Online Appendix for "Offshore Activities and Financial vs Operational Hedging"

(not for publication)

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This appendix contains additional tables that are mentioned and described in the paper but were not reported there to preserve space. Specifically, this appendix includes:

- Table OA.1: Offshore input predictions with futures contracts volume
- Table OA.2: Difference-in-differences of offshore input predictions
- Table OA.3: Falsification tests of offshore input predictions
- Table OA.4: Financial constraints and hedging motives

1. Additional results for FX illiquidity

For robustness, we consider a second measure of FX liquidity, which is the total trading volume of FX exchange-traded futures contracts. Following standard interpretations in the

literature, a more actively traded FX contract is likely to be more liquid and less costly to be used as a hedge. The trading volume data are available from the Bank for International Settlements (BIS) website.* We consider the natural logarithm of one plus the notional principal of all contracts in billions of US dollars traded for each nation in a given year.

[Insert Table OA.1 Here]

Table OA.1 confirms our findings on FX illiquidity that firms are more likely to participate in external input (we do not find an analogous result for internal input) when FX trading volume is lower. The economic impact of FX futures volume on either external input or relative external input is approximately 1.4% or 1.8%, which is considerably larger than those of FX illiquidity in Table 5 of the paper which uses the Karnaukh, Ranaldo, and Söderlind (2015) measure.

2. Difference-in-differences of offshore input predictions

Table OA.2 displays the results for all variables, including all control variables, for the first two columns in the main paper's Tables 7, 8, and 9, respectively.

[Insert Table OA.2 Here]

3. Falsification tests of offshore input predictions

Table OA.3 displays the results of placebo tests based on the main paper's Tables 7, 8, and 9, respectively. The tests are based on the primary specifications in the first two columns of each main-paper table.

[Insert Table OA.3 Here]

*See http://www.bis.org/statistics/extderiv.htm. The 23 nations with available FX future trading volume data are slightly different from the 23 nations with available FX illiquidity data by Karnaukh, Ranaldo, and Söderlind (2015). The included nations are Australia, Brazil, Canada, Japan, Mexico, New Zealand, Norway, South Africa, South Korea, Sweden, Switzerland, United Kingdom, and the 11 European Monetary Union (EMU) member nations including Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain.

4. Refined tests of financial constraints

The standard view in the literature based on Froot, Scharfstein, and Stein (1993) (FSS) is that firms hedge more in the presence of financial constraints due to precautionary motives. However, the theory in Rampini and Viswanathan (2010) (RV) suggests, counter to FSS, that constrained firms will hedge less when constraints are due to collateral constraints. In our setting, we expect the predictions of FSS to hold in the absence of collateral constraints, and the predictions of RV to hold when collateral constraints are binding. We thus consider the separate measures of financial constraints from Hoberg and Maksimovic (2015) for the equity and the debt markets. As collateral constraints are only likely to be binding for debt market constrained firms, we predict that equity market constrained firms will be more sensitive to hedging incentives as in FSS, and that debt market constrained firms will be less sensitive to hedging incentives as in RV.

[Insert Table OA.4 Here]

Panel A of Table OA.4 reconsiders the test in row 6 of Table 11 of the paper for equity and debt market constraints. We find that the DD results are indeed stronger for equity constrained firms consistent with FSS. In contrast, we find insignificant results for debt market constraints. The latter result suggests that, although the debt constrained firms might be different, support for RV is weak in this setting. In Panel B, we further test for differences between equity and debt market constrained firms using the FX illiquidity tests in Table 5 of the paper. In particular, we add the interaction term between FX illiquidity and each of the financial constraint measures. The cross terms in columns 4 and 6 once again confirm the FSS prediction that hedging motives are stronger for equity market constrained firms. However, columns 7 and 9 show that this effect reverses for debt market constrained firms as predicted by RV. Overall, we conclude that financial constraints are indeed material to hedging decisions, and furthermore that the type of constraint is also important in understanding the full effect.

Table OA.1
Offshore input predictions with futures contracts volume

The table analyzes the propensity to do offshore external or internal input. One observation is one firm-nation-year and we have a total of 145,331 observations with non-missing FX futures volume. External input dummy is one if the firm discusses its offshore external input with the relevant vocabulary in our offshore word lists along with a given nation word in a given year. Internal input dummy is one if the firm discusses its offshore internal input with the relevant vocabulary in our offshore word lists along with a given nation word in a given year. Relative external vs internal is External input dummy divided by the sum of both External and Internal input dummies. We express the dependent variables in percentages. FX futures volume is the log of one plus the size (notional principal) of all exchange-traded futures contracts in billions of US dollars for a given nation in a given year. The FX futures contract volume data come from the exchange-traded derivatives statistics at the Bank for International Settlements (BIS) website. Output fraction is the firm's output focus on a given nation, which is computed as the number of times the firm mentions its offshore output to the given nation divided by the total number of times the firm mentions its offshore output to all nations in our sample. See Appendix B of the paper for a description of our variables in detail. All control variables are one year lagged. t-statistics (in parentheses) are adjusted for nation clustering. ***, **, and * indicate statistical significance at 1%, 5%, and 10% level, respectively.

	External input dummy		Internal input dummy		Relative external vs internal	
FX futures volume	-1.398***	-0.509	0.349	-0.700	-1.816***	-0.334
	(-3.52)	(-1.07)	(0.26)	(-0.55)	(-5.20)	(-1.09)
FX futures volume * Output fraction		0.103		0.385		-0.0102
		(0.44)		(0.69)		(-0.05)
Output fraction		1.943***		3.142***		1.183***
		(7.41)		(3.67)		(4.77)
Log(GDP)	4.551***		5.987**		4.224***	
	(6.69)		(2.79)		(4.76)	
Log(GNPpc)	-3.208*		-2.086		-2.160	
	(-1.74)		(-0.40)		(-0.91)	
Distance from US	-1.260**		-3.667***		-0.333	
	(-2.71)		(-2.91)		(-0.91)	
Developed	-2.832		1.590		-3.159	
	(-1.34)		(0.20)		(-1.05)	
Political stability	2.752***	0.831	1.379	3.115***	2.185**	-0.313
	(3.25)	(1.27)	(0.47)	(4.10)	(2.11)	(-0.50)
Log(MV assets)	0.0844	0.361	0.576	6.955***	-0.629	-1.607***
	(0.26)	(0.90)	(0.57)	(8.96)	(-1.16)	(-3.16)
Log(1+age)	0.0465	0.111	1.163**	0.616	-0.336	0.144
	(0.19)	(0.61)	(2.73)	(1.69)	(-0.92)	(0.58)
Tobin's Q	-0.0953	-0.806***	-0.211	-3.642***	0.178	-0.204
	(-0.96)	(-7.48)	(-0.98)	(-20.19)	(1.02)	(-1.45)
Operating margin	-0.409***	-0.853***	-0.410	-1.288***	-0.0796	-1.217***
	(-2.89)	(-4.03)	(-1.25)	(-2.98)	(-0.54)	(-3.71)
Book leverage	0.191	0.516**	0.784***	1.107***	0.100	0.365*
	(1.08)	(2.19)	(3.20)	(2.87)	(0.41)	(1.74)
Dividend payer	0.630	0.386	0.474	3.047***	0.586	-0.00640
	(1.26)	(0.81)	(1.11)	(4.85)	(1.23)	(-0.01)
Cash/assets	0.0495	-0.569***	-0.453	-1.832***	0.0709	-0.365
	(0.43)	(-4.35)	(-1.61)	(-3.12)	(0.30)	(-0.92)
PPE/assets	-0.569**	0.296**	-0.634	1.980***	-0.219	-0.0760
	(-2.25)	(2.78)	(-1.33)	(4.66)	(-0.54)	(-0.49)
CAPX/sales	-0.111	-0.390*	0.235	-0.264	0.0158	-0.424*
	(-0.96)	(-1.79)	(0.78)	(-0.65)	(0.11)	(-1.76)
R&D/sales	-0.598***	-1.018***	-1.184***	-4.110***	-0.135	-0.175
	(-3.27)	(-4.58)	(-3.78)	(-11.44)	(-0.49)	(-0.44)
Observations	145331	145331	145331	145331	76336	76336
Adjusted R^2	0.254	0.030	0.347	0.080	0.411	0.042
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Other fixed effects	Firm	Nation	Firm	Nation	Firm	Nation

Table OA.2
Difference-in-differences of offshore input predictions

The table reports difference-in-differences effects of new CME derivative product launch events on external input, internal input, and relative external versus internal input. The table displays results for the first two columns in the paper's Tables 7, 8, and 9, respectively. The only difference is that all control variables are reported in this table, which was not possible in the main tables due to space constraints. See Appendix Table A.1 of the paper for the details of the CME events. One observation is one firm-nation-year, and we have a total of 195,651 observations (100,263 observations for the last two columns on Relative external vs internal). External input dummy is one if the firm discusses its offshore external input with the relevant vocabulary in our offshore word lists along with a given nation word in a given year. Internal input dummy is one if the firm discusses its offshore internal input with the relevant vocabulary in our offshore word lists along with a given nation word in a given year. Relative external vs internal is External input dummy divided by the sum of both External and Internal input dummies. Treated is a nation dummy variable that equals one if the nation's currency products are included in the menu of new products introduced by the CME during our sample period. Post is a year dummy variable that equals one if the year is post the first CME event-year. The Post variable is subsumed by the year fixed effects and thus is not displayed. All nation and firm control variables previously used are included in the regressions. t-statistics (in parentheses) are adjusted for nation clustering. ***, **, and * indicate statistical significance at 1%, 5%, and 10% level, respectively.

	External input dummy		Internal input dummy		Relative external vs internal	
Treated	-0.373		6.800***		-1.959***	
	(-0.61)		(2.87)		(-2.88)	
Treated * Post	-0.678**	-0.827***	-2.287*	-0.793	-0.568	-0.867*
	(-2.28)	(-3.03)	(-1.73)	(-0.98)	(-1.53)	(-1.94)
Log(GDP)	2.242***		6.232***		1.493***	
	(8.00)		(6.89)		(5.01)	
Log(GNPpc)	0.966		-3.854*		1.908***	
	(1.34)		(-1.80)		(2.76)	
Distance from US	-1.541*		-1.452		-0.745	
	(-1.71)		(-0.54)		(-0.77)	
Developed	-2.201		12.28***		-5.765***	
	(-1.35)		(3.15)		(-4.01)	
Political stability	0.276	0.112	1.933**	0.297	-0.232	-0.0356
	(0.91)	(0.28)	(2.14)	(0.35)	(-0.65)	(-0.09)
Log(MV assets)	-0.104	-0.184	0.374	5.737***	-0.862*	-2.061***
	(-0.32)	(-0.61)	(0.43)	(8.51)	(-1.74)	(-5.56)
Log(1+age)	-0.0755	0.121	1.883***	0.799***	-0.514	0.0300
	(-0.31)	(0.77)	(3.94)	(2.62)	(-1.50)	(0.14)
Tobin's Q	0.00648	-0.791***	-0.324*	-3.736***	0.399**	-0.103
	(0.06)	(-8.39)	(-1.73)	(-22.00)	(2.49)	(-0.77)
Operating margin	-0.270*	-0.733***	-0.448*	-1.486***	0.258	-0.881***
	(-1.91)	(-3.24)	(-1.72)	(-3.72)	(1.29)	(-2.86)
Book leverage	0.175	0.492**	0.825***	1.476***	0.0155	0.220
	(1.03)	(2.26)	(3.57)	(4.50)	(0.07)	(1.08)
Dividend payer	0.587	0.0245	0.138	2.397***	0.671	-0.155
	(1.44)	(0.06)	(0.38)	(4.13)	(1.59)	(-0.35)
Cash/assets	0.112	-0.235	-0.388	-1.283**	0.192	-0.0923
	(1.06)	(-1.22)	(-1.50)	(-2.42)	(1.08)	(-0.25)
PPE/assets	-0.300	0.550***	-0.410	2.526***	-0.105	0.0744
	(-1.27)	(3.88)	(-1.03)	(6.66)	(-0.28)	(0.45)
CAPX/sales	-0.136	-0.227	0.311	0.333	-0.117	-0.496**
	(-1.36)	(-1.24)	(1.22)	(0.85)	(-0.86)	(-2.15)
R&D/sales	-0.510***	-0.946***	-1.297***	-4.391***	0.0965	0.174
	(-3.05)	(-5.35)	(-5.62)	(-13.81)	(0.35)	(0.50)
Observations	195651	195651	195651	195651	100263	100263
Adjusted R^2	0.239	0.023	0.336	0.074	0.401	0.040
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Other fixed effects	Firm, Region	Nation	Firm, Region	Nation	Firm, Region	Nation

Table OA.3
Falsification tests of offshore input predictions

The table reports difference-in-differences effects of placebo events on external input, internal input, and relative external versus internal input. The placebo events correspond to the two (Panel A) and three (Panel B) years prior to each new CME derivative product launch, respectively. See Appendix Table A.1 of the paper for the details of the actual CME events. The 1999 CME event is excluded in the placebo tests, because two or three years prior to 1999 is beyond our sample period. External input dummy is one if the firm discusses its offshore external input with the relevant vocabulary in our offshore word lists along with a given nation word in a given year. Internal input dummy is one if the firm discusses its offshore internal input with the relevant vocabulary in our offshore word lists along with a given nation word in a given year. Relative external vs internal is External input dummy divided by the sum of both External and Internal input dummies. Treated is a nation dummy variable that equals one if the nation's currency products are included in the menu of new products introduced by the CME in 2002, 2006 or 2009. Post is a year dummy variable that equals one if the year is post the placebo event year. The Post variable is subsumed by the year fixed effects and thus is not displayed. All nation and firm control variables used in the paper are included in the regressions, but not reported to conserve space. t-statistics (in parentheses) are adjusted for nation clustering. ***, **, and * indicate statistical significance at 1%, 5%, and 10% level, respectively.

	External input dummy		Internal input dummy		Relative external vs internal	
Panel A: Placebo events two years prior to actual CME events						
Treated * Post	-0.0539	-0.209	-2.235	-0.178	-0.0323	-0.180
	(-0.16)	(-0.48)	(-1.50)	(-0.21)	(-0.07)	(-0.36)
Treated	-0.488		7.101***		-2.049***	
	(-0.79)		(3.03)		(-2.91)	
Observations	190601	190601	190601	190601	97681	97681
Adjusted R^2	0.239	0.023	0.336	0.074	0.401	0.040
Panel B: Placebo events three years prior to actual CME events						
Treated * Post	-0.00167	-0.178	-1.986	-0.0187	-0.100	-0.260
	(-0.00)	(-0.38)	(-1.37)	(-0.02)	(-0.21)	(-0.50)
Treated	-0.506		7.150***		-2.020***	
	(-0.81)		(3.04)		(-2.86)	
Observations	190601	190601	190601	190601	97681	97681
Adjusted R^2	0.239	0.023	0.336	0.074	0.401	0.040
Firm control	Yes	Yes	Yes	Yes	Yes	Yes
Nation control	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Other fixed effects	Firm, Region	Nation	Firm, Region	Nation	Firm, Region	Nation

Table OA.4
Financial constraints and hedging motives

The table reports difference-in-differences effects of new CME derivative product launch events (Panel A) and linear regression effects based on FX illiquidity (Panel B) on offshore activities for groups of equity-constrained versus debt-constrained firms. The dependent variable is offshore external input in Panel A, and is noted in the column headers in Panel B. One observation is one firm-nation-year and we have a total of 195,651 observations (Panel A) and 148,785 observations with non-missing FX illiquidity (Panel B), respectively. We express the dependent variables in percentages. Equity constrained is a financial constraint measure from Hoberg and Maksimovic (2015) with higher values indicating that the firms are more at risk of delaying their investments due to issues with liquidity and have plans to issue equity in their financial statements. Debt constrained is a similar financial constraints measure also from Hoberg and Maksimovic (2015) but with plans to issue debt instead. In Panel A, Treated is a nation dummy variable that equals one if the nation's currency products are included in the menu of new products introduced by the CME during our sample period. Post is a year dummy variable that equals one if the year is post the first CME event-year. The Post variable is subsumed by the year fixed effects and thus is not displayed. For either Equity constrained or Debt constrained in the first column, its complete combinations with Treated and Post are included. In Panel B, FX illiquidity is the annual illiquidity estimate for a given nation's currency against US dollars. We use the annual average of the 12 corresponding monthly FX illiquidity estimates provided by Karnaukh, Ranaldo, and Söderlind (2015). All nation and firm control variables previously used are included in the regressions, but not reported to conserve space. t-statistics (in parentheses) are adjusted for nation clustering. ***, **, and * indicate statistical significance at 1%, 5%, and 10% level, respectively.

Panel A: Triple difference-in-differences: dependent variable = External input dummy

Variable	Treated * Post * Variable	Treated	Variable	Treated * Post	Treated * Variable	Post * Variable	Fixed effects	Adjusted R^2
Equity constrained	-7.086**	-0.365	-1.682	-0.779**	0.368	3.663	Firm, Region, Year	0.239
	(-2.00)	(-0.60)	(-0.52)	(-2.50)	(0.09)	(1.36)		
	-6.930*		-2.252	-0.932***	-0.870	5.816	Nation, Year	0.023
	(-1.91)		(-0.59)	(-3.33)	(-0.19)	(1.54)		
Debt constrained	-2.502	-0.372	-0.979	-0.674**	-2.216	4.934	Firm, Region, Year	0.239
	(-0.80)	(-0.60)	(-0.18)	(-2.26)	(-0.39)	(1.47)		
	0.182		12.67**	-0.818***	-1.894	-0.521	Nation, Year	0.023
	(0.06)		(2.20)	(-3.00)	(-0.31)	(-0.12)		

Panel B: FX illiquidity and offshore activities

	Equity or Debt constrained			Equity constrained			Debt constrained		
	External input dummy	Internal input dummy	Relative external vs internal	External input dummy	Internal input dummy	Relative external vs internal	External input dummy	Internal input dummy	Relative external vs internal
FX illiquidity	0.141	0.112	0.0630	0.147	0.115	0.0833	0.111	0.118	0.0286
	(0.52)	(0.25)	(0.27)	(0.54)	(0.25)	(0.35)	(0.41)	(0.26)	(0.12)
Constrained	2.788	-12.92***	5.498**	0.213	-21.96***	4.889	11.93***	19.57***	10.14***
	(1.39)	(-4.44)	(2.30)	(0.09)	(-6.95)	(1.48)	(6.52)	(3.15)	(3.10)
FX illiquidity * Constrained	2.452**	-0.409	2.943**	2.466*	-0.292	3.443**	-2.852**	3.099	-4.735**
	(2.30)	(-0.22)	(2.14)	(2.05)	(-0.15)	(2.16)	(-2.25)	(1.21)	(-2.82)
Adjusted R^2	0.025	0.068	0.039	0.025	0.069	0.039	0.025	0.068	0.039
Fixed effects	Nation, Year	Nation, Year	Nation, Year	Nation, Year	Nation, Year	Nation, Year	Nation, Year	Nation, Year	Nation, Year