Online Appendix of
Exchange Rates and Domestic Credit – Can Macroprudential Policy Reduce the Link?

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Appendix A. Robustness Check of the Baseline

We perform a number of further analysis and tests in order to examine more deeply the relationships identified in the main results and to assess their robustness.

Appendix A.1 Using Actual Rather than Forecasted GDP Growth

In the baseline result of Table 4 in the main body of the paper, we control for the impact of the forecasted real GDP growth on domestic credit development. In this section, we replace the forecasted growth rates with the realized growth rates, i.e., the (lagged) year-over-year log change of quarterly real GDP from the IMF World Economic Outlook (WEO) database ($\Delta^4 RGDP$). Actual GDP growth rates are more commonly used in the existing literature (Fendoglu 2017; Cerutti, Claessens, and Laeven 2017). However, they may, in the context of our exercises, be inferior as a control for potential simultaneity issues that arise when both credit and the exchange rate changes are being driven by economic expectations, for example related to good news about economic prospects.

Overall, results presented in Appendix Table A1 are consistent with Table 4. However, they also suggest that GDP forecasts are a much stronger control than past realizations of GDP. While the coefficient of $\Delta^4 RGDP$ is positive and statistically significant, as was found in other studies, the size of the coefficient is only about a half of that for the GDP forecast: a one percent increase in the actual real GDP growth rates leads to an increase of the credit gap by about 0.24–0.29 percentage points of GDP, compared with about 0.45-–0.5 percentage points of GDP for the forecasted real GDP growth. This suggests that the

evolution of credit gaps is more closely related to the expectation of future growth than to past growth in GDP. Moreover, and by contrast, the coefficient on the real exchange rate movement is somewhat larger when we use actual GDP compared to when we use the growth forecast, consistent with the idea that the larger coefficient is capturing some of the "good" news effects we control for when using forecast GDP. The coefficient of the interactions term $MaPP_{i,t-1} \times \Delta^4 RER_{i,t-1}$, on the other hand, roughly remain with the same magnitudes and levels of significance.

Appendix A.2 Effects of Macroprudential Policies by Country Characteristics

We next examine whether the effects vary by country characteristics (Appendix Table A2). We initially divide the country sample into two groups: the G7 countries, which are considered to be the source countries of global capital flows, and the non-G7 group, which tend to receive these flows.

We first present results for specifications that use both macroprudential policy shocks and exchange rate shocks, as introduced separately in the sections above, for the full sample of countries. The results, shown in columns 1–4, document once again that macroprudential policy shocks have significant effects in reducing credit, and that there is an interaction, where in the presence of a shock to the domestic real exchange rate, a macroprudential tightening reduces the expansionary effect of the appreciation on the credit gap.

The results for different sample splits are shown in columns 5–12. Overall, the effects are strong for the non-G7 group, but not for the G7. In particular, the base effect of the exchange rate on credit developments is significant and strong for the non-G7 group while it is insignificant for G7 countries (as indicated by the coefficients of $\Delta^4 RER_{i,t-1}$ in columns 9-–12). The same holds for the extent to which tightening macroprudential policy can weaken the interactions between currency and credit movements, being strong and significant for non-G7 but insignificant for G7 countries.

We further divide the non-G7 group into more and less financially open economies. Using the de facto financial account openness index developed by Lane and Milesi-Ferretti (2007), we take the average index for each country over the sample period (we take 2015 value for the index in 2016). The more financially open (closed) non-G7 economies are categorized as those having an average index above (below or equal to) the sample median. We find that the interaction effects between macroprudential policy and exchange rate shocks remain strong and significant in the more financially open group, despite the reduction in the sample size to 27 countries, while both base and interaction effects are measured statistically insignificant for the group of relative more financially closed economies (columns 13–21). This leads us to conclude that the effects are strongest for small open economies, and less relevant statistically

for either advanced economies or relatively closed EMDEs.

Appendix A.3 Alternative Measure of Domestic Credit Developments

We finally consider an alternative and simpler measure of domestic credit developments. Although the credit gap is a well-established broad-based indicator of systemic risk in the time dimension (Drehmann 2013), it relies on a statistical filtering of the aggregate credit series that is subject to well-known issues regarding end-date biases, structural breaks, and the parameters driving the filtering. To side-step these criticisms, we employ an alternative and simpler measure, which is the four-quarter change of the credit-to-GDP ratio. As does the credit gap, this measure continues to relate credit aggregates to the size of the economy. It does not however, rely on any filtering method.

When using this alternative outcome variable, our specification continues to employ exchange rate shocks, macroprudential shocks, as well as monetary policy and GDP forecasts as controls. The results, shown in Appendix Table A3, document that currency appreciations are associated with increases in credit also using this alternative measure, with results for increases in the ratio of credit to GDP as statistically significant as those for the credit gap. The direct effects of macroprudential policy on the alternative measure of credit appear somewhat weaker, even as the effect remains statistically highly significant for the borrower-based tools. The strength of the interaction effects, on the other hand, is quite similar to the results using the credit gap, and economically if anything somewhat larger. For example, the coefficient of $MaPP_{i,t-1} \times \Delta^4 RER_{i,t-1}$ in column 2 is 0.446 in the bottom panel, compared with 0.256 when using the credit gap (upper panel).

Looking at different groups and specifications of macroprudential policies, the detailed results line up slightly differently. For instance, relaxations of macroprudential policy continue to strengthen the effect of appreciation on credit and this now applies to both borrower-based and financial institution-based tools. Overall, however, the headline results on the link between exchange rates and credit and the interaction effects of macroprudential policy in reducing this link carry over to this alternative measure of credit.

We finally return to the credit gap as the outcome variable and report the results for individual policy tools. Appendix Table A4 indicates strong and significant interaction effects for caps on loan-to-value (LTVs) in particular. Those results should be interpreted with caution, however, since when it comes to individual tools, the number of macroprudential actions recorded in the database is in general quite small.

Appendix B Robustness Check of the Extension "Feedback Effect"

We conduct robustness check for the feedback effect in the extension section (Table 9 and 10). For assessing the "walls" effect of capital controls with macroprudential policy shocks, Appendix Table B1 presents the result in a fixed effect model, and Table B2 presents the result in a random effect model. The random effect model considers de-meaned variables (of capital inflows and monetary policy stance). The average credit-to-GDP ratio over sample period by country is included as an additional country-specific "pull" factor in the random effect regressions. For assessing the "gate" effect of capital controls with macroprudential policy shocks, Table B3 presents the result in a fixed effect model, and Table B4 presents the result in a random effect model–with inclusion of capital inflow control shocks.

When using the constructed macroprudential policy shocks, similar to results in the main paper, we find robust evidence that macroprudential policy tightening is associated with increase in other investment flows, with the result being significant for borrower-based tools. When we further add the constructed shocks of "capital inflow controls" (see Appendix Table B4), the statistical significance of the base effect of capital control improves in some regressions.

Table A1: Robustness — Results with Actual GDP Growth Rates

	iMaPP				Borrower-based tools				Financial institutions-based tools			
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Y_{t-1}	0.983***	0.990***	0.984***	0.988***	0.987***	0.987***	0.988***	0.987***	0.986***	0.990***	0.984***	0.990***
	(0.017)	(0.016)	(0.018)	(0.017)	(0.017)	(0.016)	(0.017)	(0.016)	(0.019)	(0.017)	(0.017)	(0.017)
$\Delta^4 RER_{t-1}$	-0.056***	-0.056***	-0.052**	-0.049***	-0.058***	-0.061***	-0.057***	-0.058***	-0.058***	-0.057***	-0.057***	-0.047**
	(0.021)	(0.018)	(0.022)	(0.019)	(0.020)	(0.017)	(0.020)	(0.018)	(0.020)	(0.019)	(0.020)	(0.022)
$MaPP_{t-1}$	-0.894**	-0.745**			-2.269**	-1.955**			-0.483	-0.392		
	(0.404)	(0.350)			(0.965)	(0.996)			(0.515)	(0.477)		
$MaPP_{t-1} \times \Delta^4 RER_{t-1}$		**0.158*** **				**0.264***				**0.171*** **		
		(0.050)				(0.145)				(0.049)		
T_MaPP_{t-1}			-1.030**	-0.752			-2.097	-1.640			-0.890	-0.721
			(0.437)	(0.487)			(1.381)	(1.381)			(0.707)	(0.872)
$T\_MaPP_{t-1} \times \Delta^4 RER_{t-1}$				**0.128***				**0.303*** *				0.094
				(0.067)				(0.154)				(0.081)
L_MaPP_{t-1}			-0.331	-1.155			-3.156**	-2.664			0.231	-0.468
			(0.747)	(0.739)			(1.582)	(1.834)			(1.155)	(0.690)
$L\_MaPP_{t-1} \times \Delta^4 RER_{t-1}$				**0.191*** **				0.093				**0.201*** **
				(0.060)				(0.264)				(0.046)
MPS_{t-1}	-0.220***	-0.186***	-0.206***	-0.180**	-0.241***	-0.209***	-0.248***	-0.235***	-0.208***	-0.183***	-0.197***	-0.197**
	(0.067)	(0.061)	(0.069)	(0.080)	(0.062)	(0.063)	(0.064)	(0.064)	(0.066)	(0.063)	(0.063)	(0.077)
$\Delta^4 RGDP_{t-1}$	0.290***	0.264***	0.277***	0.269***	0.262***	0.239***	0.256***	0.252***	0.267***	0.255***	0.252***	0.257***
	(0.052)	(0.047)	(0.049)	(0.050)	(0.053)	(0.049)	(0.050)	(0.045)	(0.057)	(0.055)	(0.048)	(0.053)
Observations	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842
# of Economies	62	62	62	62	62	62	62	62	62	62	62	62
AB AR(1) test - p value	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.001	0.003	0.001	0.003	0.002
AB AR(2) test - p value	0.356	0.226	0.290	0.311	0.328	0.242	0.347	0.280	0.365	0.252	0.298	0.285
Hansen test - p value	1	1	1	1	1	1	1	1	1	1	1	1

Source: Authors' calculations.

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A2: Effectiveness of Macroprudential Policies by Country Characteristics

	All (baseline)				G7				non-G7				non-G7: Financially open				non-G7: Financially closed			
	iMaPP				iMaPP				iMaPP				iMaPP				iMaPP			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(18)	(19)	(20)	(21)
$\Delta^4 RER\_Shock_{t-1}$	-0.053**	-0.052**	-0.049**	-0.046**	0.115	4.449	0.870	-1.114	-0.059**	-0.056**	-0.058**	-0.060***	-0.066**	-0.056**	-0.067**	-0.049	-0.048	-0.040	-0.051	-0.094***
	(0.021)	(0.021)	(0.020)	(0.020)	(0.139)	(3.148)	(0.595)	(1.205)	(0.024)	(0.023)	(0.024)	(0.020)	(0.032)	(0.025)	(0.030)	(0.033)	(0.032)	(0.032)	(0.034)	(0.017)
$MaPP\_Shock_{t-1}$	-1.114**	-1.794***			0.570	-80.857			-0.741	-1.391**			0.201	-0.464			0.064	0.097		
	(0.492)	(0.600)			(1.171)	(55.555)			(0.533)	(0.620)			(0.607)	(0.573)			(0.336)	(0.285)		
$MaPP\_Shock_{t-1} \times \Delta^4 RER\_Shock_{t-1}$		**0.256*** **				15.358				**0.243*** **				**0.314*** **				-0.014		
		(0.087)				(9.654)				(0.091)				(0.100)				(0.053)		
$T\_MaPP\_Shock_{t-1}$			-2.460***	-2.944***			-7.225	125.037			-2.095***	-2.747***			-1.416	-1.798			-0.309	-0.839
			(0.717)	(0.758)			(7.761)	(94.092)			(0.689)	(0.856)			(1.028)	(1.358)			(0.496)	(0.969)
$T\_MaPP\_Shock_{t-1} \times \Delta^4 RER\_Shock_{t-1}$				**0.228****				-31.393				**0.231****				**0.301**				0.113
				(0.096)				(27.581)				(0.091)				(0.214)				(0.102)
$L\_MaPP\_Shock_{t-1}$			0.616	-0.433			22.217	0.000			0.761	-0.022			1.741*	0.887			0.676	1.444
			(0.811)	(1.118)			(22.322)	(0.000)			(0.788)	(0.980)			(0.894)	(0.994)			(0.720)	(0.933)
$L\_MaPP\_Shock_{t-1} \times \Delta^4 RER\_Shock_{t-1}$				**0.260**				2.604				**0.231**				**0.346*** **				-0.230
				(0.159)				(4.145)				(0.166)				(0.071)				(0.200)
MPS_{t-1}	-0.303***	-0.265***	-0.295***	-0.266***	-0.011	-13.593	-6.165	-14.144	-0.268***	-0.242***	-0.256***	-0.240***	-0.184**	-0.231*	-0.222**	-0.197*	-0.255**	-0.231*	-0.254**	-0.202
	(0.079)	(0.077)	(0.083)	(0.072)	(0.789)	(8.843)	(5.668)	(10.006)	(0.076)	(0.072)	(0.075)	(0.068)	(0.093)	(0.124)	(0.097)	(0.103)	(0.108)	(0.124)	(0.121)	(0.148)
$\Delta^4 F\_RGDP_{t-1}$	0.595***	0.570***	0.595***	0.564***	0.319	6.393	2.986	-2.944	0.568***	0.544***	0.569***	0.545***	0.696***	0.539***	0.658***	0.595***	0.321***	0.296***	0.292***	0.265***
	(0.097)	(0.103)	(0.095)	(0.094)	(3.161)	(6.350)	(2.701)	(3.691)	(0.099)	(0.099)	(0.101)	(0.092)	(0.152)	(0.154)	(0.157)	(0.183)	(0.104)	(0.101)	(0.113)	(0.093)
Observations	3,505	3,505	3,505	3,505	406	406	406	406	3,099	3,099	3,099	3,099	1,558	1,558	1,558	1,558	1,541	1,541	1,541	1,541
# of Economies	62	62	62	62	7	7	7	7	55	55	55	55	27	27	27	27	28	28	28	28
AB AR(1) test - p value	0.00324	0.000464	0.00121	0.000261	0.0955	0.400	0.180	0.342	0.0102	0.00196	0.00497	0.00109	0.0489	0.0222	0.0427	0.0217	0.000325	0.000300	0.000281	0.00430
AB AR(2) test - p value	0.652	0.575	0.305	0.312	0.877	0.529	0.265	0.442	0.661	0.491	0.404	0.309	0.491	0.422	0.397	0.419	0.702	0.677	0.813	0.693
Hansen test - p value	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Source: Authors' calculations.

Note: (a) Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

(b) We use the de facto financial account openness index developed by Lane and Milesi-Ferretti (2017). We take the average index for each country over the sample period (we take 2015 value for the index in 2016). The more financially open (closed) non-G7 economies are categorized as those having an average index above (below or equal to) the sample median.

Table A3: Robustness — Alternative and Simpler Measure of Credit Developments

	iMaPP				Borrower-based tools				Financial institutions-based tools			
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Y=Credit-to-GDP Gap (baseline)												
$\Delta^4 RER\_Shock_{t-1}$	-0.053**	-0.052**	-0.049**	-0.046**	-0.049**	-0.054**	-0.049**	-0.035*	-0.054**	-0.046**	-0.051**	-0.055***
	(0.021)	(0.021)	(0.020)	(0.020)	(0.025)	(0.024)	(0.022)	(0.018)	(0.022)	(0.021)	(0.020)	(0.021)
$MaPP\_Shock_{t-1}$	-1.114**	-1.794***			-2.110**	-4.030**			-1.131**	-1.528***		
	(0.492)	(0.600)			(1.021)	(1.608)			(0.552)	(0.524)		
$MaPP\_Shock_{t-1} \times \Delta^4 RER\_Shock_{t-1}$		**0.256*** **				**0.506** **				**0.185** **		
		(0.087)				(0.210)				(0.080)		
$T\_MaPP\_Shock_{t-1}$			-2.460***	-2.944***			-1.932	-2.744*			-3.358***	-3.557***
			(0.717)	(0.758)			(1.646)	(1.661)			(1.046)	(1.157)
$T\_MaPP\_Shock_{t-1} \times \Delta^4 RER\_Shock_{t-1}$				**0.228** **				**0.245** **				**0.214** **
				(0.096)				(0.098)				(0.104)
$L\_MaPP\_Shock_{t-1}$			0.616	-0.433			-2.677*	-6.619*			1.451	1.087
			(0.811)	(1.118)			(1.516)	(3.438)			(1.216)	(1.172)
$L\_MaPP\_Shock_{t-1} \times \Delta^4 RER\_Shock_{t-1}$				**0.260**				1.052***				**0.132**
				(0.159)				(0.353)				(0.081)
Observations	3,505	3,505	3,505	3,505	3,505	3,505	3,505	3,505	3,505	3,505	3,505	3,505
# of Economies	62	62	62	62	62	62	62	62	62	62	62	62
Y=4-quarter change of credit/GDP ratio												
$\Delta^4 RER\_Shock_{t-1}$	-0.105**	-0.114**	-0.100**	-0.012	-0.108**	-0.114**	-0.108**	-0.058	-0.103**	-0.107**	-0.099**	-0.046
	(0.047)	(0.050)	(0.044)	(0.056)	(0.047)	(0.053)	(0.050)	(0.037)	(0.050)	(0.045)	(0.047)	(0.051)
$MaPP\_Shock_{t-1}$	0.151	-0.926			-2.524*	-3.866***			0.697	-0.257		
	(0.912)	(0.913)			(1.509)	(1.392)			(0.843)	(0.825)		
$MaPP\_Shock_{t-1} \times \Delta^4 RER\_Shock_{t-1}$		**0.446** **				0.457				**0.345** *		
		(0.222)				(0.379)				(0.204)		
$T\_MaPP\_Shock_{t-1}$			-1.656	-0.954			-3.644**	-1.964			-1.078	-0.794
			(1.398)	(1.205)			(1.526)	(2.191)			(1.816)	(1.404)
$T\_MaPP\_Shock_{t-1} \times \Delta^4 RER\_Shock_{t-1}$				-0.034				-0.267				**0.044**
				(0.223)				(0.215)				(0.165)
$L\_MaPP\_Shock_{t-1}$			2.746	-0.394			1.242	-5.159			3.310	0.900
			(2.202)	(1.792)			(3.425)	(4.213)			(2.806)	(1.567)
$L\_MaPP\_Shock_{t-1} \times \Delta^4 RER\_Shock_{t-1}$				**0.807*** **				**1.803*** **				**0.718*** **
				(0.264)				(0.403)				(0.205)
Observations	3,505	3,505	3,505	3,505	3,505	3,505	3,505	3,505	3,505	3,505	3,505	3,505
# of Economies	62	62	62	62	62	62	62	62	62	62	62	62

Source: Authors' calculations.

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A4: Effectiveness of Macroprudential Policies by Individual Instrument

	iMaPP	Borrower-based tools		Financial institutions-based tools													Other
	iMaPP	LTV	DSTI	CCB	LVR	Capital	Conservation	LLP	LFC	Tax	LTD	LCG	LoanR	Liquidity	RR	LFX	OT
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Use MaPP Stance (same setup in Baseline)																	
$\Delta^4 RER_{t-1}$	-0.054***	-0.055***	-0.061***	-0.057***	-0.058***	-0.055***	-0.056***	-0.057***	-0.049***	-0.056***	-0.054***	-0.053***	-0.053***	-0.055***	-0.059***	-0.058***	-0.058***
	(0.018)	(0.019)	(0.021)	(0.020)	(0.020)	(0.021)	(0.022)	(0.021)	(0.017)	(0.020)	(0.021)	(0.020)	(0.018)	(0.017)	(0.022)	(0.021)	(0.022)
$MaPP_{t-1}$	-0.737	**-2.852****	-3.056	-1.754	-10.757	-2.920	-3.817	0.328	-19.412	2.482	-12.841	-3.342	0.370	**-7.331****	1.511	-5.319	-2.090
	(0.461)	(1.196)	(2.149)	(4.620)	(9.850)	(2.278)	(5.637)	(4.414)	(22.121)	(2.545)	(8.859)	(4.203)	(1.947)	(2.876)	(1.322)	(8.622)	(3.379)
$MaPP_{t-1} \times \Delta^4 RER_{t-1}$	**0.144*****	**0.370****	0.499	0.416	1.766	0.291	0.111	0.943	-2.750	-0.327	-0.867	0.207	**0.128***	0.205	0.122	1.222	0.406
	(0.048)	(0.168)	(0.329)	(0.409)	(1.323)	(0.307)	(0.198)	(0.585)	(3.993)	(0.394)	(2.655)	(0.411)	(0.069)	(0.507)	(0.099)	(1.213)	(0.560)
$\Delta^4 RER_{t-1}$	-0.052***	-0.055***	-0.056**	-0.062***	-0.058***	-0.063***	-0.054**	-0.052***	-0.054***	-0.055**	-0.056***	-0.053***	-0.052***	-0.054***	-0.058**	-0.056***	-0.059***
	(0.019)	(0.019)	(0.023)	(0.020)	(0.020)	(0.020)	(0.021)	(0.019)	(0.019)	(0.022)	(0.020)	(0.019)	(0.018)	(0.016)	(0.026)	(0.019)	(0.021)
T_MaPP_{t-1}	**-0.852***	-2.195	**-4.124***	1.585	-10.757	-2.022	-3.713	7.282	-27.235	2.957	-19.571	-7.095	-2.658	**-7.501***	1.547	-6.584	-4.685
	(0.503)	(2.164)	(2.275)	(6.711)	(9.850)	(2.209)	(6.173)	(5.797)	(31.534)	(2.887)	(15.316)	(6.152)	(2.562)	(3.958)	(1.777)	(9.783)	(4.677)
$T\_MaPP_{t-1} \times \Delta^4 RER_{t-1}$	**0.130****	**0.420****	**0.464***	1.935	1.766	0.497	0.222	**1.064***	-3.163	-0.438	0.187	-0.271	-0.178	0.447	0.098	1.391	0.096
	(0.061)	(0.209)	(0.275)	(1.398)	(1.323)	(0.390)	(0.360)	(0.590)	(4.350)	(0.478)	(3.231)	(0.613)	(0.251)	(0.614)	(0.180)	(1.410)	(0.630)
L_MaPP_{t-1}	-0.630	**-4.035****	12.817	20.394	0.000	-13.453	-18.346	-19.544	7.114	43.257	0.466	0.440	4.712	-4.985	1.446	2.674	.
	(0.709)	(1.724)	(11.959)	(108.692)	(0.000)	(9.666)	(41.921)	(17.403)	(19.691)	(48.675)	(16.042)	(6.333)	(6.912)	(4.395)	(1.723)	(32.135)	.
$L\_MaPP_{t-1} \times \Delta^4 RER_{t-1}$	**0.159*****	0.200	0.546	-3.848	0.000	-1.051	-2.770	2.506	-0.102	0.554	-5.596	0.203	-0.031	-0.211	0.152	6.953	4.452
	(0.042)	(0.250)	(0.740)	(10.355)	(0.000)	(0.867)	(7.201)	(1.844)	(4.359)	(2.267)	(8.985)	(0.508)	(0.271)	(1.010)	(0.180)	(10.345)	(4.733)
# of Overall MaPP Actions	417	58	28	5	13	91	30	27	13	30	1	1	30	34	20	16	20
# of Tightening Actions	758	93	37	7	13	116	32	41	17	33	7	10	40	49	218	24	21
# of Loosening Actions	341	35	9	2	0	25	2	14	4	3	6	9	10	15	198	8	1
Observations	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842	3,842
# of Economies	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62

Source: Authors' calculations.

Note: (a) Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

(b) The coefficient of tightening action of "other" tools is omitted due to its insufficient action number, as indicated in the table.

Table B1: Leakages and the "Walls" Effect of Capital Controls

(The Fixed Effect Model with Macroprudential Policy Shocks)

	Baseline	iMaPP				Borrower-based tools				Financial institutions-based tools			
Variables	(1) FE	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE	(7) FE	(8) FE	(9) FE	(10) FE	(11) FE	(12) FE	(13) FE
The "Walls" Effect of Capital Controls + MaPP													
$CFLOW_{t-1}$	0.713***	0.719***	0.717***	0.719***	0.719***	0.719***	0.717***	0.719***	0.719***	0.719***	0.717***	0.719***	0.718***
	(0.032)	(0.024)	(0.023)	(0.023)	(0.024)	(0.024)	(0.024)	(0.023)	(0.024)	(0.023)	(0.023)	(0.023)	(0.024)
	0.713	*0.720*	*0.719*	*0.721*	*0.720*	*0.720*	*0.719*	*0.720*	*0.720*	*0.720*	*0.719*	*0.720*	*0.720*
Y_{t-1}	0.091**	0.085**	0.121**	0.084**	0.099*	0.085**	0.120**	0.081**	0.098*	0.086**	0.122**	0.086**	0.099**
	(0.037)	(0.034)	(0.038)	(0.034)	(0.044)	(0.035)	(0.039)	(0.033)	(0.044)	(0.034)	(0.038)	(0.034)	(0.044)
	0.057	*0.055*	*0.078*	*0.054*	*0.063*	*0.054*	*0.077*	*0.052*	*0.063*	*0.055*	*0.079*	*0.055*	*0.064*
$FARI_{t-1}$	-4.933*	-6.109*	-7.344*	-6.000*	-6.419*	-6.304*	-7.522*	-6.241*	-6.619**	-6.017*	-7.264*	-6.045*	-6.332*
	(2.341)	(2.778)	(3.660)	(2.822)	(2.846)	(2.817)	(3.706)	(2.839)	(2.899)	(2.773)	(3.668)	(2.814)	(2.844)
	-0.045	*-0.054*	*-0.064*	*-0.053*	*-0.056*	*-0.055*	*-0.066*	*-0.055*	*-0.058*	*-0.053*	*-0.064*	*-0.053*	*-0.056*
$MaPP\_Shock_{t-1}$		0.165	0.154	0.126	0.154	1.520**	1.501**	1.270*	1.517**	-0.094	-0.104	-0.082	-0.108
		(0.110)	(0.104)	(0.169)	(0.110)	(0.498)	(0.507)	(0.680)	(0.502)	(0.188)	(0.179)	(0.191)	(0.192)
		0.004	*0.004*	*0.003*	*0.004*	*0.040*	*0.039*	*0.033*	*0.040*	*-0.002*	*-0.003*	*-0.002*	*-0.003*
MPS_{t-1}	0.174**	0.210**	0.205**	0.210**	0.199**	0.211**	0.206**	0.211**	0.201**	0.209**	0.204**	0.209**	0.199**
	(0.074)	(0.090)	(0.088)	(0.090)	(0.087)	(0.091)	(0.089)	(0.091)	(0.088)	(0.090)	(0.088)	(0.089)	(0.087)
	0.047	*0.054*	*0.053*	*0.054*	*0.051*	*0.054*	*0.053*	*0.054*	*0.052*	*0.054*	*0.052*	*0.054*	*0.051*
$Y_{t-1} \times FARI_{t-1}$			-0.106**				-0.104*				-0.106**		
			(0.046)				(0.048)				(0.046)		
			-0.030				*-0.030*				*-0.030*		
$Y_{t-1} \times MaPP\_Shock_{t-1}$				0.024				0.099				-0.008	
				(0.038)				(0.083)				(0.015)	
				0.006				*0.025*				*-0.002*	
$Y_{t-1} \times MPS_{t-1}$					-0.004				-0.004				-0.004
					(0.004)				(0.004)				(0.004)
					-0.013				*-0.013*				*-0.013*
$\Delta^4 F\_RGDP_{t-1}$	0.570	0.602	0.595	0.599	0.604	0.593	0.586	0.588	0.595	0.604	0.597	0.604	0.606
	(0.366)	(0.415)	(0.410)	(0.416)	(0.411)	(0.415)	(0.409)	(0.415)	(0.410)	(0.416)	(0.410)	(0.417)	(0.412)
	0.074	*0.077*	*0.076*	*0.077*	*0.077*	*0.076*	*0.075*	*0.075*	*0.076*	*0.077*	*0.076*	*0.077*	*0.078*
Constant	0.567	-0.434	-0.101	-0.460	-3.221	-0.317	-3.027	-0.302	-3.188	-0.471	-3.099	-0.462	-0.310
	(2.358)	(2.477)	(2.356)	(2.475)	(2.246)	(2.479)	(2.251)	(2.477)	(2.243)	(2.474)	(2.262)	(2.465)	(2.430)
Time-fixed Effect	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter
Observations	3,603	3,326	3,326	3,326	3,326	3,326	3,326	3,326	3,326	3,326	3,326	3,326	3,326
# of Economies	61	61	61	61	61	61	61	61	61	61	61	61	61
Overall R-square	0.725	0.733	0.733	0.733	0.733	0.733	0.733	0.734	0.733	0.733	0.733	0.733	0.733
Within R-square	0.631	0.635	0.635	0.635	0.635	0.636	0.636	0.636	0.636	0.635	0.635	0.635	0.635

Source: Authors' calculations.

Note: (a) Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

(b) We drop Taiwan POC in the sample due to missing data of financial account restriction index.

(c) The blue italic numbers are standardized coefficients, representing the change of standard deviation in the dependent variable by one standard deviation change in corresponding independent variables.

(d) Both of the capital inflows and capital control measures are based on the gross other investment inflows.

Table B2: Leakages and the "Walls" Effect of Capital Controls

(The Random Effect Model with Macroprudential Policy Shocks)

	Baseline	iMaPP				Borrower-based tools				Financial institutions-based tools			
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	RE	RE	RE	RE	RE	RE	RE	RE	RE	RE	RE	RE	RE
The "Walls" Effect of Capital Controls + MaPP													
$CFLOW\_DM_{t-1}$	0.721***	0.729***	0.728***	0.729***	0.729***	0.729***	0.728***	0.729***	0.729***	0.728***	0.727***	0.728***	0.729***
	(0.032)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
	0.726	*0.728*	*0.727*	*0.728*	*0.728*	*0.728*	*0.727*	*0.728*	*0.728*	*0.728*	*0.727*	*0.728*	*0.728*
Y_{t-1}	0.069***	0.067***	0.088***	0.065***	0.066***	0.067***	0.087***	0.063***	0.065***	0.067***	0.088***	0.068***	0.066***
	(0.024)	(0.022)	(0.026)	(0.022)	(0.022)	(0.023)	(0.027)	(0.022)	(0.022)	(0.023)	(0.026)	(0.022)	(0.022)
	0.054	*0.053*	*0.070*	*0.052*	*0.052*	*0.053*	*0.069*	*0.050*	*0.051*	*0.053*	*0.070*	*0.054*	*0.052*
$FARI_{t-1}$	-2.723*	-2.718	-3.000	-2.665	-2.710	-2.751	-3.025	-2.681	-2.742	-2.697	-2.981	-2.713	-2.688
	(1.574)	(1.748)	(2.028)	(1.750)	(1.763)	(1.747)	(2.026)	(1.731)	(1.760)	(1.748)	(2.032)	(1.776)	(1.762)
	-0.031	*-0.029*	*-0.032*	*-0.029*	*-0.029*	*-0.030*	*-0.033*	*-0.029*	*-0.030*	*-0.029*	*-0.032*	*-0.029*	*-0.029*
$MaPP\_Shock_{t-1}$		0.138	0.129	0.101	0.137	1.487***	1.471***	1.241*	1.488***	-0.121	-0.128	-0.107	-0.122
		(0.110)	(0.107)	(0.162)	(0.112)	(0.495)	(0.500)	(0.638)	(0.496)	(0.184)	(0.179)	(0.184)	(0.187)
		0.004	*0.004*	*0.003*	*0.004*	*0.048*	*0.047*	*0.040*	*0.048*	*-0.004*	*-0.004*	*-0.003*	*-0.004*
MPS_DM_{t-1}	0.156**	0.179**	0.176**	0.180**	0.178**	0.180**	0.178**	0.180**	0.180**	0.179**	0.176**	0.178**	0.178**
	(0.071)	(0.077)	(0.077)	(0.077)	(0.078)	(0.079)	(0.078)	(0.079)	(0.080)	(0.077)	(0.076)	(0.077)	(0.078)
	0.032	*0.035*	*0.034*	*0.035*	*0.035*	*0.035*	*0.034*	*0.035*	*0.035*	*0.035*	*0.034*	*0.034*	*0.034*
$Y_{t-1} \times FARI_{t-1}$			-0.061*				-0.059*				-0.062*		
			(0.035)				(0.035)				(0.035)		
			-0.021				*-0.021*				*-0.022*		
$Y_{t-1} \times MaPP\_Shock_{t-1}$				0.023				0.096				-0.010	
				(0.035)				(0.080)				(0.014)	
				0.007				*0.030*				*-0.003*	
$Y_{t-1} \times MPS\_DM_{t-1}$					-0.001				-0.001				-0.001
					(0.005)				(0.005)				(0.005)
					-0.002				*-0.002*				*-0.002*
$\Delta^4 F\_RGDP_{t-1}$	0.354	0.365	0.362	0.363	0.365	0.359	0.356	0.355	0.360	0.367	0.363	0.367	0.367
	(0.235)	(0.258)	(0.257)	(0.259)	(0.257)	(0.258)	(0.257)	(0.259)	(0.257)	(0.259)	(0.258)	(0.260)	(0.258)
	0.056	*0.057*	*0.057*	*0.057*	*0.058*	*0.057*	*0.056*	*0.056*	*0.057*	*0.058*	*0.057*	*0.058*	*0.058*
$Avg\ Credit/GDP$	0.003	0.003	0.002	0.003	0.003	0.003	0.002	0.003	0.003	0.003	0.002	0.003	0.003
	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
	0.009	*0.011*	*0.008*	*0.011*	*0.011*	*0.010*	*0.008*	*0.010*	*0.011*	*0.011*	*0.008*	*0.011*	*0.011*
Constant	1.482	1.496	1.666	1.457	1.494	1.590	1.755	1.538	1.587	1.499	1.672	1.508	1.496
	(1.617)	(1.623)	(1.730)	(1.633)	(1.626)	(1.637)	(1.748)	(1.625)	(1.639)	(1.618)	(1.725)	(1.625)	(1.620)
Time-fixed Effect	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter
Observations	3,603	3,326	3,326	3,326	3,326	3,326	3,326	3,326	3,326	3,326	3,326	3,326	3,326
# of Economies	61	61	61	61	61	61	61	61	61	61	61	61	61
Overall R-square	0.629	0.635	0.635	0.635	0.635	0.636	0.636	0.636	0.636	0.635	0.635	0.635	0.635

Source: Authors' calculations.

Note: (a) Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

(b) We drop Taiwan POC in the sample due to missing data of financial account restriction index.

(c) The blue italic numbers are standardized coefficients, representing the change of standard deviation in the dependent variable by one standard deviation change in corresponding independent variables.

(d) Both of the capital inflows and capital control measures are based on the gross other investment inflows.

Table B3: Leakages and the "Gates" Effect of Capital Controls

(The Fixed Effect Model with Macroprudential Policy Shocks and Capital Control Shocks)

	Baseline	iMaPP				Borrower-based tools				Financial institutions-based tools			
Variables	(1) FE	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE	(7) FE	(8) FE	(9) FE	(10) FE	(11) FE	(12) FE	(13) FE
The "Gates" Effect of Capital Controls + MaPP													
$CFLOW_{t-1}$	0.725***	0.725***	0.725***	0.725***	0.725***	0.725***	0.725***	0.725***	0.725***	0.725***	0.725***	0.725***	0.725***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)
	0.728	*0.728*	*0.728*	*0.728*	*0.728*	*0.728*	*0.728*	*0.728*	*0.728*	*0.727*	*0.727*	*0.727*	*0.727*
Y_{t-1}	0.094**	0.094**	0.094**	0.092**	0.103**	0.093**	0.094**	0.090**	0.102**	0.094**	0.094**	0.094**	0.103**
	(0.029)	(0.029)	(0.029)	(0.030)	(0.037)	(0.030)	(0.030)	(0.029)	(0.037)	(0.029)	(0.029)	(0.030)	(0.037)
	0.063	*0.063*	*0.064*	*0.062*	*0.069*	*0.063*	*0.063*	*0.061*	*0.069*	*0.063*	*0.064*	*0.064*	*0.070*
$\Delta FARI\_Shock_{t-1}$	-0.295	-0.321	-0.279	-0.305	-0.313*	-0.336*	-0.286	-0.371*	-0.330*	-0.268	-0.222	-0.276	-0.260
	(0.191)	(0.180)	(0.227)	(0.167)	(0.170)	(0.177)	(0.229)	(0.177)	(0.168)	(0.173)	(0.212)	(0.181)	(0.163)
	-0.003	*-0.004*	*-0.003*	*-0.003*	*-0.004*	*-0.004*	*-0.003*	*-0.004*	*-0.004*	*-0.003*	*-0.003*	*-0.003*	*-0.003*
$MaPP\_Shock_{t-1}$		0.116	0.114	0.088	0.107	1.335**	1.341**	1.068	1.329**	-0.119	-0.123	-0.110	-0.131
		(0.096)	(0.094)	(0.124)	(0.093)	(0.561)	(0.560)	(0.637)	(0.556)	(0.176)	(0.171)	(0.170)	(0.180)
		0.003	*0.003*	*0.002*	*0.003*	*0.035*	*0.035*	*0.028*	*0.035*	*-0.003*	*-0.003*	*-0.003*	*-0.003*
MPS_{t-1}	0.188*	0.189*	0.190*	0.191*	0.179*	0.190*	0.191*	0.190*	0.179*	0.190*	0.190*	0.189*	0.178*
	(0.088)	(0.090)	(0.090)	(0.090)	(0.087)	(0.091)	(0.091)	(0.091)	(0.088)	(0.090)	(0.090)	(0.089)	(0.087)
	0.050	*0.051*	*0.051*	*0.051*	*0.048*	*0.051*	*0.051*	*0.051*	*0.048*	*0.051*	*0.051*	*0.050*	*0.048*
$Y_{t-1} \times \Delta FARI\_Shock_{t-1}$			-0.019				-0.023				-0.020		
			(0.025)				(0.024)				(0.025)		
			-0.002				*-0.003*				*-0.003*		
$Y_{t-1} \times MaPP\_Shock_{t-1}$				0.022				0.105				-0.009	
				(0.025)				(0.073)				(0.012)	
				0.006				*0.029*				*-0.002*	
$Y_{t-1} \times MPS_{t-1}$					-0.003				-0.003				-0.003
					(0.004)				(0.004)				(0.004)
					-0.010				*-0.009*				*-0.010*
$\Delta^4 F\_RGDP_{t-1}$	0.518	0.518	0.517	0.517	0.520	0.510	0.508	0.504	0.512	0.520	0.519	0.520	0.522
	(0.415)	(0.415)	(0.414)	(0.416)	(0.411)	(0.415)	(0.414)	(0.415)	(0.411)	(0.416)	(0.415)	(0.416)	(0.412)
	0.067	*0.066*	*0.066*	*0.066*	*0.067*	*0.065*	*0.065*	*0.064*	*0.065*	*0.067*	*0.066*	*0.067*	*0.067*
Constant	-1.278	-4.237	-1.287	-4.250	-4.139	-1.217	-4.234	-1.188	-1.123	-1.313	-4.269	-1.306	-4.171
	(2.404)	(2.412)	(2.437)	(2.418)	(2.363)	(2.431)	(2.419)	(2.426)	(2.425)	(2.439)	(2.425)	(2.435)	(2.373)
Time-fixed Effect	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter
Observations	3,522	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506
# of Economies	61	61	61	61	61	61	61	61	61	61	61	61	61
Overall R-square	0.732	0.732	0.732	0.732	0.732	0.732	0.732	0.733	0.732	0.732	0.732	0.732	0.732
Within R-square	0.637	0.637	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.637	0.638	0.638	0.638

Source: Authors' calculations.

Note: (a) Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

(b) We drop Taiwan POC in the sample due to missing data of financial account restriction index.

(c) The blue italic numbers are standardized coefficients, representing the change of standard deviation in the dependent variable by one standard deviation change in corresponding independent variables.

(d) Both of the capital inflows and capital control measures are based on the gross other investment inflows.

Table B4: Leakages and the "Gates" Effect of Capital Controls

(The Random Effect Model with Macroprudential Policy Shocks and Capital Control Shocks)

	Baseline	iMaPP				Borrower-based tools				Financial institutions-based tools			
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	RE	RE	RE	RE	RE	RE	RE	RE	RE	RE	RE	RE	RE
The "Gates" Effect of Capital Controls + MaPP													
$CFLOW\_DM_{t-1}$	0.732***	0.732***	0.732***	0.733***	0.733***	0.732***	0.732***	0.732***	0.733***	0.732***	0.732***	0.732***	0.732***
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)
	0.733	*0.733*	*0.733*	*0.733*	*0.733*	*0.733*	*0.733*	*0.733*	*0.733*	*0.733*	*0.733*	*0.733*	*0.733*
Y_{t-1}	0.071***	0.071***	0.071***	0.069***	0.068***	0.070***	0.071***	0.066***	0.068***	0.071***	0.071***	0.071***	0.068***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.022)	(0.020)	(0.020)	(0.020)	(0.022)	(0.020)	(0.020)	(0.020)	(0.022)
	0.059	*0.059*	*0.059*	*0.057*	*0.057*	*0.058*	*0.059*	*0.055*	*0.056*	*0.059*	*0.059*	*0.059*	*0.057*
$\Delta FARI\_Shock_{t-1}$	-0.294*	-0.322**	-0.286	-0.306**	-0.319**	-0.337**	-0.293	-0.369**	-0.334**	-0.268*	-0.228	-0.279*	-0.264*
	(0.170)	(0.160)	(0.200)	(0.147)	(0.159)	(0.161)	(0.205)	(0.161)	(0.160)	(0.159)	(0.189)	(0.170)	(0.159)
	-0.004	*-0.005*	*-0.004*	*-0.004*	*-0.004*	*-0.005*	*-0.004*	*-0.005*	*-0.005*	*-0.004*	*-0.003*	*-0.004*	*-0.004*
$MaPP\_Shock_{t-1}$		0.121	0.119	0.094	0.120	1.381**	1.385**	1.107*	1.381**	-0.117	-0.121	-0.105	-0.119
		(0.100)	(0.098)	(0.128)	(0.100)	(0.566)	(0.564)	(0.631)	(0.566)	(0.178)	(0.173)	(0.169)	(0.181)
		0.004	*0.004*	*0.003*	*0.004*	*0.045*	*0.045*	*0.036*	*0.045*	*-0.004*	*-0.004*	*-0.003*	*-0.004*
MPS_DM_{t-1}	0.164**	0.163**	0.163**	0.164**	0.161**	0.164**	0.164**	0.165**	0.162**	0.163**	0.163**	0.162**	0.161**
	(0.071)	(0.070)	(0.070)	(0.071)	(0.071)	(0.072)	(0.072)	(0.072)	(0.073)	(0.070)	(0.070)	(0.069)	(0.071)
	0.033	*0.033*	*0.033*	*0.033*	*0.033*	*0.033*	*0.033*	*0.033*	*0.033*	*0.033*	*0.033*	*0.033*	*0.033*
$Y_{t-1} \times \Delta FARI\_Shock_{t-1}$			-0.017				-0.020				-0.018		
			(0.025)				(0.024)				(0.025)		
			-0.003				*-0.003*				*-0.003*		
$Y_{t-1} \times MaPP\_Shock_{t-1}$				0.021				0.106				-0.012	
				(0.024)				(0.072)				(0.012)	
				0.007				*0.036*				*-0.004*	
$Y_{t-1} \times MPS\_DM_{t-1}$					-0.001				-0.001				-0.001
					(0.003)				(0.003)				(0.003)
					-0.003				*-0.003*				*-0.003*
$\Delta^4 F\_RGDP_{t-1}$	0.250	0.252	0.251	0.252	0.252	0.246	0.245	0.244	0.247	0.254	0.253	0.253	0.255
	(0.224)	(0.225)	(0.224)	(0.225)	(0.224)	(0.225)	(0.224)	(0.226)	(0.224)	(0.225)	(0.224)	(0.225)	(0.224)
	0.040	*0.040*	*0.039*	*0.040*	*0.040*	*0.039*	*0.039*	*0.038*	*0.039*	*0.040*	*0.040*	*0.040*	*0.040*
$Avg\ Credit/GDP$	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
	0.012	*0.012*	*0.012*	*0.012*	*0.012*	*0.011*	*0.011*	*0.011*	*0.012*	*0.012*	*0.012*	*0.011*	*0.012*
Constant	-2.157	-2.165	-2.160	-2.198	-2.161	-2.110	-2.103	-2.119	-2.105	-2.164	-2.158	-2.148	-2.160
	(1.678)	(1.685)	(1.681)	(1.685)	(1.692)	(1.696)	(1.692)	(1.699)	(1.703)	(1.689)	(1.685)	(1.671)	(1.696)
Time-fixed Effect	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter
Observations	3,522	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506
# of Economies	61	61	61	61	61	61	61	61	61	61	61	61	61
Overall R-square	0.637	0.637	0.637	0.637	0.637	0.637	0.637	0.638	0.637	0.637	0.637	0.637	0.637

Source: Authors' calculations.

Note: (a) Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

(b) We drop Taiwan POC in the sample due to missing data of financial account restriction index.

(c) The blue italic numbers are standardized coefficients, representing the change of standard deviation in the dependent variable by one standard deviation change in corresponding independent variables.

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