



**NATIONAL BANK OF UKRAINE**

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**Corporate Cash Holdings and Trade Credit:  
Does Financial/Price (In)Stability Matter?**

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Kyiv, May 19, 2017



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# Outline

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- Motivation/Literature/Contribution/Preview of findings
- Empirical Strategy
- Results Discussion
- Conclusions



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# Motivation

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- The collapse of bank lending and heightened uncertainty in post-crisis period resulted in a significant increase in corporate cash reserves for precautionary motive (Bigelli & Sanchez-Vidal, 2012).
- Bank lending was sluggish and banks accumulated significant liquidity reserves (NBU, 2017)
- Credit crunch that affects financial lenders also affects non-financial lenders who provide informal financing (Love et al., 2007).
- Trade credit implies a certain risk and, therefore, is secured by precautionary cash holdings (Wu, Rui & Wu, 2012).
- Changes in macroeconomic stability trigger adjustments in firms' cash holdings (Baum et al., 2006)



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# Literature

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## Why Do Firms Hold Cash?

Information asymmetries, transaction and agency costs affect firm decision on cash savings.

- **Trade-off:** Hoarding cash can be a response to adverse shocks and potential financial constraints (Miller & Orr, 1966). Opportunity costs of the capital invested in cash make these holdings less attractive.
- **Pecking order:** rejects target level of cash. Firms finance themselves in hierarchical fashion according to the relative costs of different sources of funds (Myers Majluf, 1984). Cash is considered as “negative debt”.
- **Agency cost:** Entrenched managers prefer retaining cash to paying it out as dividends (Jensen, 1986).



## Why do firms employ trade credit?

- to ensure informal financing as a source of reserve liquidity (Love et al., 2007, Cunat, 2007)
- to advance their growth (Ferrando & Mulier, 2013).
- to enhance their sales and consequently hold less inventories (Bougheas et al., 2009).
- to discriminate customers on price basis and strengthen own competitive position on the market (Meltzer, 1960).



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# Contribution

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This study provides evidence of micro-level channel through which price volatility influences cash management.

In particular, it...

- examines on how trade credit affects cash under uncertainty
- explores asymmetric influence of credit payables and credit receivables
- looks into impact of financial cycle and immobilisation



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# Cash Holdings and Trade Credit Under Price Instability

**Trade receivables should be negatively associated with cash because they may serve as**

- Cash substitute
- Collateral for bank loan

**Trade payables should be positively associated with cash because they require cash**

- to ensure repayment of obligations
- to get cash discounts
- to avoid undesirable late payment penalties and a possible impairment in credit rating

## **Price Volatility**

- increases the cost of converting receivables into cash
- hinders firms from accurate prediction of relative prices and hence their financial flows
- restricts lenders in credit risk and transaction costs assessment



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# Regression Model and Method

- Regression model:

$$Cash/NA_{it} = \beta_1 Volatility_t + \beta_2 Rcv/NA_{it} + \beta_3 Pay/NA_{it}$$

$$+ \beta_4 Rcv/NA_{it} \times Volatility_t + \beta_5 Pay/NA_{it} \times Volatility_t$$

$$+ \sum \beta_j Controls_{it} + \mu_i + \lambda_i + \tau_t + \epsilon_{it}$$

$$\beta_1 > 0,$$

$$\beta_2 < 0, \beta_4 > 0$$

$$\beta_3 > 0, \beta_5 < 0$$

- Subsamples: Financial Constraints, Financial Cycle, Financial Immobilisation
- Panel estimator with within-groups transformations (OLS FE)
- Robustness check: OLS RE, 2SLS





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# Data

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- Our dataset comes from the National Securities and Stock Market Commission (SMIDA database), the State Statistics Service of Ukraine, and the National bank of Ukraine.
- Screened: we exclude financial firms and firms with negative sales.
- Year-end Ukrainian consumer-price index is used to deflate the variables to 2003 UAH.
- Winsorized at the most extreme (top and bottom) one percent level of the distribution
- After the screening, our sample size consists of over 140,000 firm-year observations pertaining to about 20,000 firms.
- The data cover the period between 2003 to 2015.



# Identification of Price Instability

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- A survey-based proxy derived from the dispersion of forecasts (Schmukler et al., 1999)
- A measure obtained from moving standard deviations of the macroeconomic series (Ghosal and Loungani, 2000)
- Merton's measure of risk defined as the squared first difference of the daily changes in series, divided by the square root of the number of operating days (Merton, 1980; Caglayan et al., 2010)
- An ARCH/ GARCH model to proxy for price instability (Beaudry et al., 2001; Baum et al., 2008)



# Identification of Price Instability

- The generalized ARCH (GARCH(1,1)) model is run for monthly consumer price index (CPI) and monetary aggregate M3 series where the mean equation is an autoregression over 2003-2015. The conditional variances derived from this GARCH processes are aggregated to annual frequency.

	(CPI)	(M3)
	1	2
Constant	-0.0065***	-0.1842***
AR(1)	0.2056**	0.4403***
ARCH(1)	0.5293***	0.6039***
GARCH(1)	0.5849***	0.7166***
Constant	0.0001**	-0.0007
N	184	184



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# Descriptive Statistics for All Firms

Variables	Mean	Std	Min	Max
Cash/NA	0.041	0.079	0.000	0.723
RCV/NA	0.166	0.178	0.000	0.940
Pay/NA	0.207	0.227	0.000	0.968
NWC/NA	0.106	0.322	-2.379	0.917
NWC2/NA	0.154	0.298	-2.363	0.890
FCycle	0.819	0.755	-0.571	6.369
Immobil	0.147	0.332	-2.315	1.143
Size	11.044	1.528	6.957	16.207
Growth	1.094	0.512	0.004	6.378
CF/NA	0.320	0.335	-0.294	2.565
BC/TD	0.130	0.200	0.000	0.999
N	140,607			



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# Descriptive Statistics: Small vs Large Firms

Variables	Small		Large	
	Mean	Std. Dev.	Mean	Std. Dev.
Cash/NA	<b>0.053</b>	0.091	<b>0.034</b>	0.068
RCV/NA	0.155	0.176	0.178	0.179
Pay/NA	0.208	0.224	0.209	0.226
NWC/NA	0.099	0.332	0.089	0.306
NWC2/NA	0.152	0.314	0.123	0.289
FCycle	0.860	0.811	0.730	0.666
Immobil	0.150	0.345	0.123	0.316
Size	9.401	0.694	12.674	1.030
Growth	1.046	0.471	1.136	0.555
CF/NA	0.441	0.426	0.239	0.245
BC/TD	<b>0.085</b>	0.170	<b>0.170</b>	0.213
DM	<b>0.091</b>	0.197	<b>0.197</b>	0.264
N	40,949		47,161	



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# Descriptive Statistics: Firms with vs without LTD

Variable	without LTD		with LTD	
	Mean	Std. Dev.	Mean	Std. Dev.
Cash/NA	<b>0.048</b>	<b>0.085</b>	0.032	0.067
RCV/NA	<b>0.178</b>	<b>0.188</b>	0.150	0.161
Pay/NA	<b>0.225</b>	<b>0.241</b>	0.187	0.205
NWC/NA	0.092	0.326	0.126	0.312
NWC2/NA	0.141	0.306	0.165	0.288
FCycle	0.827	0.785	0.822	0.719
Immobil	0.138	0.340	0.159	0.321
Size	10.638	1.407	<b>11.474</b>	<b>1.534</b>
Growth	1.085	0.509	1.101	0.510
CF/NA	<b>0.357</b>	<b>0.370</b>	0.282	0.285
BC/TD	0.105	0.203	0.161	0.193
DM	<b>0.000</b>	<b>0.000</b>	0.305	0.268
N	70,138		66,169	



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# Descriptive Statistics: Financial Cycle

Variable	FCycle>0		FCycle>0		FCycle<0		FCycle<0	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Cash/NA	<b>0.058</b>	0.095	0.024	0.050	0.047	0.089	0.023	0.053
RCV/NA	<b>0.166</b>	0.185	0.165	0.168	0.158	0.180	0.138	0.153
Pay/NA	<b>0.187</b>	0.225	0.206	0.211	0.362	0.280	0.373	0.259
NWC/NA	0.168	0.314	0.105	0.290	-0.301	0.242	-0.345	0.246
NWC2/NA	0.193	0.299	0.146	0.281	-0.106	0.276	-0.118	0.264
FCycle	0.934	0.807	0.843	0.654	-0.147	0.128	-0.141	0.121
Immobil	0.224	0.332	0.129	0.293	-0.252	0.254	-0.319	0.244
Size	<b>10.691</b>	1.464	11.401	1.488	<b>10.681</b>	1.632	11.268	1.671
Growth	1.080	0.513	1.105	0.498	1.094	0.583	1.096	0.544
CF/NA	0.350	0.373	0.301	0.285	0.252	0.358	0.250	0.325
BC/TD	<b>0.000</b>	<b>0.000</b>	<b>0.270</b>	<b>0.214</b>	<b>0.000</b>	<b>0.000</b>	<b>0.145</b>	<b>0.143</b>
DM	0.087	0.202	0.212	0.263	0.051	0.145	0.157	0.222
N	63,204		64,871		4,625		3,604	



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# Descriptive Statistics: Immobilisation

Variable	Immobil>0		Immobil>0		Immobil<0		Immobil<0	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Cash/NA	0.066	0.102	0.026	0.054	0.029	0.058	0.019	0.042
RCV/NA	0.171	0.189	0.168	0.171	0.150	0.169	0.154	0.160
Pay/NA	0.155	0.199	0.169	0.185	0.329	0.274	0.306	0.244
NWC/NA	0.275	0.224	0.242	0.192	-0.270	0.252	-0.239	0.223
NWC2/NA	0.262	0.243	0.243	0.216	-0.092	0.323	-0.088	0.283
FCycle	1.008	0.821	0.957	0.666	0.414	0.665	0.460	0.558
Immobil	0.340	0.236	0.270	0.193	-0.241	0.248	-0.220	0.219
Size	10.676	1.454	11.396	1.454	10.735	1.540	11.392	1.584
Growth	1.083	0.493	1.111	0.474	1.072	0.584	1.093	0.551
CF/NA	0.365	0.370	0.304	0.274	0.277	0.373	0.288	0.312
BC/TD	0.000	0.000	0.272	0.208	0.000	0.000	0.247	0.222
DM	0.093	0.212	0.251	0.280	0.059	0.151	0.126	0.197
N	50,693		45,601		17,132		22,863	





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# Results for All Firms

	Cash/NA				
	1	2	3	4	5
Volatility	0.0188***	0.0176***	0.0191***	0.0192***	0.0187***
Rcv/NA				-0.0317***	-0.0340***
Rcv/NA × Volatility					0.0446***
Pay/NA				0.0193***	0.0211***
Pay/NA × Volatility					-0.0414***
NWC1/NA	-0.0245***				
NWC2/NA		-0.0115***	-0.0199***	-0.0185***	-0.0185***
(NWC1-NWC2)/NA			-0.0332***		
Size	-0.0076***	-0.0088***	-0.0074***	-0.0073***	-0.0074***
Growth	0.0034***	0.0034***	0.0033***	0.0033***	0.0033***
CF/NA	0.0773***	0.0752***	0.0782***	0.0770***	0.0769***
BC/TD	-0.0170***	-0.0180***	-0.0145***	-0.0159***	-0.0156***
F			94.37***		
F (year)					57.35***
F (industry)					7.63***



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# Results for All Firms: Robustness Check

	Cash/NA					
	RE (cpi)	RE (m3)	FE (cpi)	RE (m3)	2SLS FE(cpi)	2SLS FE(m3)
	1	2	3	4	5	6
Volatility	0.0291***	0.0157***	0.0187***	0.0114***	0.0187***	0.0108**
Rcv/NA	-0.0126***	-0.0132***	-0.0340***	-0.0343***	-0.1832***	-0.1843***
Rcv/NA*Volatility	0.0289*	0.0171*	0.0446***	0.0278***	0.3038***	0.1889***
Pay/NA	0.0044**	0.0046**	0.0211***	0.0212***	0.0555***	0.0565***
Pay/NA*Volatility	-0.0367***	-0.0173**	-0.0414***	-0.0245***	-0.2803***	-0.1705***
BC/TD	-0.0225***	-0.0236***	-0.0156***	-0.0156***	-0.0060**	-0.0059**
Hausman ( $\chi^2$ )					288.099***	291.260***
Kleibergen-Paap rk LM					2164.784***	2168.954***
Hansen's J					0.211	0.200
Root MSE					0.057	0.057
R <sup>2</sup>	0.114	0.113	0.084	0.084		
N	136,307	136,307	136,307	136,307	126,917	126,917



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# Results for Subsamples: Impact of Financial Constraints

	Cash/NA			
	small	large	low DM	high DM
	1	2	3	4
Volatility	0.0269***	0.0135*	0.0232***	0.0177***
NWC2/TA	-0.0315***	-0.0181***	-0.0334***	-0.0140***
Rcv/NA	-0.0692***	-0.0225***	-0.0551***	-0.0211***
Rcv/NA*Volatility	0.1386***	-0.0112	0.0700***	0.0211
Pay/NA	0.0394***	0.0213***	0.0365***	0.0175***
Pay/NA*Volatility	-0.0897***	-0.0127	-0.0492**	-0.0495***
Size	-0.0094***	-0.0075***	-0.0084***	-0.0079***
Growth	0.0072***	0.0014*	0.0035***	0.0031***
CF/NA	0.0784***	0.0848***	0.0822***	0.0713***
BC/TD	-0.0253***	-0.0100***	-0.0195***	-0.0095***
R <sup>2</sup>	0.114	0.064	0.096	0.071
N	40,949	47,161	70,138	66,169



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# Results for Subsamples: Impact of Financial Cycle

	Cash/NA			
	fcycle>0	fcycle>0	fcycle<0	fcycle<0
	1	2	3	4
Volatility	<b>0.0246***</b>	-0.0017	-0.0362	0.0131
NWC2/TA	-0.0262***	-0.0190***	-0.0538***	-0.0350**
Rcv/NA	<b>-0.0557***</b>	<b>-0.0200***</b>	-0.023	-0.0246
Rcv/NA × Volatility	<b>0.0724***</b>	0.0195	0.2472	-0.0297
Pay/NA	0.0288***	0.0246***	0.0569***	0.0527***
Pay/NA × Volatility	<b>-0.0559***</b>	0.0006	-0.033	-0.0002
Size	-0.0126***	-0.0028***	-0.0145*	0.001
Growth	0.0041***	0.0024***	0.0029	0.0048*
CF/NA	0.0969***	0.0459***	0.0745***	0.0250***
BC/TD		0.0034		0.0339
R <sup>2</sup>	0.111	0.043	0.137	0.096
N	63,204	64,871	4,628	3,604



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# Results for Subsamples: Impact of Immobilisation

	Cash/NA			
	immobil>0	immobil>0	immobil<0	immobil<0
	1	2	3	4
Volatility	<b>0.0270***</b>	<b>-0.0004</b>	<b>0.0060</b>	<b>-0.0070</b>
NWC2/TA	-0.0824***	-0.0447***	-0.0475***	-0.0378***
Rcv/NA	-0.1059***	-0.0463***	-0.0666***	-0.0381***
Rcv/NA × Volatility	<b>0.0754***</b>	<b>0.0110</b>	<b>0.0360</b>	<b>0.0170</b>
Pay/NA	0.0761***	0.0438***	0.0598***	0.0474***
Pay/NA × Volatility	<b>-0.0543*</b>	<b>0.0140</b>	<b>-0.0001</b>	<b>0.0070</b>
Size	-0.0187***	-0.0050***	-0.002	-0.0001
Growth	0.0025**	0.0030***	0.0056***	0.0017**
CF/NA	0.1128***	0.0540***	0.0444***	0.0274***
BC/TD		0.0030		0.0050
R <sup>2</sup>	0.138	0.056	0.103	0.064
N	50,693	45,601	17,132	22,863



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# Conclusions

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- Cash holdings increase as a firm encounters higher price volatility.
- Cash is sensitive to the joint impact of trade credit and price volatility.
- Asymmetric influence underlines the need to separate the effects of demand and supply sides of the trade credit.
- Firms extend risky trade credit to their customers under price uncertainty and it lends ground for accumulation of excessive liquidity, especially for financially constrained firms.
- Under uncertainty firms accept more certain informal financing.



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# Conclusions

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- Price stability facilitates conversion of cash substitutes (trade receivables) into cash.
- Lower price volatility also increases the cost of trade payables and, thus, makes bank financing more attractive for the firms.

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## **Avenues for future research:**

- Effect of market competition
- Impact of switching costs