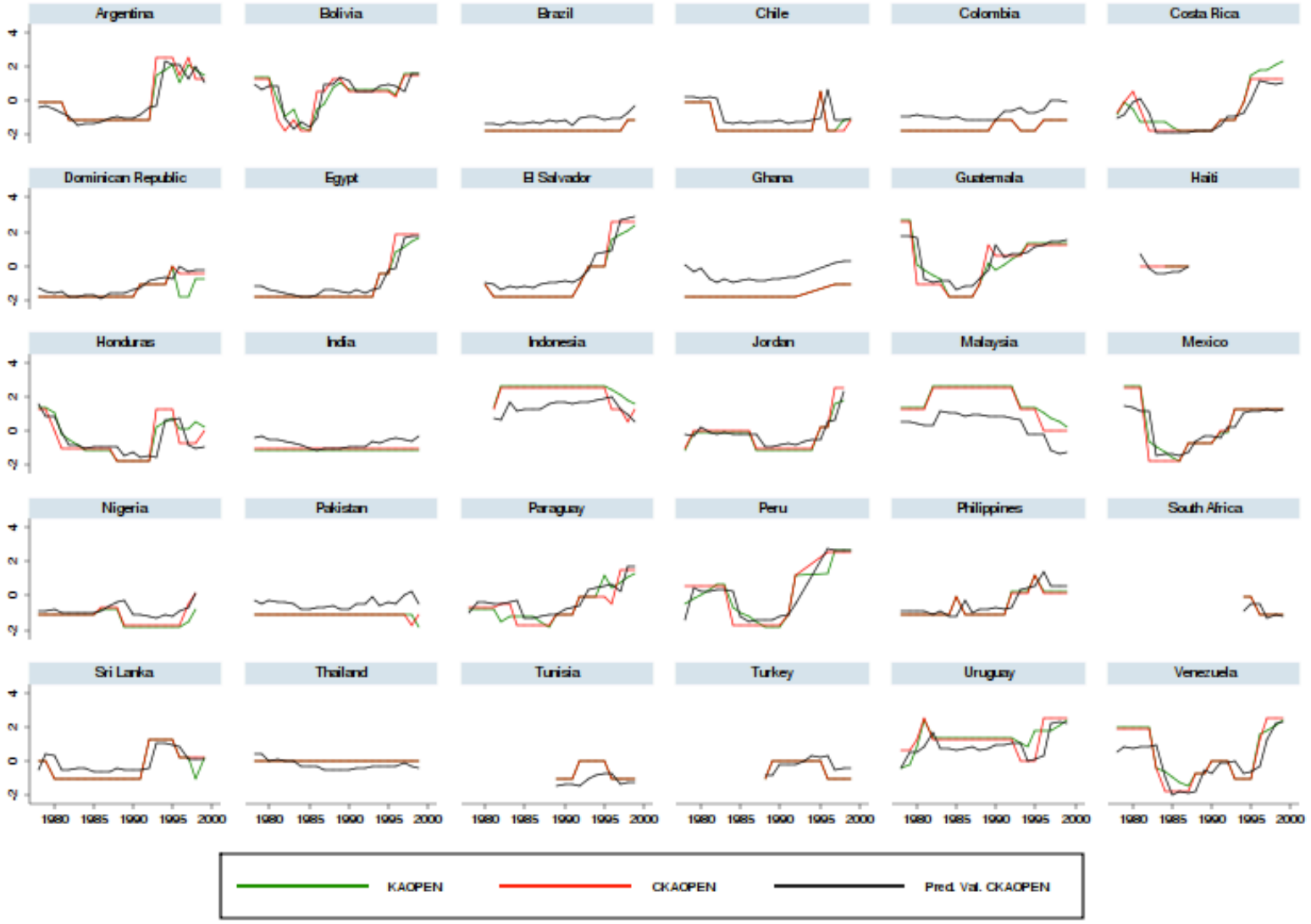
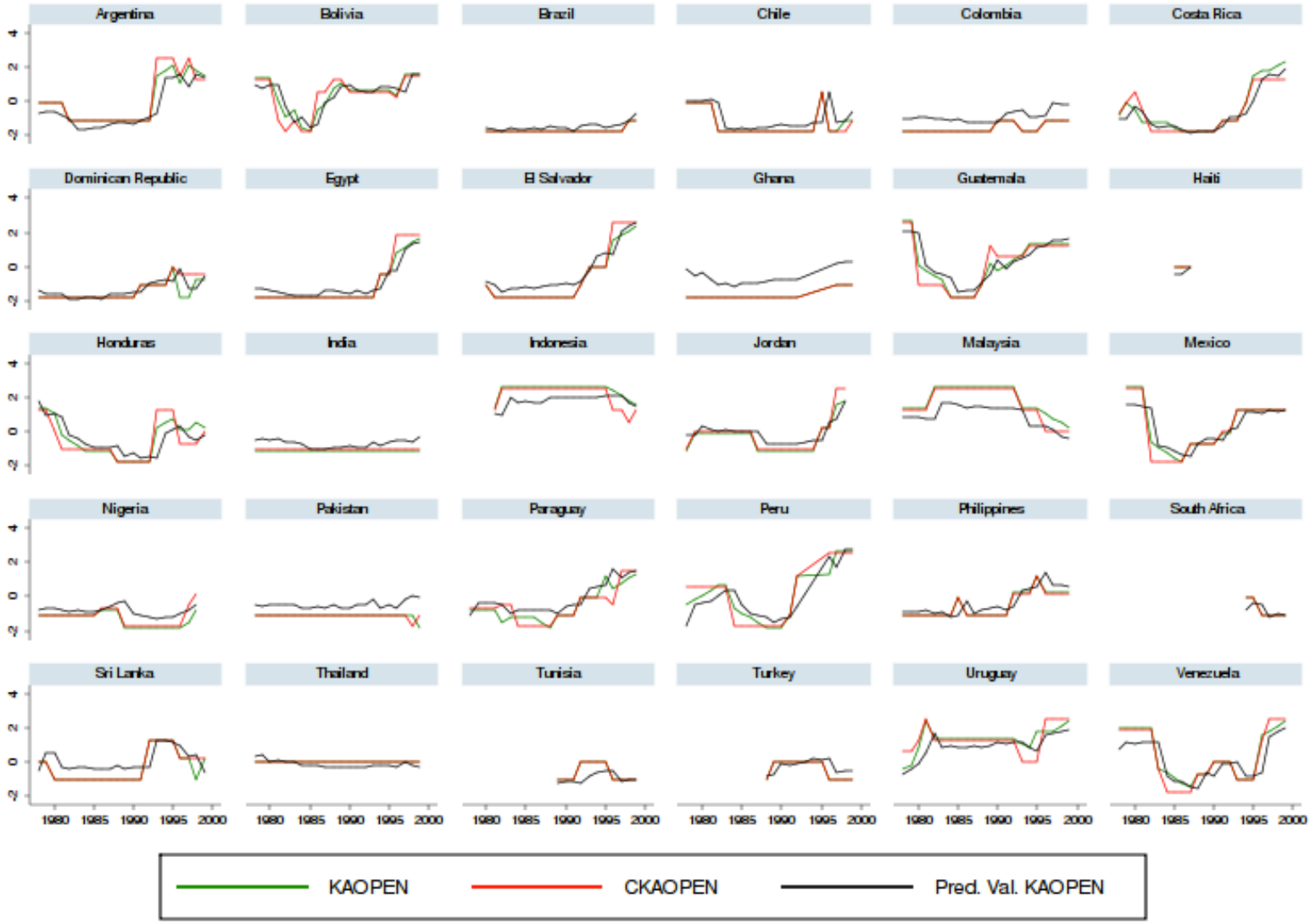


Figure A4: Predicted Values of KAOPEN (Chwieroth)



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