International Bank Lending Channel of Monetary Policy: Lessons from Chile, Korea, and Poland*

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Introduction

- We study channels of monetary policy transmission from advanced to emerging-market economies
- How is it transmitted?
- How sensitive are these responses to UMP?
- How important are banks' balance sheets' in modulating these effects?

Relevance

- Emerging market banking systems are special
  - Fast growth pace
  - High banking dependence
  - Indexed lending (state-contingent loans, original sin)
  - Globalisation through liabilities rather than assets
  - Previously vulnerable to financial crises
- Suitable to study inward transmission, because of their financial size, net capital inflows and incipient internationalisation
- Scant evidence from bank-level data (with exception of Chen, Wu, Jeon, and Wang 2017)
- Evidence of effect of appreciation of local currency on domestic banks' leverage (Bruno and Shin 2014,2015)

Main channels

- Bank-lending: funding exposure, mediated by
  - (Net) Foreign funding dependence L^*/A (+)
  - (Net) Intragroup funding L^*_{ig}/A (-)
  - Liquidity R/A (-)
  - Capital ratios K/A (-)

- Portfolio: capacity to substitute assets, mediated by
  - Share of investment in securities $Sec./A$ (+)
  - Share of commercial and investment loans $C\&I/A$ (-)
  - Share of foreign claims A^*/A (-)

Special characteristics of CKP banking systems

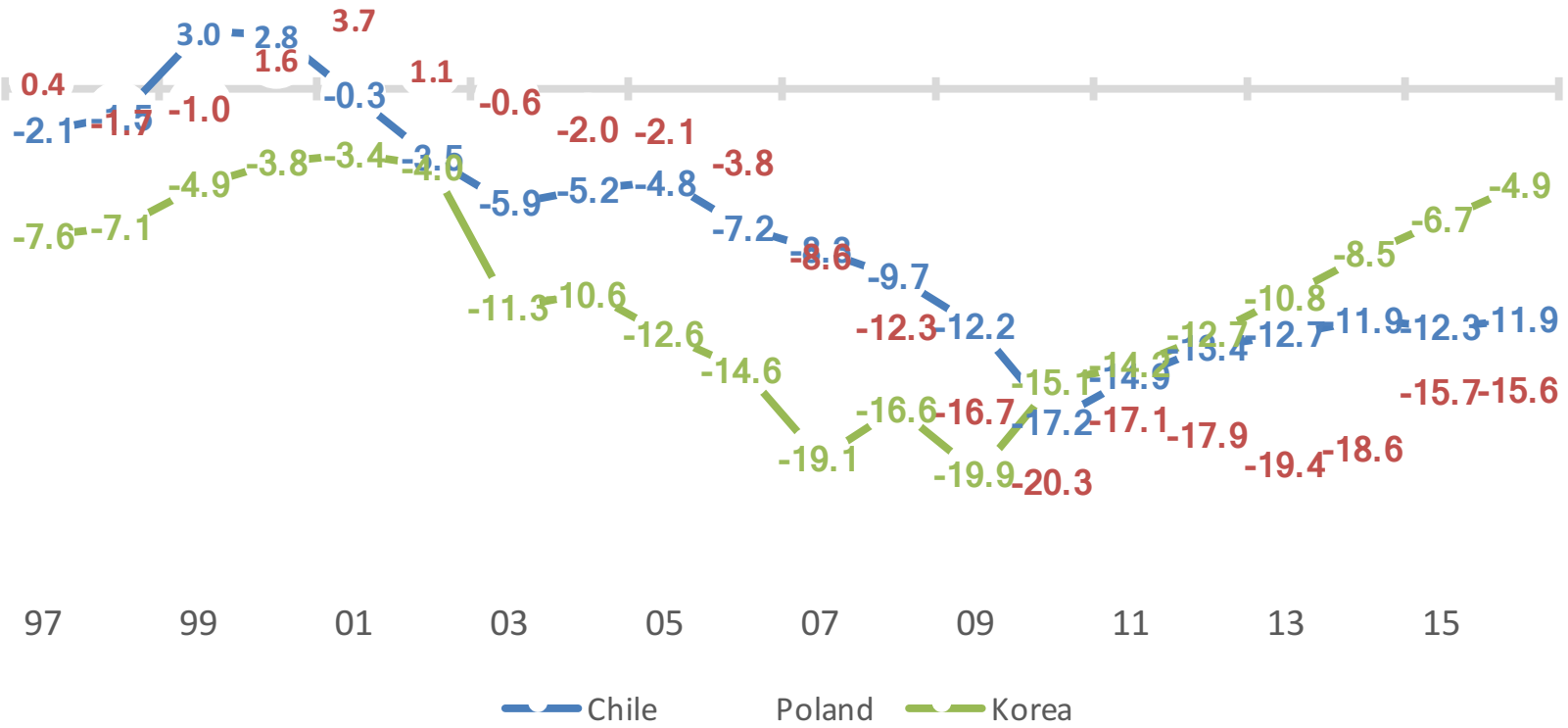
Table 1

Variables*	Chile	Korea	Poland
General Inward Statistics			
GDP (USD mn)	174,286	1,006,883	388,125
Assets of resident banks (USD mn)	162,822	1,221,397	246,946
Assets of foreign banks (USD mn)	61,406	97,106	136,084
Number of banks	12	16	18
Number of foreign banks	5	2	14
Transmission channels (%)			
Liquid ratio	20.4	25.8	12.9
Tier 1 ratio	10.6	11.8	20.9
C&I Loans/Assets	38.6	32.6	27.5
Securities/Assets	13.2	17.5	15.2

Source: Author's elaboration.
* 2000-2015 averages.

Banks are net debtors in these economies

Figure 1: Net International Investment Position of Banks
(% of GDP)



Sources: Banco Central de Chile, Nadorowy Bank Polski and Bank of Korea.

Concentrated expositions from/to abroad

Table 2: Cross-border expositions (% of total assets)

Variable*	US	EA	JP	UK
		Chile		
Cross-border liabilities	4.7	1.1	0.1	0.5
Net cross-border liabilities	3.1	0.8	0.0	0.3
Net intragroup funding	0.0	0.2	0.0	0.2
Cross-border assets	1.7	0.3	0.0	0.2
		Korea		
Cross-border liabilities	2.2	0.8	0.7	2.3
Net cross-border liabilities	1.1	0.7	0.2	0.6
Cross-border assets to banks	0.6	0.2	0.1	0.5
Cross-border assets to non-banks	0.5	0.5	0.1	0.1
		Poland		
Cross-border liabilities	0.3	7.2	...	0.5
Net cross-border liabilities	-0.0	4.3	...	-0.4

* Averages over the sample period.
Source: Author's elaboration.

Bank-level data and its issues

- Confidential data on foreign claims and liabilities, by *country* of counterpart
- Bank-level data on domestic non-financial sector lending and other balance sheet items
- To account for indexation:
  - Chile: values at constant prices and exchange rates
  - Poland: values at constant exchange rates
- Fictitious merged-banks
- Small N Large T panels

Methodology

- Follows Buch, Bussière, Goldberg, and Hills (2017) standard approach for individual countries
- Estimation of correlations between lending growth and interest rates :

$$\begin{aligned}\Delta Y_{b,t} = \alpha_0 + \sum_{c=1}^{C}\left(\sum_{k=0}^{K}\left(\alpha^c_{1,k}\Delta MP^c_{t-k} + \alpha^c_{2,k}\Delta MP^c_{t-k}ZLB^c_{t-k} + \alpha^c_{3,k}ZLB^c_{t-k}\right) + \right.\\ \left.\alpha_4 Z^c_{t-1}\right) + \alpha_5 X_{b,t-1} + \alpha_6^{domestic} Z^{domestic}_{t-1} + \\ \alpha_6^{domestic}\Delta MP^{domestic}_{t-1} + \alpha_8 VIX_{t-1} + f_b + \varepsilon_{b,t} \qquad (1)\end{aligned}$$

- Then we identify channels through bank heterogeneity

$$\begin{aligned}\Delta Y_{b,t} = \alpha_0 + \sum_{c=1}^{C}\Bigg(\sum_{k=0}^{K}\big(\alpha^c_{1,k}\Delta MP^c_{t-k}W^c_{b,t-k-1} + \alpha^c_{2,k}\Delta MP^c_{t-k}ZLB^c_{t-k}W^c_{b,t-K-1} \\ +\alpha^c_{3,k}ZLB^c_{t-k}W^c_{b,t-K-1}\big) + \alpha^c_4 W^c_{b,t-K-1}\Bigg) + \alpha_5 X_{b,t-1} + f_b + f_t + \varepsilon_{b,t} \quad (2)\end{aligned}$$

- For foreign positions, we exploit country and bank heterogeneity

$$\begin{aligned}\Delta Y_{b,t} = \alpha_0 + \sum_{c=1}^{C}\Bigg(\sum_{k=0}^{K}\big(\alpha^c_{1,k}\Delta MP^c_{t-k}W^c_{b,t-k-1} + \alpha^c_{2,k}\Delta MP^c_{t-k}ZLB^c_{t-k}W^c_{b,t-K-1} \\ +\alpha^c_{3,k}ZLB^c_{t-k}W^c_{b,t-K-1}\big) + \alpha^c_4 W^c_{b,t-K-1}\Bigg) + \alpha_5 X_{b,t-1} + f_b + f_t + \varepsilon_{b,t} \quad (3)\end{aligned}$$

- For the case of QE, we estimate the previous equations, without taking into account of interactions between ΔMP and QE

Main findings

- Without taking into account bank heterogeneity, positive monetary policy shocks are associated with lower lending growth.
- However, this is reversed significantly during ZLB and QE, and remains present when accounting for bank heterogeneity.
- There **some evidence of bank lending channel for all CKP**. This is consistent with a net debtor international position of their banks.
- There also **some evidence on portfolio lending**, but not for Chile and Poland. This is consistent with higher foreign assets activity by Korean banks.

Specific banking channels

- We find more significant effects through gross and net total foreign liabilities.
- In the case of Chile, intra-group liabilities do not provide a cushion against foreign MP tightening.
- Liquidity is significant in some MP specifications for Poland and Chile.

- A puzzling result is that an increase in QE leads to lower domestic lending growth through the banking channels.

Table 3: Bank Lending Channel: Short Rate and QE

Channel	(1) L^*/A	(2) $(L^*-A^*)/A$	(3) $(L^*-A^*)_{ig}/A$	(4) Liquid Ratio
		Panel A: Chile		
$\sum^c \alpha^c_{1,0}$	0.022	0.743	0.928	−0.314*
$\sum_k \sum_c \alpha^c_{1,k}$	1.137	1.281	−0.448	−0.320
$\sum^c \alpha^c_{2,0}$	−0.082	−0.110	0.154	−0.002
$\sum_k \sum_c \alpha^c_{2,k}$	−0.251*	−0.274*	0.051	0.083
		Panel B: Korea		
$\sum^c \alpha^c_{1,0}$	−0.207	−0.281	-	0.004
$\sum_k \sum_c \alpha^c_{1,k}$	−1.012***	−1.293**	-	0.011
$\sum^c \alpha^c_{2,0}$	−0.005	−0.003	-	0.000
$\sum_k \sum_c \alpha^c_{2,k}$	−0.004	−0.006	-	0.000
		Panel C: Poland		
$\sum^c \alpha^c_{1,0}$	1.309	−0.255	-	−0.009
$\sum_k \sum_c \alpha^c_{1,k}$	5.572	−1.562	-	0.219
$\sum^c \alpha^c_{2,0}$	0.163	0.104	-	0.002
$\sum_k \sum_c \alpha^c_{2,k}$	0.280	−0.123	-	0.007

Specific portfolio channels

- In portfolio channels, CMP tightening is significant as expected for Chile in Sec/A and A^*/A and in $C\&I/A$ for Poland
- UMP easing is significant as expected for Poland in $Sec./A$ and Korea in $C\&I/A$
- This is a result worth noting, given the lower pace of financial asset globalisation of banks from emerging market economies, compared to their liabilities.

Table 4: Portfolio Channel: Short Rate and QE

Channel	(1) Tier 1	(2) $C\&I/A$	(3) $Sec./A$	(4) A^*/A
		Panel A: Chile		
$\sum^c \alpha^c_{1,0}$	−0.386	−0.139	−0.240	−3.320*
$\sum_k \sum_c \alpha^c_{1,k}$	−0.885	−0.066	−0.409*	0.320
$\sum^c \alpha^c_{2,0}$	−0.060	−0.013	−0.011	0.158
$\sum_k \sum_c \alpha^c_{2,k}$	−0.252	0.000	0.058	0.142
		Panel B: Korea		
$\sum^c \alpha^c_{1,0}$	0.004	0.005	−0.005	0.547
$\sum_k \sum_c \alpha^c_{1,k}$	0.003	0.007	0.077	0.879
$\sum^c \alpha^c_{2,0}$	0.000	0.000	0.001	−0.006
$\sum_k \sum_c \alpha^c_{2,k}$	−0.001	−0.001*	0.001	0.011
		Panel C: Poland		
$\sum^c \alpha^c_{1,0}$	0.191	−0.118*	0.062	
$\sum_k \sum_c \alpha^c_{1,k}$	0.199	−0.123	0.231	
$\sum^c \alpha^c_{2,0}$	−0.006	−0.013	0.011**	
$\sum_k \sum_c \alpha^c_{2,k}$	0.002	0.002	0.013*	

Final remarks and further steps

- Collinearity of MP rates: Consider only one monetary area at the time
- Geographical versus currency exposure ($/€ dominance)
- Narrow down domestic lending to lending in local currency without indexation in the case of Poland and Chile, and compare it to indexed and/or FX local lending
- Use demeaned variables in interactions, whether for statistical convenience (Gambacorta et al 2017) or for robustness against possible misspecification (Sørensen and Ozer-Balli, 2012)

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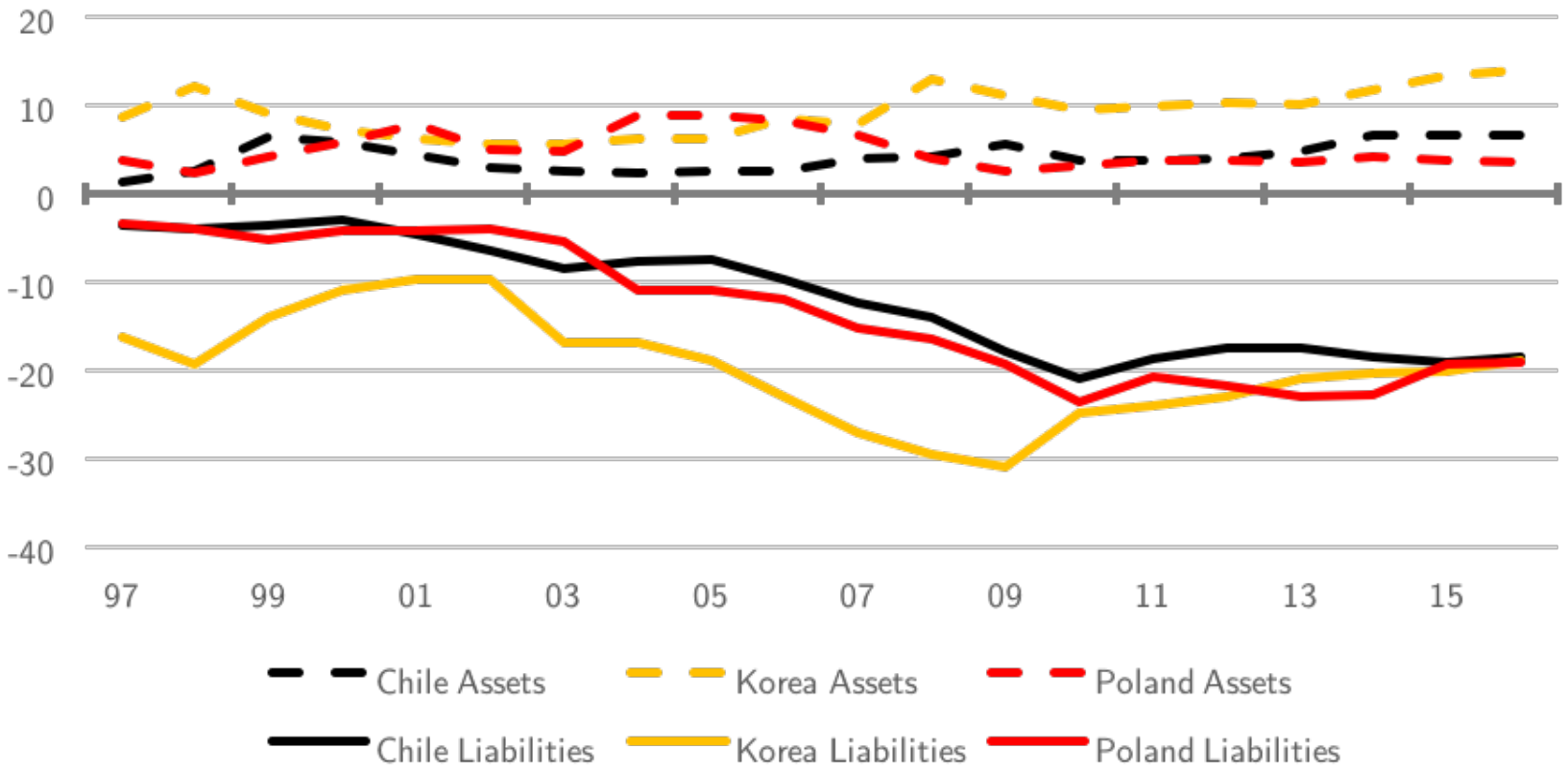
Gross Positions of Banks

Figure 2: Gross International Investment Position of Banks
(% of GDP)



Sources: Banco Central de Chile, Nadorowy Bank Polski and Bank of Korea.

Table 5: Bank Lending Channel: Short Rate and ZLB

Channel	(1) L^*/A	(2) $(L^*-A^*)/A$	(3) $(L^*-A^*)_{ig}/A$	(4) Liquid Ratio
		Panel A: Chile		
$\sum_c \alpha^c_{1,0}$	0.707	1.041	0.541	−0.231
$\sum_k \sum_c \alpha^c_{1,k}$	1.070	0.850	−0.347	−0.143
$\sum_c \alpha^c_{2,0}$	−4.661	−10.147*	−50.673	−3.891
$\sum_k \sum_c \alpha^c_{2,k}$	−4.096	−1.974	13.623	−1.599
$\sum_c(\alpha^c_{1,0}+\alpha^c_{2,0})$	−3.954	−9.106	−50.132	−4.122
$\sum_k \sum_c(\alpha^c_{1,k}+\alpha^c_{2,k})$	−3.026	−1.124	13.276	−1.743
		Panel B: Korea		
$\sum^c \alpha^c_{1,0}$	0.012	0.073	-	0.055*
$\sum_k \sum_c \alpha^c_{1,k}$	−0.509	−0.778*	-	0.015
$\sum_c \alpha^c_{2,0}$	0.153*	−0.123	-	−0.052**
$\sum_k \sum_c \alpha^c_{2,k}$	−0.087	−0.010	-	−0.029
$\sum_c(\alpha^c_{1,0}+\alpha^c_{2,0})$	0.165	−0.050	-	0.002
$\sum_k \sum_c(\alpha^c_{1,k}+\alpha^c_{2,k})$	−0.595*	−0.789*		−0.014
		Panel C: Poland		
$\sum^c \alpha^c_{1,0}$	−3.529	0.032	-	−0.039
$\sum_k \sum_c \alpha^c_{1,k}$	0.443	−3.594*	-	0.119
$\sum_c \alpha^c_{2,0}$	5.644	2.094	-	1.193
$\sum_k \sum_c \alpha^c_{2,k}$	1.646	13.270*	-	−0.533
$\sum_c(\alpha^c_{1,0}+\alpha^c_{2,0})$	2.116	2.126	-	1.154
$\sum_k \sum_c(\alpha^c_{1,k}+\alpha^c_{2,k})$	2.089	9.676	-	−0.414

Table 6: Bank Lending Channel: Short Rate (Taylor) Residual and ZLB

Channel	(1) L^*/A	(2) $(L^*-A^*)/A$	(3) $(L^*-A^*)_{ig}/A$	(4) Liquid Ratio
		Panel A: Chile		
$\sum_c \alpha^c_{1,0}$	0.987	1.427	−3.160	−0.094
$\sum_k \sum_c \alpha^c_{1,k}$	2.945	2.877	−3.153	−0.416
$\sum_c \alpha^c_{2,0}$	−1.716	−2.578	40.713	0.448
$\sum_k \sum_c \alpha^c_{2,k}$	−5.929*	−6.582	113.414	0.250
$\sum_c(\alpha^c_{1,0}+\alpha^c_{2,0})$	−0.729	−1.151	37.553	0.354
$\sum_k \sum_c(\alpha^c_{1,k}+\alpha^c_{2,k})$	−2.983*	−3.706	110.261	−0.165
		Panel B: Korea		
$\sum_c \alpha^c_{1,0}$	−0.005	0.067	-	−0.005
$\sum_k \sum_c \alpha^c_{1,k}$	0.015	0.244	-	−0.017
$\sum_c \alpha^c_{2,0}$	−0.021	−0.050	-	0.007
$\sum_k \sum_c \alpha^c_{2,k}$	0.080	−0.205	-	0.014
$\sum_c(\alpha^c_{1,0}+\alpha^c_{2,0})$	−0.026	0.017	-	0.002
$\sum_k \sum_c(\alpha^c_{1,k}+\alpha^c_{2,k})$	0.095	0.038	-	−0.004
		Panel C: Poland		
$\sum_c \alpha^c_{1,0}$	0.589	2.614**		0.382**
$\sum_k \sum_c \alpha^c_{1,k}$	0.679	3.399	-	0.758
$\sum_c \alpha^c_{2,0}$	1.707	−13.090	-	−1.917
$\sum_k \sum_c \alpha^c_{2,k}$	18.850	2.625	-	−5.562
$\sum_c(\alpha^c_{1,0}+\alpha^c_{2,0})$	2.296	−10.480	-	−1.534
$\sum_k \sum_c(\alpha^c_{1,k}+\alpha^c_{2,k})$	19.530	6.024	-	−4.805

Table 7: Bank Lending: Shadow Rate and ZLB

Channel	(1) L^*/A	(2) $(L^*-A^*)/A$	(3) $(L^*-A^*)_{ig}/A$	(4) Liquid Ratio
		Panel A: Chile		
$\sum_c \alpha^c_{1,0}$	0.539	0.607	−1.415	0.118
$\sum_k \sum_c \alpha^c_{1,k}$	1.327	0.990	2.981	−0.118
$\sum_c \alpha^c_{2,0}$	−2.076	−1.302	71.704	0.487
$\sum_k \sum_c \alpha^c_{2,k}$	−4.690	0.916	204.542	2.369
$\sum_c(\alpha^c_{1,0}+\alpha^c_{2,0})$	−1.537	−0.695	70.289	0.605
$\sum_k \sum_c(\alpha^c_{1,k}+\alpha^c_{2,k})$	−3.363	1.906	207.523	2.251
		Panel B: Korea		
$\sum_c \alpha^c_{1,0}$	0.001	0.004	-	−0.001
$\sum_k \sum_c \alpha^c_{1,k}$	0.022***	0.024*	-	0.005
$\sum_c \alpha^c_{2,0}$	−0.029	−0.023	-	0.001
$\sum_k \sum_c \alpha^c_{2,k}$	−0.104	−0.099	-	−0.005
$\sum_c(\alpha^c_{1,0}+\alpha^c_{2,0})$	−0.028	−0.019	-	0.000
$\sum_k \sum_c(\alpha^c_{1,k}+\alpha^c_{2,k})$	−0.082	−0.074	-	0.000
		Panel C: Poland		
$\sum_c \alpha^c_{1,0}$	−2.210	0.419	-	-
$\sum_k \sum_c \alpha^c_{1,k}$	−2.818	−2.035**	-	-
$\sum_c \alpha^c_{2,0}$	−0.233	−1.757	-	-
$\sum_k \sum_c \alpha^c_{2,k}$	7.354	13.380	-	-
$\sum_c(\alpha^c_{1,0}+\alpha^c_{2,0})$	−2.443	−1.338	-	-
$\sum_k \sum_c(\alpha^c_{1,k}+\alpha^c_{2,k})$	4.537	11.350	-	-

Table 8: Portfolio Channel: Short Rate and ZLB

Channel	(1) Tier 1	(2) $C\&I/A$	(3) $Sec./A$	(4) A^*/A
		Panel A: Chile		
$\sum_c \alpha^c_{1,0}$	−0.873	−0.235	−0.260	−0.914
$\sum_k \sum_c \alpha^c_{1,k}$	−0.329	0.000	−0.273	0.759
$\sum_c \alpha^c_{2,0}$	10.609	−1.362	−7.511	14.949
$\sum_k \sum_c \alpha^c_{2,k}$	6.589	−0.136	1.679	−33.240
$\sum_c (\alpha^c_{1,0} + \alpha^c_{2,0})$	9.736	−1.597	−7.771	14.034
$\sum_k \sum_c (\alpha^c_{1,k} + \alpha^c_{2,k})$	6.260	−0.136	1.406	−32.481
		Panel B: Korea		
$\sum_c \alpha^c_{1,0}$	0.309*	0.036	0.009	0.154
$\sum_k \sum_c \alpha^c_{1,k}$	0.657	0.213	0.506	−0.080
$\sum_c \alpha^c_{2,0}$	−0.307*	−0.035	0.006	0.112
$\sum_k \sum_c \alpha^c_{2,k}$	−0.725	−0.224	−0.476	−0.040
$\sum_c (\alpha^c_{1,0} + \alpha^c_{2,0})$	0.002	0.001	0.015	0.266
$\sum_k \sum_c (\alpha^c_{1,k} + \alpha^c_{2,k})$	−0.069	−0.012	0.030	−0.120
		Panel C: Poland		
$\sum_c \alpha^c_{1,0}$	−0.068	−0.118	0.091	-
$\sum_k \sum_c \alpha^c_{1,k}$	0.032	−0.328	0.060	-
$\sum_c \alpha^c_{2,0}$	−0.670	0.906	0.314	-
$\sum_k \sum_c \alpha^c_{2,k}$	8.819	0.910	−1.826	-
$\sum_c (\alpha^c_{1,0} + \alpha^c_{2,0})$	−0.738	0.788	0.404	-
$\sum_k \sum_c (\alpha^c_{1,k} + \alpha^c_{2,k})$	8.851	0.582	−1.766	-

Table 9: Portfolio Channel: Shadow Rate and ZLB

Channel	(1) Tier 1	(2) $C\&I/A$	(3) $Sec./A$	(4) A^*/A
		Panel A: Chile		
$\sum_c \alpha^c_{1,0}$	−0.717	0.015	0.014	−0.527
$\sum_k \sum_c \alpha^c_{1,k}$	−0.785	−0.100	−0.262	0.804
$\sum_c \alpha^c_{2,0}$	0.383	−0.188	0.304	1.403
$\sum_k \sum_c \alpha^c_{2,k}$	−2.482	0.256	1.006	8.530
$\sum_c(\alpha^c_{1,0} + \alpha^c_{2,0})$	−0.334	−0.173	0.318	0.876
$\sum_k \sum_c(\alpha^c_{1,k} + \alpha^c_{2,k})$	−3.267	0.156	0.744	9.333
		Panel B: Korea		
$\sum_c \alpha^c_{1,0}$	0.007	−0.001	−0.004*	0.031
$\sum_k \sum_c \alpha^c_{1,k}$	0.125	0.016	0.284	0.129**
$\sum_c \alpha^c_{2,0}$	−0.002	0.001	0.005	0.040
$\sum_k \sum_c \alpha^c_{2,k}$	−0.102	−0.014	−0.280	0.096
$\sum_c(\alpha^c_{1,0} + \alpha^c_{2,0})$	0.005*	0.000	0.001	0.071*
$\sum_k \sum_c(\alpha^c_{1,k} + \alpha^k_{2,0})$	0.022**	0.002	0.004	0.225*
		Panel C: Poland		
$\sum_c \alpha^c_{1,0}$	−0.046	−0.024	−0.018	
$\sum_k \sum_c \alpha^c_{1,k}$	0.197	−0.170	0.050	
$\sum_c \alpha^c_{2,0}$	−1.168***	0.218	0.159	
$\sum_k \sum_c \alpha^c_{2,k}$	−3.515	1.022	0.340	
$\sum_c(\alpha^c_{1,0} + \alpha^c_{2,0})$	−1.214***	0.194	0.141	
$\sum_k \sum_c(\alpha^c_{1,k} + \alpha^c_{2,k})$	−3.318	0.852	0.390	

Table 10: Portfolio Channel: Short Rate (Taylor) Residual and ZLB

Channel	(1) Tier 1	(2) $C\&I/A$	(3) $Sec./A$	(4) A^*/A
		Panel A: Chile		
$\sum_c \alpha^c_{1,0}$	−0.150	−0.015	0.000	−1.418
$\sum_k \sum_c \alpha^c_{1,k}$	−0.720	−0.178	−0.376	−0.182
$\sum_c \alpha^c_{2,0}$	1.385	0.164	0.351	−1.376
$\sum_k \sum_c \alpha^c_{2,k}$	3.572	−0.082	0.117	−4.946
$\sum_c(\alpha^c_{1,0} + \alpha^c_{2,0})$	1.235	0.149	0.352	−2.794
$\sum_k \sum_c(\alpha^c_{1,k} + \alpha^c_{2,k})$	2.851	−0.260	−0.259	−5.128
		Panel B: Korea		
$\sum_c \alpha^c_{1,0}$	−0.042	−0.008	−0.010	−0.787*
$\sum_k \sum_c \alpha^c_{1,k}$	−0.159**	−0.027	0.216	−3.050**
$\sum_c \alpha^c_{2,0}$	0.050*	0.010	0.013*	0.070
$\sum_k \sum_c \alpha^c_{2,k}$	0.158***	0.024	−0.241	0.322
$\sum_c(\alpha^c_{1,0} + \alpha^c_{2,0})$	0.008*	0.002	0.004	−0.716*
$\sum_k \sum_c(\alpha^c_{1,k} + \alpha^c_{2,k})$	−0.001	−0.003	−0.025	−2.728**
		Panel C: Poland		
$\sum_c \alpha^c_{1,0}$	−0.325	−0.124	0.333*	
$\sum_k \sum_c \alpha^c_{1,k}$	−0.899	−0.439*	0.784	
$\sum_c \alpha^c_{2,0}$	1.921	1.476*	1.862*	
$\sum_k \sum_c \alpha^c_{2,k}$	5.949	6.235*	3.561	
$\sum_c(\alpha^c_{1,0} + \alpha^c_{2,0})$	1.596	1.352*	2.195**	
$\sum_k \sum_c(\alpha^c_{1,k} + \alpha^c_{2,k})$	5.049	5.796*	4.345	