



CORPORATE FOREIGN CURRENCY BORROWING AND INVESTMENT. THE CASE OF HUNGARY.

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FX loan: pro

In good times, FX borrowing can contribute to growth.

- When financial frictions and policy imperfections are present. e.g.
 - the uncovered interest parity does not hold (see Basso et al (2007)) or
 - implicit government guarantee covers the depreciation premium (see Ranciére et al 2010).
- FX borrowing
 - lowers the cost of loans and
 - eases borrowing constraints
- FX loan takers face lower cost, can allow **larger leverage** and end up with **greater investment**.



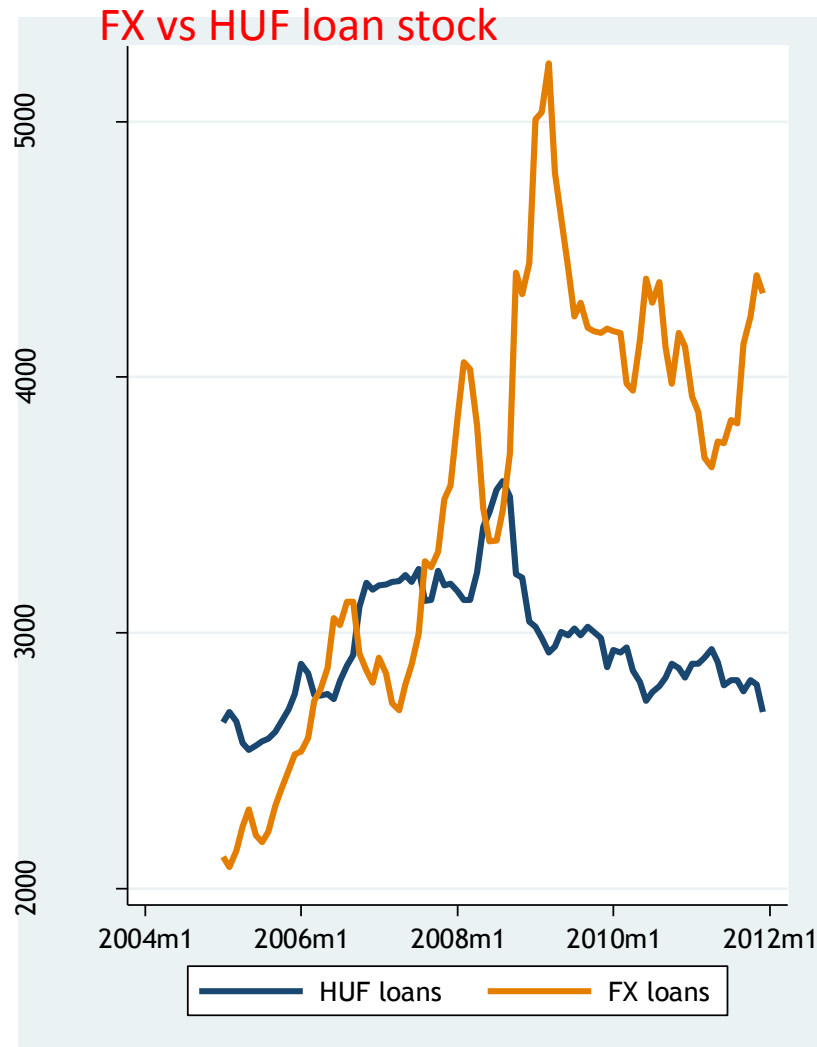
FX loan: backside

In bad times, it can increase the probability of a costly financial crisis.

- Sudden depreciation in the presence of FX borrowing → third-generation type financial crisis. Krugman (1999); Eichengreen et al (1999); Christiano et al (2006)
- Depreciation causes **Balance Sheet effects**: → increased the debt burden → lower net worth → smaller investment for credit-constrained firms.
- Offsetting force: depreciation also improves **competitiveness**
- MISMATCH matters for the **net effect**

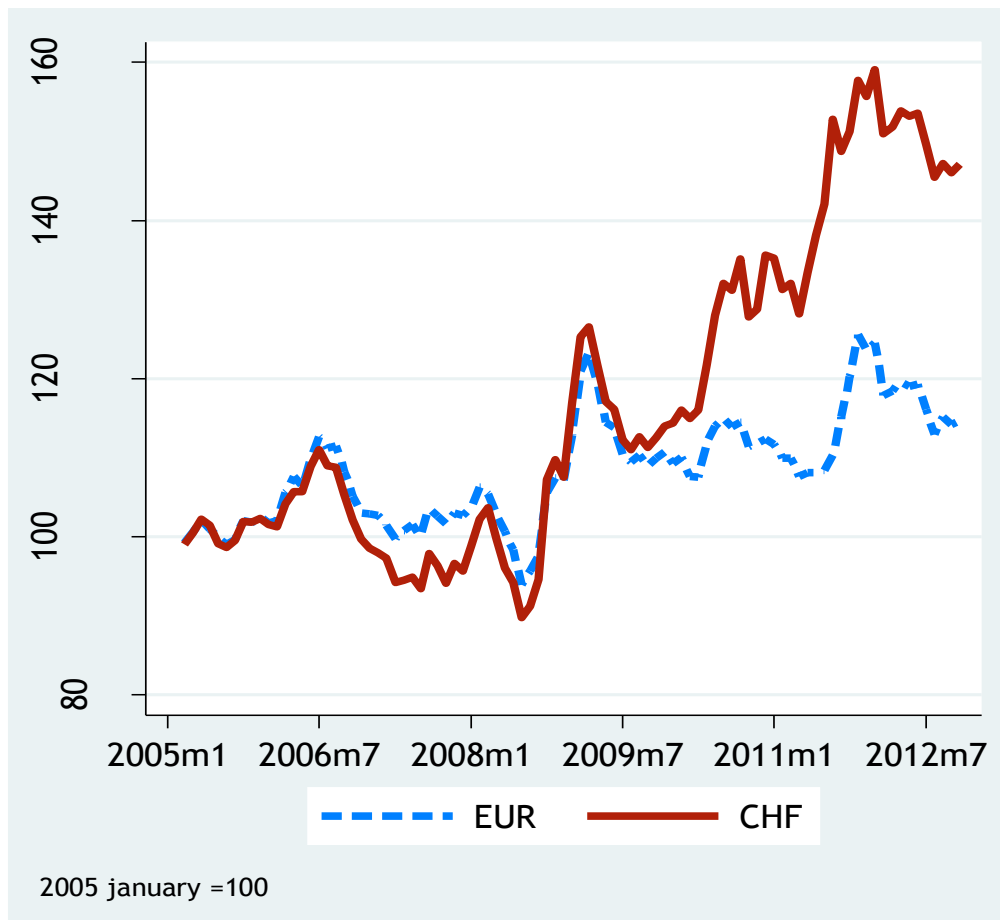


Building up of FX stock in corporate sector





Crisis caused depreciation





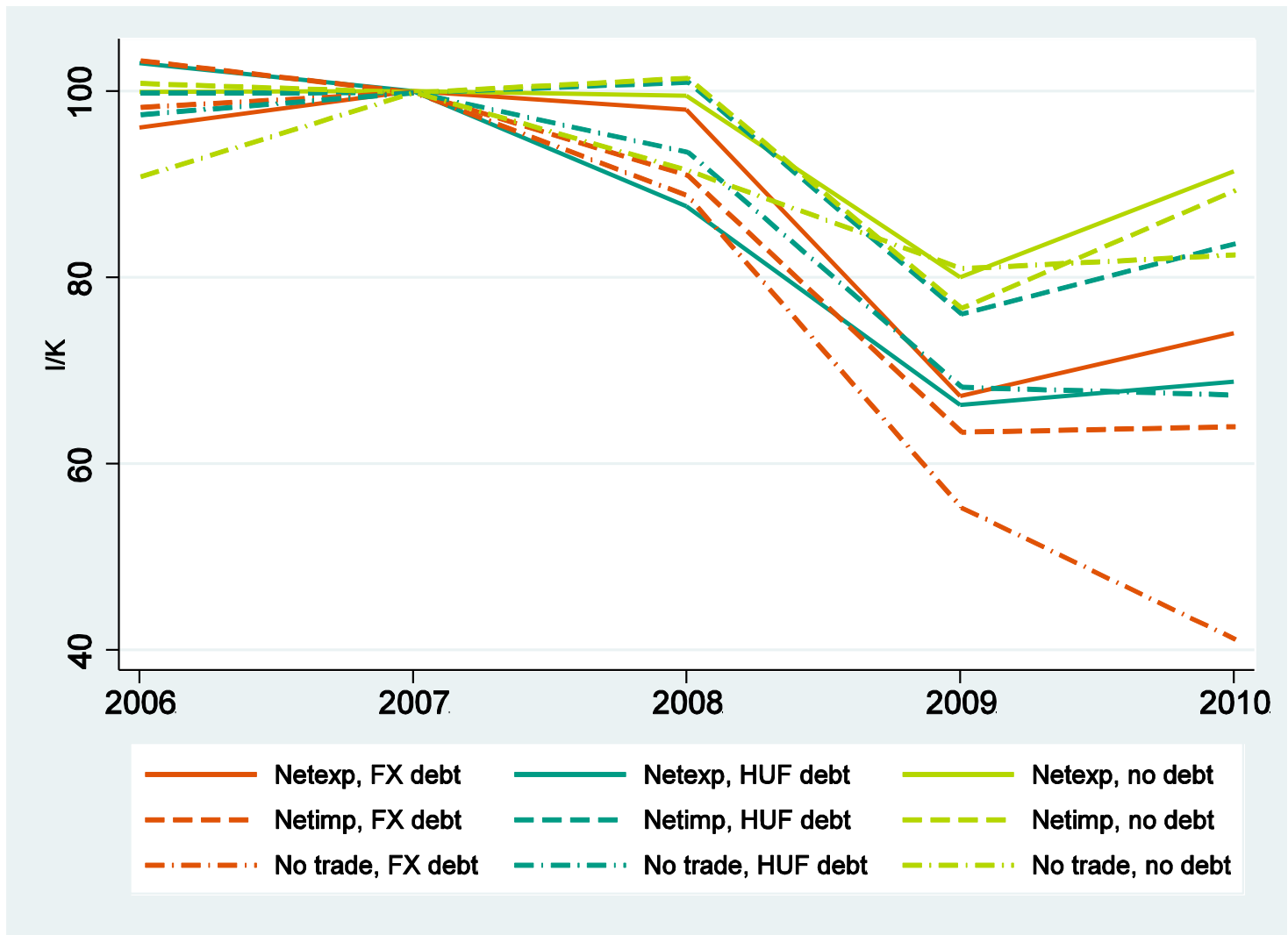
Questions

Measure the effect of FX loans on investments

- Did the availability of FX loan prior to the crisis **increase investment rate**?
 - Can we find evidence on easing liquidity constraint?
- Did FX loan holders under-invest in the crisis due to **balance sheet** effects?
- Did **competitiveness** effects kick in?



Preliminary evidence



From: Endrész-Gyöngyösi-Harasztsi (2011)



Methodology

- We estimate average treatment effects (ATE) in various set-ups and follow language from program evaluation studies.
- Assume W is the treatment of having FX loan.
- $Y(1)$ outcome with W and $Y(0)$ without
- $ATE = E(Y(1)-Y(0))$
- W is not randomly assigned, mean difference of observed Y 's is not ATE.
- We use control function approach with rich set of covariates X .

$$E(Y | W, X) = \mu_0 + \mu_1 W + g_0(X) + W(g_1(X) - g_0(X))$$

where g_0 and g_1 are unknown functions with zero expected value and the coefficient μ_1 captures ATE.



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Methodology (cont)

We estimate a linear specification of g_0 and g_1

- *pre-crisis period effect:*

$$d(I_{it}/K_{it-1}) = C + \mu_1 W_{it} + \beta' X_{it-1} + \varepsilon_{it} \quad t = \{2006, 2007, 2008\}$$

W is the treatment variable, μ_1 is the coefficient of interest and X_{t-1} is a vector of firm characteristics and I_{it}/K_{it-1} is the investment rate.

Treatment definitions are:

$W_{FX}^{HUF} = 1$ if firm takes up FX loan at year t
 $= 0$ if firm takes up HUF but not FX loan at year t

$W_{FX}^{NOFX} = 1$ if firm takes up FX loan at year t
 $= 0$ if firm does not take up FX loan at year t



Methodology (cont)

We estimate a linear specification of g_0 and g_1

- *balance sheet effect:*

$$(I_{it+j}/K_{i,t+j-1} - I_{it-1}/K_{it-2}) = C + \mu_1 W_{it^*} + \beta' X_{it-1} + \varepsilon_{it} \quad t = 2008, j = \{1, 2\}$$

$W_{BS} = 1$ if firm has FX debt in the fall of 2008
= 0 if firm has no FX debt in the fall of 2008



Methodology (cont)

We estimate a linear specification of g_0 and g_1

- *competitiveness effect:*

$$(I_{it+j}/K_{i,t+j-1} - I_{it-1}/K_{it-2}) = C + \mu_1 W_{it} + \beta' X_{it-1} + \varepsilon_{it} \quad t = 2008, j = \{1, 2\}$$

$$W_{\text{comp}}^{\text{EXP}} = 1 \text{ if firm exports in 2008}$$
$$= 0 \text{ if firm does not export in 2008.}$$

$$W_{\text{comp}}^{\text{IMP}} = 1 \text{ if firm imports in 2008}$$
$$= 0 \text{ if firm does not import in 2008.}$$



Methodology (cont..)

Additional investigations.

- We augment with crossterms of treatment and proxies of being liquidity constrained to target heterogeneity explicitly.

E.g. pre-crisis period effect becomes.

$$d(I_{it}/K_{i,t-1}) = C + \mu_1 W_{it} + \beta' X_{i,t-1} + \lambda W_{it} X_{i,t-1} + \varepsilon_{it}$$

- We test linearity assumption by using matching technique.
- We restrict investigation to long term loans
- We focus on relatively large investments instead of changes in I/K. Reaching 10-30% of the assets.



Dataset

Firm level data from 2005 to 2011

- **Credit register** (domestic loans by currency, maturity)
- **Financial reports:** balance sheet and income statements
- **Balance of Payment:** net foreign financing (non FDI)
- **Trade: export and import**
- Coverage: private non-financial firms, 5 employment threshold
- Yearly stocks and flows for **2004-2011**
- Novelty:
 - **almost full coverage** of double book-keeping firms (not just listed firms)
 - very rich information on firm characteristics



Dataset

Sample size is selected years

	2004	2007	2010
Agriculture and Mining	4791	4600	4488
Manufacturing	15271	14525	13551
Energy and Construction	9931	10748	10178
Retail and Wholesale	23093	23597	22935
All Other services	40635	45333	50584
Total	93721	98803	101736



Dataset 2.

Control variables

variable	calculated as	2005-2007 average		
		obs.	mean	sdev
labor	<i>ln (employment)</i>	82311	1.927	1.292
sales	<i>ln (sales)</i>	98483	9.134	4.252
foreign dummy	<i>10% foreign own. capital</i>	98483	0.116	0.320
log of TFP	<i>Levinsohn Petrin (2003)</i>	70900	5.962	2.107
leverage	<i>debt/total assets</i>	98483	0.092	0.294
FX debt in assets	<i>FX debt/total assets</i>	98483	2.022	0.298
depreciation rate	<i>amortization/capital</i>	98479	0.188	0.181
effective tax rate	<i>CIT paid/EBIT</i>	84346	0.096	0.076
export share	<i>export/sales</i>	98483	0.022	0.124
import share	<i>import/materials</i>	98482	0.275	1.896



Results

The impact of FX lending on investment before the crisis

	2006	2007	2008
W_{FX}^{HUF}	0.0727*** [0.0145]	0.139*** [0.0119]	0.126*** [0.0120]
W_{FX}^{NOFX}	0.101*** [0.0137]	0.169*** [0.0112]	0.149*** [0.0111]

The Table shows results from 6 separate regressions. The first row shows OLS estimations regressing the change in investment rate on the treatment variable W_{FX}^{HUF} and a list of control variables. Only the coefficients on the treatment variables are collected. The second row collects coefficient estimates from three different regressions where the treatment variable is W_{FX}^{NOFX} . Columns correspond to cross sections from 2006 to 2008. Controls include those in Table 5. Robust standard errors are in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

In 2006 the investment rate of firms, who took FX loan to finance their investment in that year, would have been 7 to 10 percentage points lower in the absence of FX loans. Compare this to the sample investment ratio of 19-20% in the period.



Results

The impact of FX lending on investment before the crisis

Long contracts only

year	2006	2007	2008
$W_{FX-long}^{HUF}$	0.0609*** [0.0153]	0.125*** [0.0128]	0.130*** [0.0130]
$W_{FX-long}^{NOFX}$	0.106*** [0.0141]	0.172*** [0.0116]	0.169*** [0.0116]

High investment dummies

	[1]	[2]
Dep.Var:	High inv. dummy 10	High inv. dummy 30
W_{FX}^{HUF}	0.143*** [0.0111]	0.128*** [0.0104]
controls:	yes	yes
dummy: sector	yes	yes
Observations	9776	9776
R-squared	0.109	0.144



Results

The impact of FX lending on investment before the crisis

Testing liquidity easing channel

Dep.Var: $\Delta I/K$ (2007)	[1]	[2]	[3]	[4]
W_{FX}^{HUF}	0.938*** [0.112]	0.318*** [0.0366]	0.140*** [0.0125]	0.160*** [0.0144]
W x sales	-0.0645*** [0.00882]			
W x labor		-0.0644*** [0.0118]		
W x dummy: foreign own.			-0.0167 [0.0390]	
W x dummy: trader				-0.0711*** [0.0222]
controls:	yes	yes	yes	yes
dummy: sector	yes	yes	yes	yes
Observations	8573	8573	8573	8573
R-squared	0.086	0.083	0.08	0.081

This table contains results from 4 separate OLS estimations regressing the change in investment rate on the treatment variable W_{FX}^{HUF} and interactions with treatment variables. Each equation looks at the same cross section of 2007. Only the coefficients on the treatment variables and interaction terms are collected. Controls include those in Table 13. Robust standard errors are in brackets. *** p<0.01, ** p<0.05, * p<0.1



Results: post-crisis

Balance sheet effects caused by the depreciation

periods	stat.	OLS	Matching
2007-2009	W_{bs}	-0.045***	-0.05***
	s.e.	[0.005]	[0.007]
	obs	39831	7625
2007-2010	W_{bs}	-0.043***	-0.045***
	s.e.	[0.005]	[0.008]
	obs	37564	7132

The Table collects results on the coefficient of the treatment variable W_{bs} from 4 separate estimations. The first column shows OLS regressions of the change in investment rate (2007-2009 above and 2007-2010 below) on the treatment variables. Controls include those in Table 15. The second column includes the corresponding matching estimations. Robust standard errors are in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The investment rate of FX borrowers was about 4 percentage point lower in 2009, than would have been in the absence of FX borrowing.



Results: post-crisis

Balance sheet effects caused by the depreciation

Testing liquidity easing channel

Dep.Var: $\Delta I/K$ (2007-2009)	[1]	[2]	[3]	[4]
W_{bs}	-0.147*** [0.0336]	-0.0745*** [0.0117]	-0.0477*** [0.00530]	-0.0509*** [0.00588]
x sales	0.00858*** [0.00270]			
x labor		0.0121*** [0.00376]		
x dummy: foreign own.			0.0483*** [0.0133]	
x dummy: trader				0.0336*** [0.0102]
controls:	yes	yes	yes	yes
dummy: sector	yes	yes	yes	yes
Observations	44867	44867	44867	44867
R-squared	0.027	0.027	0.027	0.026

The Table collects results from 4 separate estimations They are OLS regressions of the change in investment rate (2007-2009) on the treatment variables and interaction between treatment variables and selected controls: log of sales, log of size, foreign ownership dummy and variable indicating trade. Additional control variables are the same as in Table 15. Robust standard errors are in brackets. *** p<0.01, ** p<0.05, * p<0.1



Results: post-crisis

Competitiveness effect

	[1]	[2]	[3]	[4]
sample	manufacturing		retail	
Dep.Var:	$\Delta I/K$ ('07-'09)	$\Delta I/K$ ('07-'10)	$\Delta I/K$ ('07-'09)	$\Delta I/K$ ('07-'10)
W^{EXP}_{comp}	0.0211* [0.0120]	0.0307** [0.0123]		
W^{IMP}_{comp}			-0.0143 [0.0102]	-0.014 [0.0106]
Obs.	8870	8342	12582	11843

The Table collects results from 4 separate estimations. The first two are OLS regressions of change in investment rate between 2007-2009 and between 2007-2010 (second column) on treatment variable (W^{EXP}_{comp}) for manufacturing firms. The third and fourth column shows OLS regressions of change in investment rate between 2007-2009 (third) and between 2007-2010 (fourth column) on treatment variable (W^{IMP}_{comp}) for retail sector firms only. Control variables are the same as in Table 16. Robust standard errors are in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Investment rate was about 2 and 3 percentage points higher in 2009 and 2010, due to the depreciation.



Concluding remarks

- Investigate the impact of foreign currency lending on real investment.
- The results show that before the crisis FX lending increased investment rates by a significant amount, more than 10 percentage point.
- We find evidence for balance sheet effects as well during the crisis. Firms with FX loan at the end of 2008 had an investment rate 4-5 percentage point lower than would have had in the absence of FX debt.
- The impact of FX lending was stronger for more liquidity constrained firms, both in the pre- and the post-crisis period.
- As to the competitiveness effect, the evidence is weaker, only the linear regression gives significant estimates.
- Results are robust to changes in methodology or the definition of treatment.



Thank you for your attention.

Any questions?

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