



Seðlabanki Íslands

Price Setting Behaviour in Turbulent Times

Survey Evidence from Icelandic Firms

Karen Á. Vignisdóttir and Þorvarður Tjörvi Ólafsson
Economics Department, Central Bank of Iceland

Seminar at the Central Bank of Iceland
May 19, 2009



Introduction

- Essential for central banks to understand how firms set prices as price setting behaviour plays a significant role in inflation dynamics, the transmission mechanism of monetary policy and business cycles in general
- Inflation dynamics is driven by how firms set prices, how often they change prices and how they form expectations with regard to demand, competitors' behaviour and economic policy



Introduction

- Nominal rigidities ensure that monetary policy influences the real economy
- But what kind of nominal rigidities are there present in the economy and how best to model them?
 - Sticky prices the most common way in New Keynesian economics but many variations in modelling approaches



Research approaches to price setting

1. Aggregate price indices

- Time series estimates of inflation persistence using CPI indices

2. Micro data

- Frequency and size of price changes estimated using detailed price data

3. Surveys

- Asking price setters directly about pricing decisions
- Qualitative evidence to compare with quantitative estimates but also supplementary information that cannot be extracted from neither micro nor macro data
- The two steps of price setting, relative importance of driving factors, distinguish between price stickiness theories, focus on special features such as reaction to exchange rate movements



Icelandic price setting research

- Macro approach limited by extensive structural changes in the economy
- Research on Icelandic micro data currently underway in cooperation with Emi Nakamura, Jón Steinsson and others
- The results presented today are based on the survey approach



About the survey study

- Based on similar surveys that have been conducted in the US, UK, Canada, Sweden, Norway and in the Euro Area
 - Especially on the work done by the ECB Inflation Persistence Network
- Survey conducted in June-July 2008 by Capacent Gallup via phone and internet
- Delay of publication of results due to the financial crisis
- Authors of upcoming paper: Ásgerður Ó. Pétursdóttir, Karen Vignisdóttir and Þorvarður Tjörvi Ólafsson

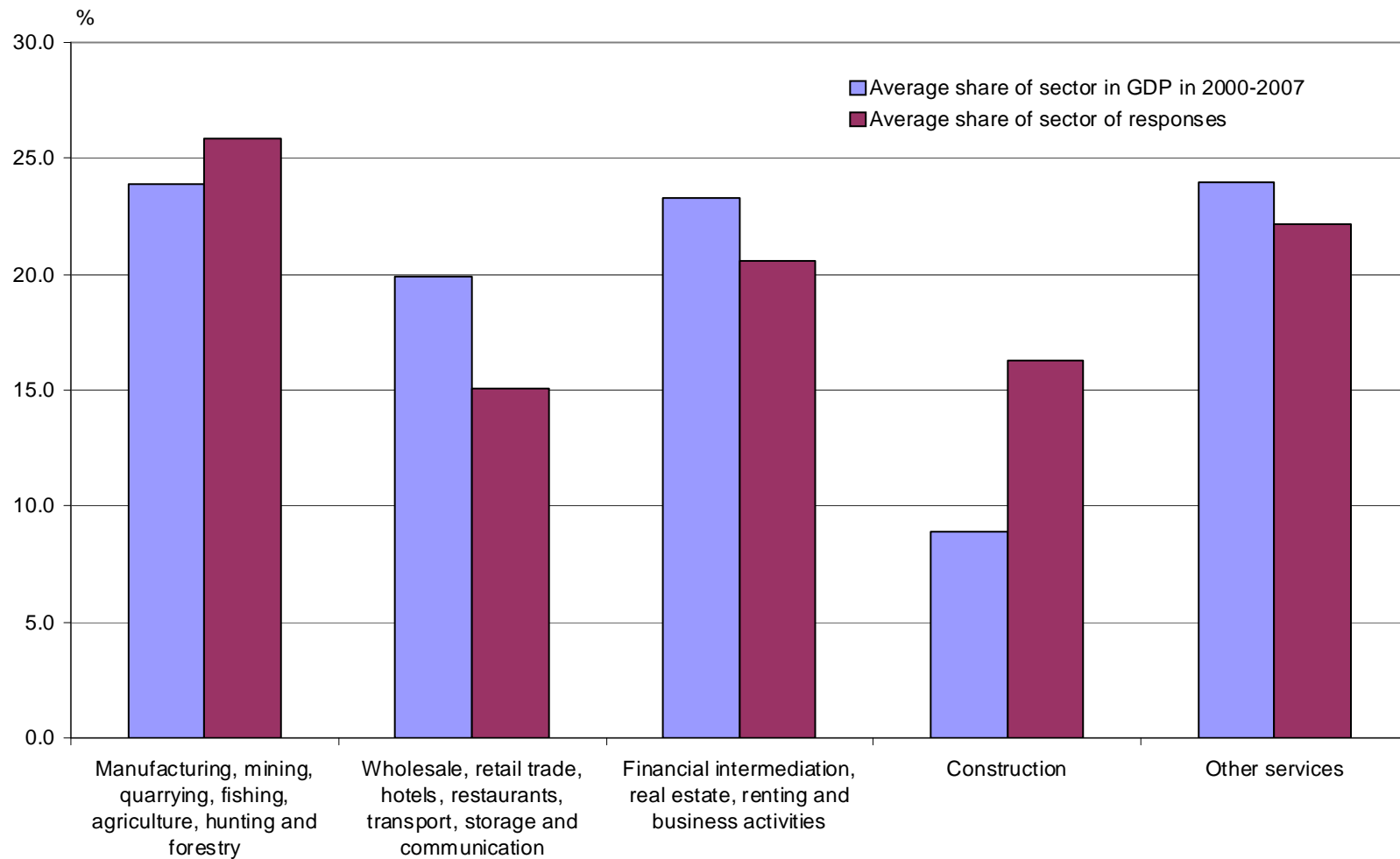


About the survey study

- Random sample of 600 firms from the Business Directory, final sample composed of 580 firms
- Firms with fewer than 4 employees excluded
- 45,2% response rate comparable to similar foreign studies (average 47%, range from 24-70%)
- Respondents were asked to use their “main product”, i.e. the product that generates the most turnover, as a reference for their answers and focus their answers on the domestic market
 - Main product’s turnover is on average 60-80% of firm’s total turnover
- The respondents broadly reflect the sector division but not firm size distribution (based on the number of employees) as large firms are overrepresented



Broadly representative by industry

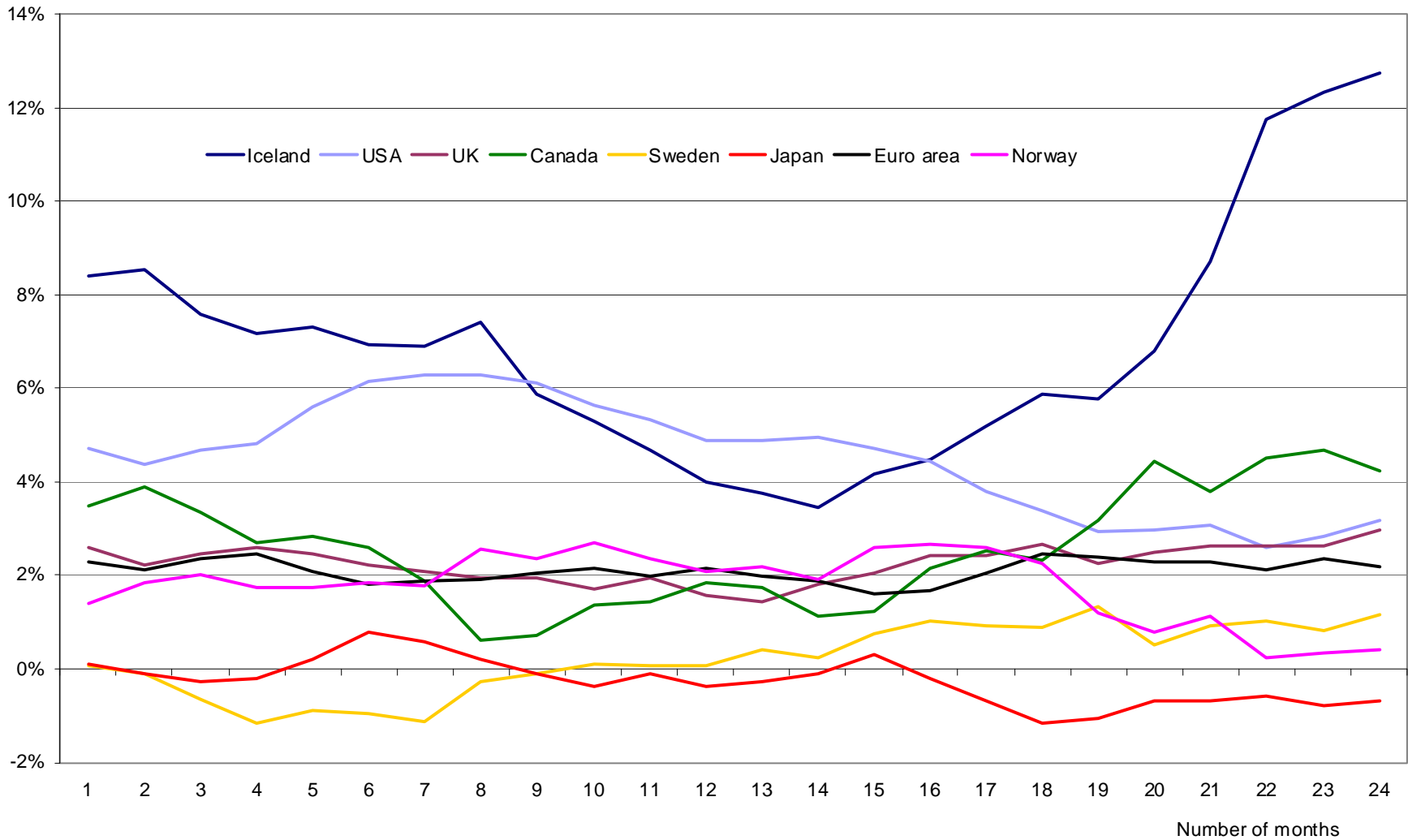


Macroeconomic comparison with other countries



- One of the main contribution of the Icelandic survey is the more turbulent macroeconomic environment that firms faced during and prior to the survey period
- Other price setting surveys have been done in periods characterised by low and stable inflation
- The survey was conducted following the large depreciation of the króna in H1/2008 but prior to the collapse of the banking system in October 2008
- In the twelve months prior to the survey period, inflation increased from 4,0% to 12,7% where the largest share of the increase took place in the last few months prior to the survey period

Inflation two years prior to the end of survey



Macroeconomic comparison with other countries



Table 1: International comparison of the macroeconomic environment for price setting

	<i>IS</i>	<i>US</i>	<i>UK</i>	<i>CA</i>	<i>JA</i>	<i>SW</i>	<i>NO</i>	<i>EU</i>	<i>BE</i>	<i>LU</i>	<i>NL</i>
Average inflation during period and 12 months prior	6.9	4.7	2.3	2.5	-0.5	0.7	1.8	2.1	1.5	2.8	1.8
Peak of inflation during period and 12 months prior	12.7	6.3	3	4.7	0.3	1.3	2.7	2.5	1.8	4.1	2.3
Inflation volatility ¹	8.3	1.4	1.9	2	1.8	3.2	2.8	-	1.3	1.6	1.4
Exchange rate volatility ¹	11	11	10.4	9.2	18.6	11.6	7.5	-	4.7	3.6	4.2
Exchange rate pass-through ¹	0.43	0.02	0.04	0.03	0.21	0.07	0.18	-	0.2	0.37	0.41
Output volatility ¹	2.7	0.9	1.1	1.3	1.2	1.3	1	-	1	1.9	1.1

1. According to Pétursson, Thórarinn G., (2008).



Exchange rate movements and price setting

- Special focus on the role of the exchange rate, which is a nearly unique focus within the literature
 - To some extent in Amirault et al. (2006) for Canada
- A natural feature to focus on in the Icelandic context given the large exchange rate shocks, high exchange rate pass-through and discussions in the public arena
- Ask firms about their responses to exchange rate movements, the reasons for incomplete pass-through and ways to restore profits following a depreciation
- Group firms by their exposure to exchange rate movements using the share of costs of imported inputs of total production costs

Main characteristics of the market



Table 2: Market and competition characteristics (percentages)

	<i>Total</i>	<i>Manufacturing and fishing</i>	<i>Wholesale, retail, hotels, restaurants, transport, and communication</i>	<i>Financial intermediation, real estate, renting and business activities</i>	<i>Construction</i>	<i>Other services</i>
Main customer						
Consumers	40.8	37.2	63.1	56.4	30.4	19.4
Other firms	43.6	54.3	21.1	23.1	43.5	71
Equal share of consum	15.6	8.6	15.8	20.5	26.1	9.7
Firm-customer relationships						
Long-term	72.8	83	46	69	60	100
Occasional	27.2	18	54	31	40	0
Number of competitors						
0 to 3	23.9	35	33	9	17	30
4 to 15	27.6	38	22	31	17	23
16 or more	48.5	27	44	60	67	47
Leaders in domestic market						
Own firm	26.8	33	39	23	5	32
Other firm	20.8	19	30	23	23	11
No leading company	52.3	47	30	55	73	57



Main characteristics of the market

Table 3: International comparison of survey results for market and competition characteristics (percentages)

	<i>IS</i>	<i>NO</i>	<i>EU</i>	<i>AT</i>	<i>BE</i>	<i>FR</i>	<i>GE</i>	<i>IT</i>	<i>PT</i>	<i>SP</i>
Main customer										
Consumers	40.8	40	21	9	40	30	7	25	13	39
Other firms	43.6	40	75	84	56	66	89	79	84	58
Equal share of consumers and other firms	15.6									
Firm-customer relationships										
Long-term	72.8	75	70	81	41	54	57	69.8	83	86
Occasional	27.2	20	30	19	56	46	43	30	17	14
Number of competitors										
0 to 3	23.9			17.5	27.8	20.4		17.5		
4 to 15	27.6			40.2	43.1	63.1		39.3		
16 or more	48.5			42.3	29.1	11.3		28.4		

- Large share of customer-relationships is characterised by long-term relationships as in most other countries
- Large number of competitors an indicator of competition pressures



Price discrimination

Table 4: International comparison of survey results for extent of price discrimination

<i>The price of main product is:</i>	<i>IS</i>	<i>EU</i>	<i>FR</i>	<i>GE</i>	<i>IT</i>	<i>LU</i>	<i>PT</i>	<i>SP</i>
The same for all customers	22.2	18	23	8	19	29	24	35
Different depending on quantity	30.4	42	35	51	41	29	41	29
Decided case by case	47.4	40	42	41	40	42	35	36

- Strong evidence of price discrimination as in other studies, only roughly a fifth of firms charge the same price for all customers



Price setting method

Table 5: Type of price setting by sectors

	<i>Total</i>	<i>Manufacturing and fishing</i>	<i>Wholesale, retail, hotels, restaurants, transport, and communication</i>	<i>Financial intermediation, real estate, renting and business activities</i>	<i>Construction</i>	<i>Other services</i>
Constant or variable markup on costs	45.1	51	60	34	37	45
Taking the price of the main competitor as reference	34.9	39	30	37	36	29
Price tied to the evolution of the CPI index	21.4	9	10	30	27	26

- Cost-based pricing with variable or constant mark-up is found to be the most popular price setting method but price indexation seems to be used extensively as well
- Mark-up pricing evidence of monopolistic competition
- Price indexation popular in the financial sector, construction and other services



Price setting method

Table 6: Type of price setting and number of competitors

	<i>Total</i>	<i>0-3 competitors</i>	<i>4-15 competitors</i>	<i>16 or more competitors</i>
Constant or variable markup on costs	45.1	60	50	36
Taking the price of the main competitor as reference	34.9	25	35	38
Price tied to the evolution of the CPI index	21.4	16	15	27

Table 7: International comparison of survey results for type of price setting

	<i>IS</i>	<i>EU</i>	<i>UK</i>	<i>BE</i>	<i>FR</i>	<i>GE</i>	<i>IT</i>	<i>NL</i>	<i>PT</i>	<i>SP</i>
Markup	45.1	54	37	46	40	73	42	56	65	52
- Constant markup on costs	15		17	13		4		27		
- Varying markup on costs	30.1		20	33		69		30		
Competitors' price	34.6	27	25	36	38	17	32	22	13	27
Other	20.3	19	38	18	22	10	26	21	23	21

- Not surprisingly, mark-ups characterise monopolistic markets whereas competitors' prices have more influence where the number of competitors is larger
- Type of price setting is similar to other countries



Information set for pricing decisions

Table 8: International comparison of survey results for information set for pricing decisions

	<i>IS</i>	<i>EU</i>	<i>UK</i>	<i>BE</i>	<i>IT</i>	<i>LU</i>	<i>PT</i>	<i>SP</i>	<i>NO</i>
Future context	32.3	48	35	34	68	44	47	28	
Present/Past context	67.7	34	53	29	32	26	30	39	70
Other			12	37		30	23	33	

- The degree of backward-looking vs. forward-looking in price setting is a classic issue in economic theory
 - Specifications and estimations of Phillip curves
 - Effects of monetary policy
- Icelandic firms seem to be in the high-end of backwardness found in other studies but roughly similar to Norwegian firms



Time-dependant vs. state-dependant pricing

Table 9: International comparison of survey results for price reviewing rules (percentages)

	<i>IS</i>	<i>EU</i>	<i>UK</i>	<i>CA</i>	<i>SW</i>	<i>NO</i>	<i>BE</i>	<i>LU</i>	<i>NL</i>
Time-dependant	39.3	34	42	66.5	18.2	27	26	18	36
Mainly time-dependant but also in reaction to specific events	46.7	46	44		40.7	44	40	32	18
State-dependant (non-regular)	14.1		14	33.5	33.8	12			
Other					7.3	17			

- Dynamic price adjustments traditionally either modelled as state-dependant or time-dependant
- Given the different implications of state- and time-dependant price setting, surveys have been used to see which is a better approximation to the real world
- Similar share of purely time-dependant price setting firms as in other countries despite the more volatile macroeconomic environment



Price review frequency

Table 10: Frequency of price reviews in the last 12 months

	<i>Total</i>	<i>Manufacturing and fishing</i>	<i>Wholesale, retail, hotels, restaurants, transport, and communication</i>	<i>Financial intermediation, real estate, renting and business activities</i>	<i>Construction</i>	<i>Other services</i>
Median	3	4	4	2	2	2
0	6.8	5.7	5.3	12.5	0	9.4
1	14.4	11.4	5.3	29.2	13.6	12.5
2 to 3	39.4	25.7	31.6	33.3	50	56.3
4 or more	39.4	57.1	57.9	25	36.4	21.9

- Price setting in two stages: review and changes
- Median frequency of price reviews indicates that firms review their prices every 4 months
- The most frequently cited frequency is 2, indicating that firms review their prices every 6 months
- Manufacturing and wholesale/retail review their prices most often or roughly every 3 months



Price change frequency

Table 11: Frequency of price changes in the last 12 months

	<i>Total</i>	<i>Manufacturing and fishing</i>	<i>Wholesale, retail, hotels, restaurants, transport, and communication</i>	<i>Financial intermediation, real estate, renting and business activities</i>	<i>Construction</i>	<i>Other services</i>
Median	2	2	2	1	2	2
0	8.5	3.1	10.5	16.7	4.5	9.4
1	30.2	18.8	36.8	41.7	27.3	31.3
2 to 3	44.2	59.4	26.3	33.3	50	43.8
4 or more	17.1	18.8	26.3	8.3	18.2	15.6

- Median frequency of price changes and the most frequently-cited one is 2 indicating that prices stay unchanged for 6 months
- This is in line with preliminary results of a study currently underway using micro data for the period from 1997



International comparison

Table 12: International comparison of survey results for price reviews and price changes

	<i>IS</i>	<i>EU</i>	<i>US</i>	<i>UK</i>	<i>CA</i>	<i>SW</i>	<i>NO</i>	<i>JA</i>	<i>BE</i>	<i>LU</i>	<i>NL</i>
Median frequency of price reviews	3	2.7	2	2		1	2	1 to 2	1	2	4
Most frequently cited price-review frequency	2	1	1	1		1		1 to 2			
Median frequency of price changes	2	1	1.4	2	4	1	1	1 to 2	1	2	1
Most frequently cited price-change frequency	2	1	1	1	1	1		1 to 2			

- Higher frequency of price reviews than found in most other studies, but not much higher given the more volatile macroeconomic environment
- Frequency of actual price changes is relatively high compared to most other studies but the median firm nevertheless keeps prices unaltered for 6 months
- Higher inflation in Iceland indicates that the size of price changes is larger in Iceland – an issue that is better studied using micro data



Determinants of price changes

Table 13: The importance of factors driving price changes

	<i>Most important</i>	<i>Second most important</i>	<i>Weighted importance (0-100)</i>
<i>Increases</i>			
Costs	68.7	27.4	80.9
Exchange rate changes	22.9	29.1	35.9
Competitors' price	1.5	28.2	14.1
Demand	6.9	15.4	13.7
<i>Decreases</i>			
Costs	37.6	33.3	52.8
Exchange rate changes	20	18.4	28.4
Competitors' price	20.8	27.2	33.2
Demand	21.6	21.1	31.2
<i>Asymmetries in price changes (Importance for increases/Importance for decreases)</i>			
Costs			1.5
Exchange rate changes			1.3
Competitors' price			0.4
Demand			0.4

- As expected, increased costs and exchange rate depreciations are the main causes of price increases with competitors' price increases following third and increased demand running fourth
- Surprisingly, lower costs are also the main reason for price decreases and price decreases by competitors, a main reason in other studies, comes in second



Determinants of price changes

Table 14: Asymmetries in price changes by sectors

	Total	<i>Manufacturing, mining, quarrying, fishing, agriculture, agriculture, hunting and forestry</i>	<i>Wholesale, retail, hotels, restaurants, transport, storage and communication</i>	<i>Financial intermediation, real estate, renting and business activities</i>	Construction	Other services
Costs	1.5	1.5	1.3	1.6	2.2	1.4
Exchange rate changes	1.3	1.1	1.2	1.3	1.7	1.5
Competitors' price	0.4	0.4	0.2	0.6	0.4	0.4
Demand	0.4	0.5	0.0	0.4	0.4	0.5

- Costs are more important for price increases than decreases, as expected, whereas competitors' price changes and demand shocks are more important for price decreases than increases as expected
- Exchange rate changes are more important for price increases than for price decreases, evidence of asymmetric pass-through
- Asymmetries in price changes following cost shocks and exchange rate shocks are largest in the construction sector



Determinants of price changes

Table 15: The importance of factors driving price changes (weighted importance, 0-100) and actual price changes in the last 12 months

	<i>Total</i>	<i>0</i>	<i>1</i>	<i>2 to 3</i>	<i>4 or more</i>
Increases					
Costs	80.9	72.2	90.8	86	57.5
Exchange rate changes	35.9	16.7	25	31.6	80
Competitors' price	14.1	27.8	19.7	13.2	0
Demand	13.7	22.2	7.9	14.9	12.5
Decreases					
Costs	52.8	50	65.3	55.6	42.1
Exchange rate changes	28.4	16.7	18.1	24.1	63.2
Competitors' price	33.2	22.2	40.3	33.3	23.7
Demand	31.2	55.6	22.2	31.5	21.1

- Firms that changed their prices most often in the last 12 months view exchange rate changes as very important driving factors whereas firms with stickier prices mention competitors' prices as important driving factors



Determinants of price changes

Table 16: International comparison of survey results for the importance of factors driving price changes¹

	<i>EU</i>	<i>AT</i>	<i>BE</i>	<i>LU</i>	<i>NL</i>
Increases					
Labour costs	3	3.4	2.9	3.5	2.7
Costs of raw materials	3.1	3.1	2.9		2.5
Financial costs	2.2	1.9	2.2	3	2.1
Demand	2.2	1.9	2.2	2.3	2.3
Competitors' price	2.4	2	2.5	2.4	2.5
Decreases					
Labour costs	2.1	1.3	2.1	2.6	2.1
Costs of raw materials	2.6	2.2	2.3		2
Financial costs	1.9	1.6	1.8	2.5	1.8
Demand	2.5	2	2.5	2.7	2.5
Competitors' price	2.8	2.6	2.9	2.8	2.7

1. Ranked on the scale from 1 to 4 with regard to importance ("4 = very important")

- Exchange rate movements are found to be of little importance in other studies, often mentioned as the least important driving factor



Evidence on theories of price stickiness

- The economic literature has provided us with numerous empirical studies concerning price stickiness and many theories as to why prices are left unchanged over time although a price change would be optimal
- Menu costs and information costs are most often used in theory
- Surveys are crucial in providing evidence for which theories best reflect reality
- Implicit and explicit contracts as a source of price rigidity have received the highest score in most surveys conducted in other countries whereas menu costs have been considered of little importance
- Of interest whether the same applies in the more extreme environment in Iceland



Evidence on theories of price stickiness

Table 17: The importance of theories explaining price stickiness by sectors

	Total	Manufacturing and fishing	Wholesale, retail, hotels, restaurants, transport, and communication	Financial intermediation, real estate, renting and business activities	Construction	Other services
Implicit contracts	34.1	44.8	37.5	20	23.8	38.9
Explicit contracts	31	22.4	12.5	42.5	45.2	31.5
Temporary shocks	28.8	48.3	37.5	12.5	23.8	18.5
Coordination failure	26.1	24.1	21.9	37.5	31	18.5
Pricing thresholds	15	6.9	25	12.5	14.3	20.4

- Implicit and explicit contracts are also the most important factors in Iceland
- Temporary shocks are most important for price stickiness in manufacturing, wholesale and retail while coordination failures are most important in financial services and construction
- Pricing thresholds are most important in wholesale, retail and other services
- Explicit contracts tend to be more important for price stickiness at larger firms



Evidence on theories of price stickiness

Table 18: International comparison of the ranking of theories of price stickiness

	<i>IS</i>	<i>EU</i>	<i>US</i>	<i>UK</i>	<i>CA</i>	<i>SW</i>	<i>NO</i>	<i>JA</i>	<i>BE</i>	<i>LU</i>	<i>NL</i>
Implicit contracts	1	1	4	5	2	1	2 to 3	2	1	2 to 3	1
Explicit contracts	2	2 to 3	5	1	3	3	1	3	2 to 3	1	2
Temporary shocks	3	6							6		3 to 4
Coordination failure	4	4	1	3		4	2 to 3	1	4	5	5
Pricing thresholds	5			4	4		4	4			
Menu costs	6 to 7						5				
Change non price factors	6 to 7	7	3					5		6	6
Judging quality by price	8	5							5	4	3 to 4
Cost-based pricing		2 to 3	2	2	1	2			2 to 3	2 to 3	

- In general, the ranking of theories explaining price stickiness is similar to other countries



Reactions to specific exchange rate shocks

Table 19: Reaction to króna appreciation in H1/2007 and depreciation in H1/2008

Appreciation in H1/2007

Decrease price	20
Increase price	4.2
Unchanged price	75.8

Depreciation in H1/2008

Decrease price	2.4
Increase price	62.6
Unchanged price	35

- Special focus on the link between exchange rate movements and price setting
- Shocks: Approx. 10% appreciation in H1/2007 and roughly 30% depreciation in H1/2008
- Strong evidence for asymmetric exchange rate pass-through, approximately 2/3 of firms raised their prices following the depreciation in H1/2008 while only 1/5 lowered their prices in reaction to the appreciation in H1/2007



Reactions to specific exchange rate shocks

Table 20: Magnitude of price increase following a króna depreciation in H1/2008 and number of actual price changes in the last 12 months

	<i>Total</i>	<i>1</i>	<i>2 to 3</i>	<i>4 or more</i>
Mean	14.7	10.4	12.8	23.2

Table 21: Sector reaction to króna appreciation in H1/2007 and depreciation in H1/2008

	<i>Total</i>	<i>Manufacturing, mining, quarrying, fishing, agriculture, agriculture, hunting and forestry</i>	<i>Wholesale, retail trade , hotels, restaurants, transport, storage and communication</i>	<i>Financial intermediation, real estate, renting and business activities</i>	<i>Construction</i>	<i>Other services</i>
<i>Appreciation in H1/2007</i>						
Decrease price	20	35	32	17	5	11
Unchanged or higher price	80	65	68	83	95	89
<i>Depreciation in H1/2008</i>						
Increase price	62.6	90	68	48	63	47
Unchanged or lower price	37.4	10	32	52	37	53

- Asymmetric pass-through in all sectors following the actual exchange rate changes in H1/2007 and H1/2008



Reactions to specific exchange rate shocks

Table 22: Reaction to króna appreciation in H1/2007 and depreciation in H1/2008 and number of competitors

	<i>Total</i>	<i>0 to 3</i>	<i>4 to 15</i>	<i>16 or more</i>
Appreciation in H1/2007				
Decrease price	20	25	34	13
Unchanged or higher price	80	75	66	87
Depreciation in H1/2008				
Increase price	62.6	72	67	55
Unchanged or lower price	37.4	28	33	45

- Competition does not seem to play a role in passing an appreciation into lower prices but competition does seem to play a role in limiting the increase of prices following a depreciation



Size of shocks necessary to affect prices

Table 23: Necessary magnitude of exchange rate changes within a quarter for price adjustment to take place

	<i>Depreciate</i>	<i>Appreciate</i>
Mean	11.4	15.9
Less than 10%	33	32.7
10-15%	49.5	35.7
More than 15%	17.5	31.6

Table 24: Necessary magnitude of exchange rate changes within a quarter for price adjustment to take place for each sector

	<i>Total</i>	<i>Manufacturing, mining, quarrying, fishing, agriculture, and forestry</i>	<i>Wholesale, retail trade, hotels, restaurants, transport, storage and communication</i>	<i>Financial intermediation, real estate, renting and business activities</i>	<i>Construction</i>	<i>Other services</i>
Depreciate	11.4	10.2	12.8	9.8	10.5	13.2
Appreciate	15.9	13.7	15	13.8	18.5	18.7

- Further evidence of asymmetric exchange rate pass-through in the firms' responses on the necessary magnitude of exchange rate changes to affect price setting
- Firms in all sectors express a lower threshold for the necessary size of a depreciation to be passed into higher prices than the size of an appreciation



Size of shocks necessary to affect prices

Table 25: Necessary magnitude of króna depreciation within a quarter for price adjustment to take place and actual price changes in the last 12 months

	<i>Total</i>	<i>0</i>	<i>1</i>	<i>2 to 3</i>	<i>4 or more</i>
Less than 10%	33	37.5	13.3	31	66.7
10-15%	49.5	37.5	56.7	52.4	33.3
More than 15%	17.5	25	30	16.7	0

- As expected, those firms that have changed prices most often in the last year have the lowest threshold for exchange rate changes before they choose to adjust their prices



Incomplete pass-through of appreciations

Table 26: Importance of reasons for incomplete pass-through of króna appreciation into prices

Increased costs	17.6
Unsustainable appreciation	15.2
Insufficient appreciation	6.4
Large demand	5.6
Competitors do not lower their prices	4
Not valid for the firm	51.2

- Rising costs main reason for incomplete pass-through of króna appreciation
- Also evidence of forward-looking estimates of the sustainability of króna appreciation
- Surprisingly small role for strong demand and limited competition
- Manufacturing, a sector very exposed to exchange rate changes, point towards increased costs and unsustainability of the appreciation as the main reasons for incomplete pass-through of króna appreciations - more so than other sectors

Methods to restore profits after a depreciation



Table 27: Importance of methods of restoring profit margins following a depreciation of the króna

Reduce costs	47.1
Increase price	37
Increase productivity or production quantity	6.7
Change supplier	2.5
Other means	6.7

Table 28: Importance of methods of restoring profit margins following a depreciation of the króna for each sector

	<i>Total</i>	<i>Manufacturing, mining, quarrying, fishing, agriculture, agriculture, hunting and forestry</i>	<i>Wholesale, retail trade , hotels, restaurants, transport, storage and communication</i>	<i>Financial intermediation, real estate, renting and business activities</i>	<i>Construction</i>	<i>Other services</i>
Reduce costs	47.1	38	26	63	57	54
Increase price	37	50	63	26	19	25
Other means	15.9	13	11	11	24	21

- Reducing costs a more important method to restore profit margins after a depreciation than increasing prices
- Clear sector difference with regard to most important methods to restore profit margins following a króna depreciation

Methods to restore profits after a depreciation



Table 29: Importance of methods of restoring profit margins following a depreciation of the króna and competition status

	<i>Total</i>	<i>Market leaders</i>	<i>Market followers within monopolistic monopolistic competition</i>	<i>Competition</i>
Reduce costs	47.1	35	55	47
Increase price	37	48	30	35
Other means	15.9	16	15	18

- Market leaders are more inclined to raise prices to restore their profits following a króna depreciation, whereas market followers and firms operating in a market with no market leaders are more inclined to reduce costs following a depreciation to restore profits

Methods to restore profits after a depreciation



Table 30: Importance of methods of restoring profit margins following a depreciation of the króna and number of price reviews in the last 12 months

	<i>Total</i>	<i>0</i>	<i>1</i>	<i>2 to 3</i>	<i>4 or more</i>
Reduce costs	47.1	100	54	53	28
Increase price	37	0	31	28	54
Other means	15.9	0	15	19	17

- As expected, firms that focused on reducing costs following a króna depreciation have conducted the fewest price reviews in the last 12 months whilst roughly half of those that have reviewed their prices four times or more say increasing prices is the most important method to restore profit margins
- Small firms rely more on price increases to restore profit margins following a króna depreciation whilst larger firms emphasize cost reduction and other solutions



Cost structure and price setting

Table 31: Median share of input in total production costs

	<i>Total</i>	<i>Manufacturing and fishing</i>	<i>Wholesale, retail, hotels, restaurants, transport, and communication</i>	<i>Financial intermediation, real estate, renting and business activities</i>	<i>Construction</i>	<i>Other services</i>
Labour	40	25	20	40	40	65
Imported inputs	15	30	35	0	15	4.5

Table 32: Price reviewing rules and share of imported input costs of total production costs

	<i>Total</i>	<i>0</i>	<i>1-10%</i>	<i>11-40%</i>	<i>over 40%</i>
Time-dependant	39.3	50	42	41	23
Mainly time-dependant but also in reaction to specific events	46.7	36	52	46	58
State-dependant (non-regular)	14.1	14	6	12	19

- Volatility of input costs important for volatility in prices
- Imported inputs are most important in manufacturing and in the wholesale/retail sector whereas labour costs have a large weight in construction and financial services
- Pure time-dependant price setting decreases with the higher share of imported input costs



Exposure to exchange rate changes

Table 33: Frequency of price reviews and actual changes in the last 12 months and share of imported input costs of total production costs

	<i>Total</i>	<i>0</i>	<i>1-10%</i>	<i>11-40%</i>	<i>over 40%</i>
Median price review frequency	3	2	3	3	5
Median price change frequency	2	2	2	2	2

- Use the share of costs of imported inputs of total production costs as a measure of firms' exposure to exchange rate changes
- As expected, price review frequency rises as share of imported input cost of production costs increases
- The median firm with imported input costs weighing over 40% of total production costs reviews its prices every 10 weeks
- The actual price change frequency of the median firm is nevertheless the same
- It is likely that the size of the price changes increases with the share of imported input costs of total production costs



Exposure to exchange rate changes

Table 34: The importance of factors driving price changes and share of imported input costs of total production costs

	<i>Total</i>	<i>0</i>	<i>1-10%</i>	<i>11-40%</i>	<i>over 40%</i>
<i>Increases</i>					
Costs	82	90.4	78.3	82.9	73.1
Exchange rate changes	35.2	7.7	16.7	50	59.6
Competitors' price	14.4	19.2	21.7	11	5.8
Demand	12.8	21.2	25	4.9	9.6
<i>Decreases</i>					
Costs	53.8	50	53.4	61.5	44
Exchange rate changes	27.3	2	12.1	39.7	48
Competitors' price	33.6	30	43.1	26.9	36
Demand	30.7	56	36.2	20.5	20
<i>Asymmetries in price changes (Importance for increases/Importance for decreases)</i>					
Costs	1.5	1.8	1.5	1.3	1.7
Exchange rate changes	1.3	3.9	1.4	1.3	1.2
Competitors' price	0.4	0.6	0.5	0.4	0.2
Demand	0.4	0.4	0.7	0.2	0.5

- As expected, exchange rate changes are stronger driving factors of price changes as the share of imported input costs of total production costs becomes larger
- Decreased demand is a stronger driving factor for price decreases in firms with small or non-existing share of imported input costs of total production costs



Exposure to exchange rate changes

Table 35: Reaction to króna appreciation in H1/2007 and depreciation in H1/2008 and share of imported input costs of total production costs

	<i>Total</i>	<i>0</i>	<i>1-10%</i>	<i>11-40%</i>	<i>over 40%</i>
<i>Appreciation in H1/2007</i>					
Decrease price	20	0	8	28	31
Unchanged or higher price	80	100	92	73	69
<i>Depreciation in H1/2008</i>					
Increase price	62.6	32	35	80	92
Unchanged or lower price	37.4	68	65	20	8

- As expected, the share of firms who adjusted their prices in response to the two specific exchange rate shocks increases with rising share of imported input costs of total production costs
- 1/3 of firms with no imported input costs increased their prices following the depreciation in H1/2007, whilst none of them lowered their price following the appreciation in H1/2008



Exposure to exchange rate changes

Table 36: Importance of methods of restoring profit margins following a depreciation of the króna and share of imported input costs of total production costs

	<i>Total</i>	<i>0</i>	<i>1-10%</i>	<i>11-40%</i>	<i>over 40%</i>
Reduce costs	47.1	50	56	53	25
Increase price	37	18	24	43	54
Other means	15.9	32	20	5	21

- As the share of imported input costs of total production costs rises, so does the reliance on price increases as the method to restore profits following a depreciation



The role of labour costs

Table 37: Price reviewing rules and share of labour costs of total production costs

	<i>Total</i>	<i>0-20%</i>	<i>21-40%</i>	<i>41-60%</i>	<i>over 60%</i>
Time-dependant	39.3	28	29	48	62
Mainly time-dependant but also in reaction to specific events	46.7	56	49	48	27
State-dependant (non-regular)	14.1	17	23	3	12

- Pure time-dependant price setting increases in line with higher share of labour costs of total production costs



The role of labour costs

Table 38: The importance of factors driving price changes and share of labour costs of total production costs

	<i>Total</i>	<i>0-20%</i>	<i>21-40%</i>	<i>41-60%</i>	<i>over 60%</i>
Increases					
Costs	82	76.4	80	81.7	93.5
Exchange rate changes	35.2	56.9	38.6	25	4.3
Competitors' price	14.4	8.3	12.9	20	17.4
Demand	12.8	2.8	18.6	15	23.9
Decreases					
Costs	53.8	57.6	56.1	43.3	59.1
Exchange rate changes	27.3	50	27.3	18.3	0
Competitors' price	33.6	27.3	27.3	46.7	34.1
Demand	30.7	9.1	39.4	40	43.2

Table 39: Frequency of price reviews and actual changes in the last 12 months and share of labour costs of total production costs

	<i>Total</i>	<i>0-20%</i>	<i>21-40%</i>	<i>41-60%</i>	<i>over 60%</i>
Median price review frequency	3	4	2.5	2.5	2
Median price change frequency	2	2	2	2	2

- As expected, costs become a more important driving factor of price increases as labour costs are a larger share of total production costs
- Price review frequency decreases in line with higher share of labour costs of total production costs



Credibility of the Central Bank

Table 40: Credibility of the Central Bank of Iceland's inflation target

<i>How likely that inflation will be at target in five years</i>	<i>Total</i>	<i>Manufacturing and fishing</i>	<i>Wholesale, retail, hotels, restaurants, transport, and communication</i>	<i>Financial intermediation, real estate, renting and business activities</i>	<i>Construction</i>	<i>Other services</i>
Very or rather likely	30.5	15.6	50	30	25	38.7
Neither likely nor unlikely	21.4	15.6	11.1	26.7	25	25.8
Very or rather unlikely	48.1	68.8	38.9	43.3	50	35.5

- Credibility of monetary policy is important for price setting as it encourages forward-looking price setting which makes monetary policy more effective and decreases the costs of disinflation
- Credibility is also important for the degree of exchange rate pass-through
- The results reflect the credibility issue the Central Bank faced even before the banking collapse as only 30% of firms think it likely that inflation will be at target in five years
- Credibility of the inflation target is lowest in manufacturing and greatest in the wholesale/retail sector



Concluding remarks

- The results indicate that price setting is by and large similar in Iceland as in other countries despite the more volatile macroeconomic environment and the large increases in inflation prior to the survey
- The median Icelandic firm reviews its prices every four months and changes them every six months
- Price stickiness is therefore smaller than in most other countries but the large increase in inflation over the period in question suggest that the size of price changes is larger here than elsewhere
- Implicit and explicit contracts are found to be the most important sources of price rigidity as in most other surveys



Concluding remarks

- Firms that are more exposed to exchange rate movements review their prices more often but have the same price change frequency
- Strong evidence of asymmetric exchange rate pass-through with a stronger tendency for depreciation to be passed through to higher prices than appreciation into lower prices
 - 65% of firms raised their prices following the depreciation in H1/2008 while only 20% lowered their prices in reaction to the appreciation in H1/2007
 - Firms in all sectors express a lower threshold for the necessary size of a depreciation to be passed into higher prices than the size of an appreciation
- Some evidence of firms with little or no exposure to exchange rate movements increasing their prices following a depreciation



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