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Price-setting behaviour in New Zealand*

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Abstract

New evidence from a large survey of over 5300 firms provides insight into price-setting behaviour in New Zealand. There is considerable heterogeneity in behaviour both between and within sectors, and marked asymmetry in the responses to shocks. The median number of prices reviews is twice per year, but the median number of changes is just once. Multi-product firms reset prices more frequently, even accounting for other firm characteristics. Explicit and implicit contracts and strategic complementarity are the most widely recognised causes of price stickiness. Menu costs and sticky information are not widely recognised.

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Access to the data used in this study was provided by Statistics NZ in accordance with security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular business or organisation. The results in this paper have been confidentialised to protect individual businesses from identification.

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1 Introduction

Price-setting behaviour of firms determines inflation dynamics and is of crucial importance for monetary policy. Nominal rigidities in prices affect monetary policy's ability to influence real activity.¹ There are a number of competing theories of nominal rigidities with potentially different implications for modelling the economy and for the conduct of monetary policy.

The responses to a large behavioural survey of the price-setting practices of New Zealand firms point to a great heterogeneity in practices across firms. The advantage of behavioural surveys is that they allow direct identification of the methods used by firms to set prices, and to discriminate between competing theories of price rigidities that are observationally equivalent in micro price data. For example, studies of micro data are unable to determine whether the price remains unchanged because of contracts.

Blinder (1991) and Blinder *et al.* (1998) survey US firms on their price-setting behaviour and the sources of price stickiness. There have been several follow-up surveys in other countries, including, among others, surveys for the United Kingdom (Greenslade and Parker, 2012), Sweden (Apel, Friberg and Halstern, 2005), Canada (Amirault, Kwan and Wilkinson, 2006), the euro area (Fabiani *et al.*, 2006), and Australia (Park, Rayner and D'Arcy, 2010).

Studies of price-setting behaviour in New Zealand have to date been rare. Buckle and Carlson (2000) use qualitative survey responses to Quarterly Survey of Business Opinion (QSBO). They find that large firms (as measured by number of employees) change prices more frequently than smaller firms, which they attribute to lump sum menu costs, which are proportionately larger for smaller firms. Coleman and Silverstone (2007) also use data from the QSBO, finding considerable heterogeneity in price-setting behaviour.

¹ Recent work by Bhattarai *et al.* (2014) finds that the source of the shock and the response of monetary policy can affect the impact of price flexibility on output.

The survey analysed here is the first purpose-designed behavioural survey carried out in New Zealand, and is superior to the QSBO for the purposes of understanding firms' price-setting behaviour in a number of dimensions. First, the questions are specifically designed to elicit the underlying causes of price stickiness, including understanding the differing influences on the review and change stages of the price-setting process. Second, there are a markedly higher number of respondents. Finally, the firms are carefully stratified and sampled across all private sector industries to accurately represent the make-up of firms in the New Zealand economy.

The New Zealand survey is the largest country survey carried out to date, with a markedly superior response rate. It has more than twice the respondents of the next largest survey, and over 25 times the number of respondents in Blinder (1991). It is also the first such survey that covers all non-government sectors in the economy. The survey was carried out in 2010 under the auspices of Statistics New Zealand's annual *Business Operations Survey*.

The majority of firms set prices as a mark-up over costs, although a significant minority are influenced by competitors' prices. Few firms raise prices using a rule-of-thumb process, such as indexing to inflation. Only a small fraction of firms are purely forward looking when setting prices, with firms most likely to set prices based on current conditions. This result is true across firm sizes and sectors and provides evidence to support the use of a so-called hybrid New Keynesian Phillips Curve (NKPC). Firms react asymmetrically to shocks, with positive cost shocks being more important for price changes than negative ones.

The results point to large heterogeneity in price-setting behaviour both within and between sectors. Most sectors had some firms that did not change price over the previous year, as well as some firms that change price on a daily frequency. The median number of price reviews is twice over the previous year, but the median annual number of price changes is once. There is also marked heterogeneity in price-setting behaviour by firm size, with larger firms resetting prices more frequently. This is in line with the previous research on New Zealand and with the findings of Goldberg and Hellerstein (2009). Price stickiness is more prevalent in firm-to-firm

transactions, with those firms selling to households and individuals changing prices more frequently.

Explicit and implicit contracts are the most cited reasons for firms to leave prices unchanged. This is an important finding since such contracts are not reported in the micro price data,² and evidence in the literature on their existence is sparse. Strategic complementarity, where a firm's optimal price depends on its competitors' is also commonly cited as being very important in preventing price increases. Physical (menu) costs involved in changing prices are rarely viewed as being important. There is little support for the costs of gathering information having an impact on the frequency of reviews.

2 Survey design and characteristics of respondents

2.1 Survey design

The data used here originate from the 2010 *Business Operations Survey* carried out by Statistics New Zealand in August 2010.³ The target population was businesses on Statistics New Zealand's Business Frame with an annual GST turnover greater than NZD 30,000 and at least 6 employees. Firms operating in public administration and safety were excluded, as were local government enterprises, the central bank and non-profit institutions in the service of households. The survey questions on price setting are provided in the appendix.⁴

The final estimated population size of firms was 35,307 enterprises. The sample design was a two-level stratification, firstly by Australia and New Zealand Standard Industrial Classification 2006 (ANZSIC06) industrial sector, and then by firm size within each sector, as determined by number of employees. The four employment size groups were small (6-19

² See Klenow and Malin (2010) and Nakamura and Steinsson (2013) for excellent summaries of the micro price data literature.

³ See

http://www.statistics.govt.nz/browse_for_stats/businesses/business_growth_and_innovation/business-op-survey-2010-tables.aspx for a full description of the survey.

⁴ A full copy of the survey questionnaire is available at

[http://www2.stats.govt.nz/domino/external/quest/sddquest.nsf/12df43879eb9b25e4c256809001ee0fe/6233ea80fe191165cc25777d007a8490/\\$FILE/BOS%202010_Sample.pdf](http://www2.stats.govt.nz/domino/external/quest/sddquest.nsf/12df43879eb9b25e4c256809001ee0fe/6233ea80fe191165cc25777d007a8490/$FILE/BOS%202010_Sample.pdf)

employees), medium 1 (20-29 employees), medium 2 (30-49 employees) and large (50+ employees). The breakdown for publication is slightly different from that used in the sample stratification, with the firm employment sizes used in this paper being: small (6-19 employees), medium (20-100 employees) and large (100+ employees).

The survey was sent to a random sample of firms within this sampling frame. Firms were asked to report on the most recently completed financial year prior to the sampling date. The survey had 5369 replies, a response rate of 81.8 percent and comprising approximately one firm in seven of the total population of firms. The number of respondents is markedly larger than previous country surveys of pricing behaviour, and the response rate also higher (see table A1 in the appendix).

The results presented here have been weighted using weights provided by Statistics New Zealand to represent the population of firms. These weights are calculated within each industry and firm size stratum such that multiplying each firm in the sample by its weight will deliver the number of firms in the total population in each stratum.⁵

It should be noted that these weights deliver aggregate and sectoral statistics that are firm-count weighted, so emphasise the behaviour of the more numerous smaller firms. Firms with more employees in general have a greater share of sector value added than those with fewer, so a sector aggregate based on output (perhaps of more interest to macroeconomic policymakers) could potentially differ from the results shown here. To account for this potential difference, the aggregate results for each question are also presented using employment weights, calculated by dividing the aggregate employment in each stratum derived from Statistics New Zealand's 2010 Business Demography Survey by the number of firms in that stratum.⁶ Data for output by employment size and by industry are unfortunately not available.

⁵ The mean weight of firms is 6.6, with around 80 percent of firms having a weight less than 10.

⁶ Pre-school and school education and hospitals were excluded on the assumption that the majority of employment within these industries would primarily be in the state sector.

2.2 Relevance of survey questions for price-setting behaviour of respondents

Economic theory on pricing concentrates on profit-maximising firms that are able to determine their own price. Previous surveys, e.g. Blinder *et al.* (1998), Amirault *et al.* (2006), Greenslade and Parker (2012), have consequently excluded firms in certain sectors from their sample, notably in primary industries and in the health and education sectors. Prices in primary industries (agriculture, fishing, forestry and extraction) were assumed by these authors to be set by the balance of supply and demand in international markets and firms consequently assumed to be price-takers. Similarly, firms operating in the health and education sectors often have some form of regulatory control over pricing.

The New Zealand survey includes these sectors in its sampling frame, but asks firms who reviews and sets the prices. For the primary sectors, the assumption made by previous papers has some validity – less than half of the firms in the primary sectors set their own prices (table 1). Three quarters of firms surveyed in the health and education sectors set their own prices, although the survey excludes local government enterprises, such as public hospitals, which account for a large share of activity in those sectors. The share of businesses that set their own prices within the other sectors is much higher – reaching 95 percent for industry and construction. In the following analysis, the data presented relate only to those firms that are responsible for setting their own prices.

Table 1: Who reviews and sets the prices?

Industry name	Number of firms in population	Who reviews the price? (percent of firms)		
		The business	A parent business	Other
Agriculture	2103	32	13	56
Commercial fishing ^(a)	42	79	0	29
Forestry & logging	210	39	16	47
Agriculture, forestry, & fishing support services	762	89	2	9
Mining	99	67	15	15
Primary^(b)	3216	48	10	43
Food, beverage, & tobacco	921	91	8	1
Textile, clothing, footwear, & leather	357	96	2	1
Wood & paper product	528	95	1	4
Printing, publishing, & recorded media	306	94	3	3
Petroleum, coal, chemical, & associated product	414	98	1	0
Non-metallic mineral product	165	95	2	2
Metal product	912	93	4	3
Transport and industrial machinery & equipment	831	96	2	3
Other machinery & equipment	210	96	4	0
Other manufacturing	369	99	2	0
Electricity, gas, water, & waste services ^(a)	114	84	8	11
Industry^(b)	5127	94	4	2
Construction^(b)	3468	95	2	3
Machinery & equipment wholesaling	903	86	13	2
Other wholesale trade	1959	95	3	3
Retail trade	4215	73	15	12
Trade^(b)	7077	81	11	8
Accommodation & food services	4194	88	10	2
Transport, postal, & warehousing	1362	81	15	4
Publishing	120	88	3	8
Motion picture	135	96	2	0
Telecommunications ^(a)	87	90	7	7
Finance	159	85	8	8
Insurance ^(a)	45	80	13	7
Auxiliary finance	303	62	11	28
Rental, hiring, & real estate services	804	84	12	4
Other professional scientific	2907	91	7	3
Computer systems design	558	87	10	3
Administrative & support services	1335	79	9	12
Arts & recreation services	486	75	14	11
Other services	978	90	4	6
Private services^(b)	13473	86	9	5
Education & training	717	79	7	13
Health care & social assistance	2226	69	3	28
Government services^(b)	2943	71	4	24
Overall	35307	82	8	10

(a) the number of respondents for commercial fishing; electricity, gas, water and waste services; telecommunications and insurance is low, so results from these sectors should be treated with caution;

(b) sectors have been grouped using the terminology favoured by Fabiani *et al.* (2006), augmented with the addition of primary and government services, which were not included in that paper.

2.3 Customer groups

The survey indicated that a large proportion of transactions takes place between firms. 57 percent of respondents identified other businesses as the main customers for their product or service (table 2). Of those business customers, firms outside of the business group are the largest customer type, followed by retailers and wholesalers. Households are the next largest customer group, with 45 percent of respondents.

Firms in the industry sector are much less likely to sell to individuals or households, with 87 percent of these firms selling primarily to businesses. A fifth of firms in the health and education sectors sold their product or service primarily to the government. In terms of firm size, smaller firms are more likely to sell direct to households, whereas a higher proportion of larger firms sold to retailers and other businesses.

Table 2: Main customer group that pays for the good or service^(a)

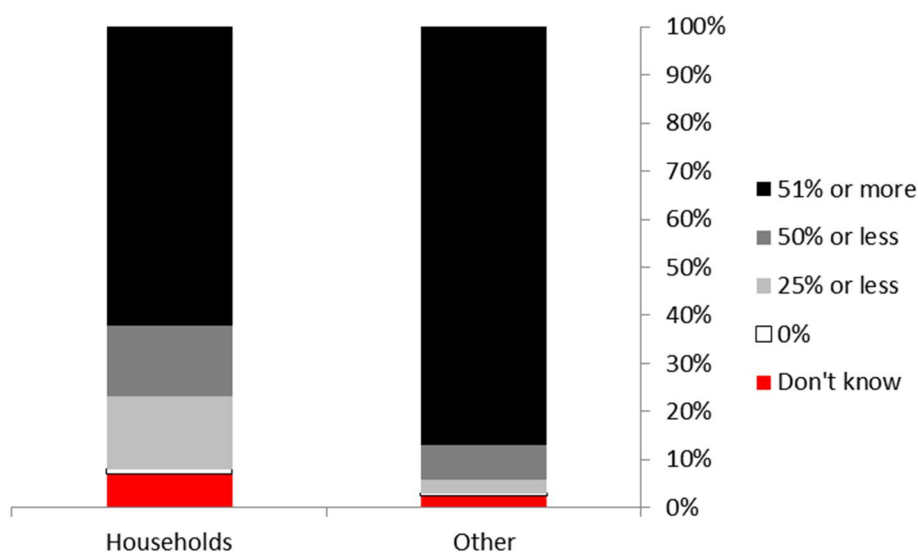
	Individual or household	Business within business group	Retailer or wholesaler outside of group	Other business outside business group	Gov't	Total
Firm size						
Small	49	9	14	31	5	108
Medium	33	9	20	39	7	108
Large	23	9	28	40	8	108
Sector						
Primary	23	10	24	46	1	108
Industry	17	9	33	45	2	106
Trade	50	5	25	22	3	105
Private services	51	11	10	32	4	108
Gov't services	80	1	1	6	21	109
Overall: firm population weight	45	9	16	33	5	107
Overall: employment weight	35	8	21	35	8	107

(a) While the original question asked firms to mark only one category, some did not. These multiple responses have been maintained by Statistics New Zealand, resulting in rows that sum to greater than 100 percent.

There is a large degree of continuing customer relationships, with three quarters of firms having at least half of their customers return for repeat business. This high degree of repeat customers is consistent with the

customer markets theory of pricing (see e.g. Bils, 1989). Firms whose main customers are households are less likely to have repeat customers – only 62 percent of these firms had more than half their customers returning, compared with 87 percent of firms with other main customer types (figure 1).

Figure 1: Customers who return for repeat business



It appears, therefore, that households are comparatively fickle customers, whereas business customers tend to maintain more continuous, longer-lasting relationships with their suppliers. One potential explanation for this is that households consume final goods, so can choose between competing providers of that final good. Conversely, firms purchase intermediate goods and changing between suppliers may require costly re-tooling of production processes, or there may simply be far fewer possible suppliers of specific intermediate goods.

3 How do firms set prices?

The survey asks firms to identify the principal method used for setting the price of their product or service. Economic theory suggests that in imperfectly competitive markets firms will choose to set prices as a mark-up over marginal costs. Under perfect competition prices should be set equal to marginal costs.

In practice, previous work has shown that firms cannot always precisely determine what their marginal cost is, so the question referred simply to margin over costs. This potential departure from theory aside, most firms recognised costs plus profit margin as the best description of their pricing method (table 3). Just under a third of firms instead mentioned the influence of competitors' prices. A tenth of firms set prices according to a rule of thumb, such as a change by a fixed amount, or in line with inflation.

There is little difference between the pricing methods used by small and large firms. The difference between the price setting methods used by different sectors is more marked. Firms in the industrial and trade sectors are more likely to use a cost plus mark-up approach. Conversely, firms in the health and education sectors are nearly four times more likely to use a rule of thumb than firms in industry or trade. This could include inflation indexing. Firms selling multiple products are more likely to adopt a costs plus profit margin than single product firms.

Table 3: Methods for setting prices (percent of firms)

	Costs plus profit margin	Influence of competitors' prices	Rule of thumb ^(a)	Other
Firm size				
Small	55	29	10	9
Medium	55	32	9	7
Large	51	34	6	12
Number of products				
Single	42	34	14	14
Multiple	59	28	8	7
Sector				
Primary	45	39	8	13
Industry	65	27	6	5
Trade	66	29	6	4
Private services	50	31	11	10
Gov't services	27	30	23	24
Perceived competition				
Captive market / no effective comp.	47	9	17	27
No more than 1 or 2 competitors	58	20	15	9
Many competitors, some dominant	55	34	8	7
Many competitors, none dominant	56	32	8	6
Overall: firm population weight	55	30	10	8
Overall: employment weight	51	32	9	11

(a) Such as a change by a fixed amount, or in line with inflation.

3.1 Are firms' price reviews forward looking?

In models using the so-called New Keynesian Phillips Curve (NKPC), firms set prices based on their expectations of desired future own prices. However, such models typically struggle to match the degree of price stickiness found in the data. Consequently, some authors propose a 'hybrid' NKPC where past inflation also affects price setting. Various methods have been used to implement this backward-looking behaviour in models, including rule of thumb price-setting (Galí and Gertler, 1999), indexation of inflation (Christiano, Eichenbaum and Evans, 2005) or stickiness in gathering information (Mankiw and Reis, 2002).

Given that some of these modelling assumptions are relatively *ad hoc* with potentially little microeconomic support, it is useful to know what information firms use when reaching their pricing decisions. Just 6 percent of New Zealand firms are fully forward looking (table 4). More than 40

percent of firms use current information, with a similar number also incorporating some view of the future. There is little difference between industries, but larger firms are more forward looking than smaller firms. This suggests some costs involved in carrying out assessment of the future, which are relatively higher for small firms. Interestingly, there is little difference between the responses of firms who review prices at different intervals (see section 4.2 below), with those firms who review prices less frequently than annually just as likely to focus on just the current economic situation as those firms who review prices daily. These findings provide support for the use of a 'hybrid' NKPC, given the large proportion of firms that are not solely forward looking.

Table 4: Pricing decisions – reliance on economic conditions (percent of firms)

	Current economic conditions	Current and expected future economic conditions	Expected future economic conditions	Don't know
Firm size				
Small	44	38	6	12
Medium	40	47	8	6
Large	27	60	10	4
Sector				
Primary	42	38	9	11
Industry	41	43	7	9
Trade	42	40	7	12
Private services	43	42	6	10
Gov't services	27	56	8	12
Frequency of review				
Daily	53	38	4	5
Quarterly	47	40	4	9
Less frequently than annually	53	30	6	11
Response to specific events	45	33	8	14
Overall: firm population weight	43	41	6	10
Overall: employment weight	35	50	8	7

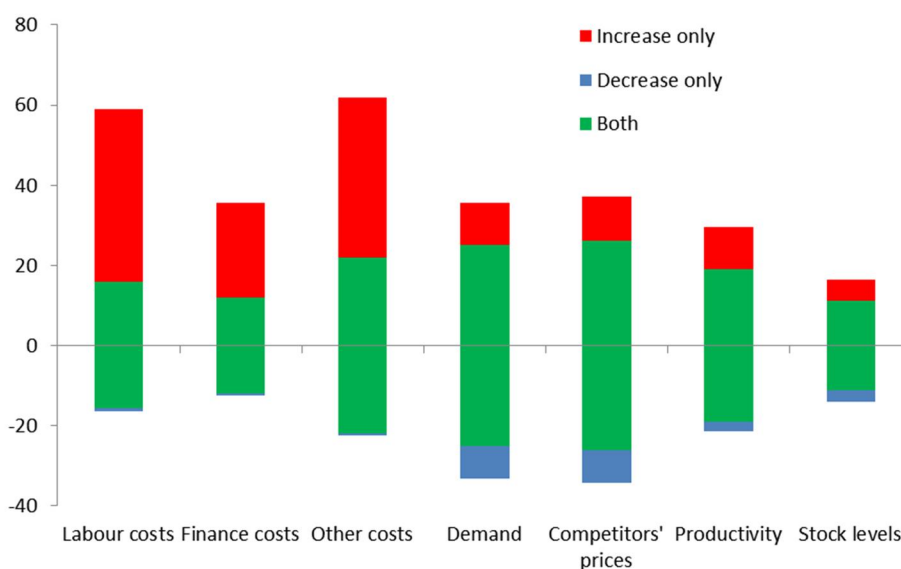
3.2 What factors influence prices?

Firms were asked which factors were important for price setting, indicating whether these factors were always important, or whether there is an asymmetry between increases and falls in these factors. Figure 2 sets out the average response, with a larger bar indicating a greater proportion of firms citing this factor as being important for price changes. 'Other costs' are viewed as the most important factor affecting prices, followed by labour costs, competitors' prices and demand. Productivity, finance costs and the number of competitors are seen as important factors by a little more than half of firms. However, the majority of firms did not view inventories as an important factor affecting prices.

There are some notable asymmetries, with costs in particular being more important for price rises than price falls. The number of firms citing costs as being important for price increases is noticeably larger than the proportion of firms citing these reasons as being important for only price falls. Conversely, the number of firms citing demand as being important for only price increases is approximately the same as those who said it only affected price decreases. The response that demand is important for both price increases and decreases is much bigger than either of the previous one-sided responses, implying a symmetric response.

These results for the importance of demand contrast a little with the findings of Coleman and Silverstone (2007), who find that demand changes are far more important for price decreases than increases. Conversely, the asymmetry of responses for the importance of costs is more in keeping with Coleman and Silverstone.

Figure 2: Factors that affect price changes (percent of firms citing factor as important for price changes)



To some extent, asymmetry in response to costs may reflect the evolution of such costs. Nominal wages rarely fall, so respondents may not have experience of price setting following lower labour costs. Further, while labour costs may be important for the price level of a firm, it does not necessarily translate into more frequent price resets. Only 7 percent of firms in the sample reset wages more frequently than once per year, with 30 percent doing so less frequently than annually.

The survey took place in August 2010, immediately following the global financial crisis. Financing costs for banks had increased, and were passed on to some customers, although these increases were offset to an extent by the low Official Cash Rate of the Reserve Bank of New Zealand. Half of firms had no change to their interest rates or fees, whereas 31 percent faced an increase, and 18 percent had a decrease. Unlike labour costs (with downward nominal wage rigidity), the asymmetry in response to finance costs cannot be attributed to one-sided evolution of the relevant cost. That said, firms that had experienced increased interest rates or fees over the previous year were more likely to indicate that finance costs were important for price increases than firms that had experienced constant or

falling interest rates. This evidence is in line with the role played by financial frictions in pricing behaviour found by Gilchrist et al. (2013).

Other costs include raw materials and other intermediate inputs. Sectors where a high percentage of firms reported 'other costs' as not affecting price changes tended to be those with a low share of intermediates in gross output.⁷ Similar to finance costs, the costs of inputs can fluctuate both positively and negatively. There appears to be little relationship between the asymmetry of pricing responses by firms and the fluctuations in input prices for their industry over the previous five years.

3.3 The importance of temporary price reductions sales

Given the reluctance to upset customers by making a permanent price change, firms could be reluctant to drop prices if they would need to increase them again in the future. One method for circumventing this problem is to use a temporary price reduction – a sale. When asked whether the use of temporary price reductions is important, 44 percent of respondents said 'not at all', and 29 percent said 'moderately' or 'very important' (table 5). These responses are in line with Coleman and de Veirman (2011), who find that sales occur rarely for 50 percent of the items in the CPI basket, but frequently for 30 percent of the basket.

⁷ According to the recently published 2006-07 input-output tables for New Zealand.

Table 5: Importance of temporary price reductions (sales) – percent of firms

	Not at all	A little important	Moderately important	Very important	Don't know
Firm size					
Small	45	17	15	12	11
Medium	45	16	18	14	7
Large	33	17	18	25	7
Sector					
Primary	43	16	17	15	8
Industry	41	19	19	12	9
Trade	26	18	27	23	6
Private services	48	19	13	9	11
Gov't services	64	9	6	4	17
Main customer					
Households	41	19	16	13	12
Retailers	31	20	21	21	7
Other firms outside group	52	15	16	10	8
Government	61	14	5	8	11
Proportion repeat customers					
0%	35	2	34	22	6
51% or more	47	16	16	12	9
Overall: firm pop. weight	44	17	16	13	10
Overall: employment weight	40	17	17	18	8

4 Frequency of price reviews and changes

There are two stages to the process for setting prices. In the first stage, the firm gathers information as to what the optimal price (or potentially the optimal pricing strategy) may be. In the second stage, the firm decides on whether it should change its current price to, or at least towards, this optimal price. The advantage of a behavioural survey over price quote data is that it permits understanding of these two stages separately.

4.1 Are prices time or state dependent?

There are some costs associated with reviewing and changing prices, which are discussed in greater detail below. As a result of these costs, most firms do not continuously adjust prices.⁸ The literature differentiates

⁸ As shown below, 5 percent of firms review their prices daily, which could be viewed as effectively continuous.

between two forms of price setting: *time-dependent* and *state-dependent* pricing. Time-dependent pricing is where price resets happen as a function of time. In some models the time between price reset is fixed, e.g. Taylor (1980), in others the opportunity to reset prices is random, e.g. Calvo (1983). In state-dependent models, the price is changed in reaction to shocks. Such models typically assume a cost of changing prices, e.g. Sheshinski and Weiss (1977) and Dotsey, King and Wolman (1999). The consequence of these costs is that firms do not change prices until a shock occurs that is large enough to create sufficient divergence between the current and optimal price for it to be worthwhile to change price.

The survey asked firms whether they reviewed prices at regular intervals, in response to specific events, or a combination of the two strategies. A quarter of firms review prices at regular intervals only, 15 percent did so in response to events, and the majority (61 percent) use the combined strategy. These response rates are similar across sectors and firm sizes.

4.2 How frequent are price reviews?

Firms that claimed some form of time dependence in their price reviewing process were asked to give the frequency at which prices are reviewed. The responses display considerable heterogeneity; 10 percent of firms review prices at least weekly, whereas a third of firms review prices either yearly or less frequently (table 6). There are also large divergences in the responses by firm size and sector. Larger firms are likelier to review prices at more frequent intervals than small firms. Firms in the trade sector review prices more frequently – a quarter of these firms review prices at least weekly, compared with 6 percent of private services firms and 9 percent of firms in industry.

Table 6: Frequency of price reviews (percent of firms)

	Daily	Weekly	Monthly	Quarterly	Half-yearly	Annually	Less than annual	Specific events only
Firm size								
Small	5	6	13	14	14	28	5	16
Medium	5	4	14	15	14	31	4	13
Large	9	10	13	14	11	31	2	10
Sector								
Primary	5	12	6	16	8	28	5	22
Industry	5	4	12	17	15	27	6	14
Trade	12	14	18	15	13	12	2	15
Private serv.	3	3	10	15	14	36	5	14
Gov't serv.	0	0	2	6	12	61	9	10
Overall: pop.	5	5	13	14	14	29	5	15
Overall: emp.	6	8	13	13	12	32	4	12

The effect of these factors on the frequency of price review can be estimated using an ordered probit model. Firms are aggregated into three categories, based on the frequency of review: frequent (daily, weekly, monthly), medium (quarterly and half yearly) and slow (annual or less frequent). Table 7 shows the estimated average marginal effects for this model. A model with seven categories (daily, weekly, monthly, quarterly, half-yearly, annually, less frequent than annual) yields qualitatively similar results.

Table 7: Average marginal effects on frequency of review

Evaluated at:	Frequent	Medium	Slow
<i>Firm size</i>			
Small	-	-	-
Medium	0.0041	0.0032	-0.0052
Large	0.0424***	0.0089***	-0.0513***
<i>Sector</i>			
Primary	-	-	-
Industry	0.0288	0.0060	-0.0349
Construction	0.1582***	0.0056	-0.1638***
Trade	0.2368***	-0.0113	-0.2255***
Private services	-0.0612***	0.0229***	0.0841**
Gov't services	-0.1947***	-0.1590***	0.3537***
<i>Main customer</i>			
Firms within group	-	-	-
Households	0.0711***	0.0172***	-0.0883***
Retailers	0.0061	0.0015	-0.0076
Firms outside group	0.0157	0.0038	-0.0194
Government	0.0060	0.0014	-0.0074
<i>Perceived performance</i>			
Lower profitability	-0.0148	-0.0036	0.0184
Higher profitability	-0.0079	-0.0019	0.0098
Lower productivity	-0.0025	-0.0006	-0.0031
Higher productivity	0.0420***	0.0102***	-0.0521***
Perceived competition	0.0413***	0.0100***	-0.0521***
Multiple products	0.0557***	0.0135***	-0.0692***

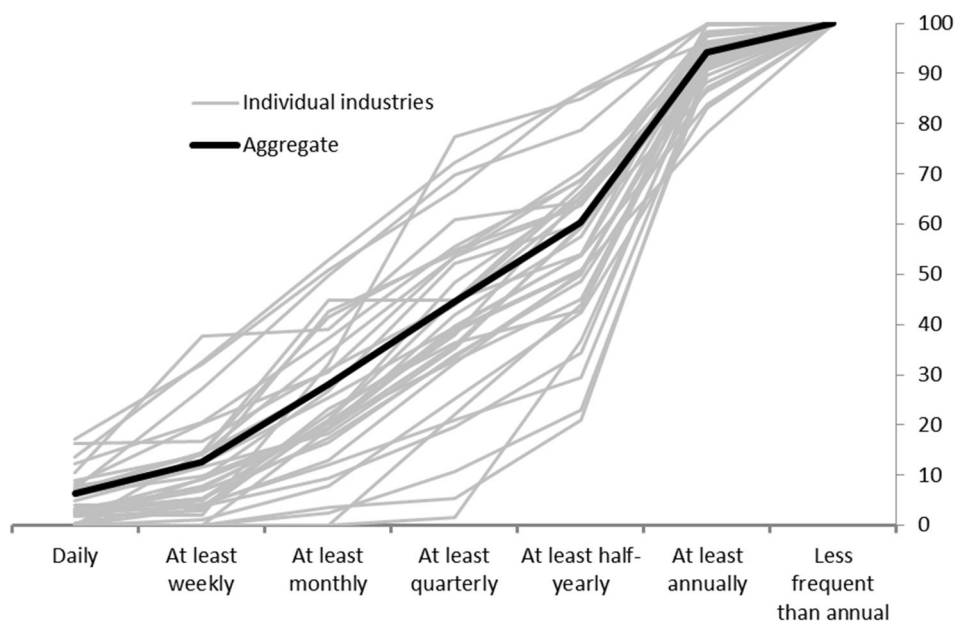
*Significant at 10 percent level, ** at 5 percent and *** at 1 percent.

Taking into account other characteristics of the firms, large firms are more likely to review more frequently, as are firms in trade and construction. Conversely, firms in the service sectors review prices less frequently. Firms whose main customers are households are more likely to review at high frequencies, but other types of customers do not appear to affect the frequency of review.

Firms were asked how they perceived their profitability and productivity relative to other firms in their sector. Perceived profitability appears to have no effect on the frequency of price reviews. However, firms that believe they are more productive than their competitors are more likely to review prices at more frequent intervals than firms who believe their productivity to be in line with the sector average. Firm selling more than one product review prices more frequently *for their main product or service* than firms selling just one product (see section 5.5 below for a more detailed discussion of multi-product firms).

The wide heterogeneity of price reviews between industries is displayed in figure 3, which shows the cumulative share by frequency of reviews for each of the 36 industries. Furthermore, there is wide heterogeneity *within* industries, with most industries containing firms that review prices daily and those that do so less frequently than annually.

Figure 3: Cumulative distribution of firms, by frequency of price review^(a)



(a) excludes firms that review prices only in response to specific events, for whom there are no data on the frequency of review.

4.3 How frequent are price changes?

Firms were asked how many times they changed prices in the most recent financial year. The picture is one of notable price stickiness. Around a quarter of firms had not changed prices, and a further 36 percent changed prices only once (table 8). Only 12 percent of firms changed prices more than six times over the previous year, with a further 12 percent changing it between three and six times. Larger firms change prices more frequently than smaller firms, resulting in an employment-weighted overall result slightly more flexible than a firm-count weighted one.

Split by sector, prices are notably stickier among service-sector firms. Only 8 percent of firms in government services, and 34 percent of firms in private services change prices more than once. This contrasts with the trade sector, where 60 percent of firms change prices more than once.

Table 8: Frequency of price changes, last financial year (percent of firms)

	Zero	Once	Twice	6 times or less	26 times or less	182 times or less	More than 182 times
Firm size							
Small	26	36	16	12	5	3	2
Medium	21	37	17	13	7	4	2
Large	15	36	12	15	8	7	6
Sector							
Primary	26	31	15	11	8	6	2
Industry	21	40	18	11	5	2	3
Trade	16	24	18	19	10	8	4
Private services	27	39	17	10	4	2	1
Government services	29	63	6	2	0	0	0
Overall: firm population weighted	24	36	16	12	6	4	2
Overall: employment weighted	20	37	14	14	7	5	4

An ordered probit was carried out to investigate the factors that influence the number of price changes over the previous year. Firms were split into three categories – sticky (two price changes or less), medium (3 – 26 price changes) and flexible (more than 26 price changes).⁹ There is a clear difference in results by firm size, with large firms the most likely to appear in the flexible category, followed by medium-sized firms, and then small firms (table 9). Firms in construction and trade are more likely to appear in the flexible category. Firms in service sectors are more likely to appear in the sticky category, with firms in government services the most likely.

Firms selling to households and those facing higher perceived competition are more likely to appear in the flexible category. Similarly those firms who believe they are more productive than their competitors and those firms selling multiple products made more frequent price changes. The results for

⁹ A seven category ordered probit delivers similar qualitative results.

price changes are unsurprisingly similar to those for price reviews, given the endogeneity of the decision to review prices.

Table 9: Average marginal effects on frequency of price change

Evaluated at:	Flexible	Medium	Sticky
<i>Firm size</i>			
Small	-	-	-
Medium	0.0320***	0.0306***	-0.0626***
Large	0.0686***	0.0562***	-0.1249****
<i>Sector</i>			
Primary	-	-	-
Industry	-0.0201	-0.0164	0.0366
Construction	0.0542**	0.0313**	-0.0855**
Trade	0.1198***	-0.0509***	-0.1707***
Private services	-0.0570***	-0.0561***	0.1131***
Gov't services	-0.1230***	-0.1866***	0.3095***
<i>Main customer</i>			
Firms within group	-	-	-
Households	0.0231**	0.0197**	-0.0428**
Retailers	0.0066	0.0056	-0.0122
Firms outside group	0.0173	0.0147	-0.0320*
Government	-0.0075	-0.0064	0.0138
<i>Perceived performance</i>			
Lower profitability	0.0011	0.0010	-0.0021
Higher profitability	-0.0102	-0.0087	0.0190
Lower productivity	-0.0003	-0.0003	0.0006
Higher productivity	0.0252***	0.0215***	-0.0466***
Perceived competition	0.0271***	0.0231***	-0.0503***
Multiple products	0.0339***	0.0289***	-0.0628***

*Significant at 10 percent level, ** at 5 percent and *** at 1 percent.

4.4 Comparison with previous surveys of other economies

The large heterogeneity in the frequency of price changes is a feature of previous price-setting surveys (table 10). The median number of price changes over one year by a New Zealand firm is once, which is similar to that found in other small open economies. But there appears to be a greater level of price stickiness, with only 40 percent resetting prices more than once, compared with 48 percent in the United Kingdom, 51 percent in the United States and 67 percent in Canada. Similarly, 24 percent of firms did not reset prices in the previous year, compared with 13 percent in the United Kingdom, 10 percent in the United States and 8 percent in Canada.

Table 10: International comparison of frequency of price changes per year (percent of firms)

Price changes per annum	New Zealand	Australia	Canada	Euro area	United Kingdom ^(a)	United States
≥ 4	24	33 ^(b)	59	14	30	35
2-3	16	12 ^(b)	8	20	18	16
1	36	40	27	39	39	39
< 1	24	15	8	27	13	10
Median	1	1	4	1	1	1.4

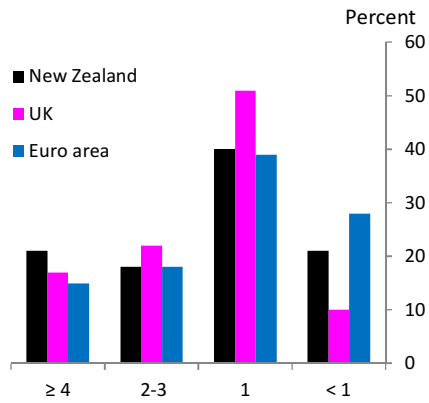
(a) The responses for the United Kingdom have been adjusted for the actual number of price changes made by firms that responded 'irregularly' or 'other' to the frequency of price changes.

(b) Estimate, based on Park, Rayner and D'Arcy (2010) Graph 1, p11.

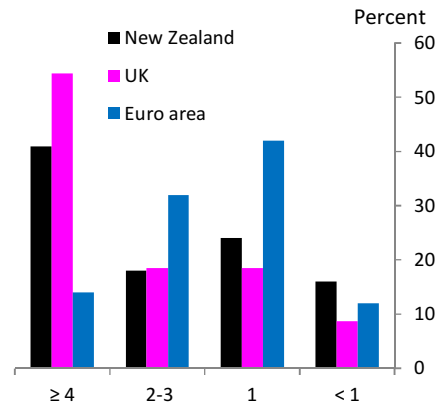
As noted above, the New Zealand survey draws responses from a wider range of sectors than previous surveys in other countries. This raises the possibility that differences between surveys may arise from differences in sectoral composition between economies, or between sampling strategies. To account for this potential source of differing results, figure 4 shows the distribution of the frequency of price changes for a number of sectors in New Zealand, the United Kingdom and the euro area. There are noticeable differences in the distributions between countries, for example only 17 percent of trade firms in the euro area change prices more than 3 times a year, compared with 41 percent in New Zealand and 54 percent in the United Kingdom. These results suggest that the differences between country survey results are not solely down to differences in sectoral composition.

Figure 4: Distribution of price changes by sector in New Zealand, UK and euro area

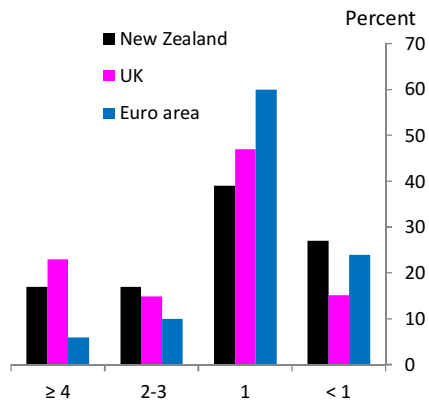
Industry



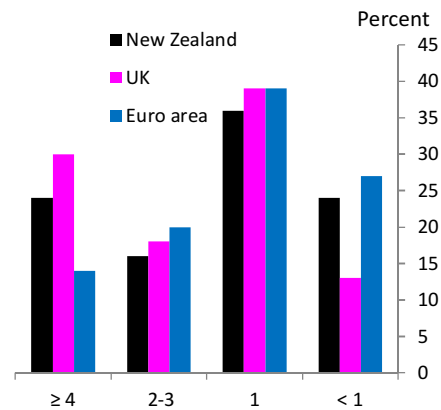
Trade



Private services



Total economy



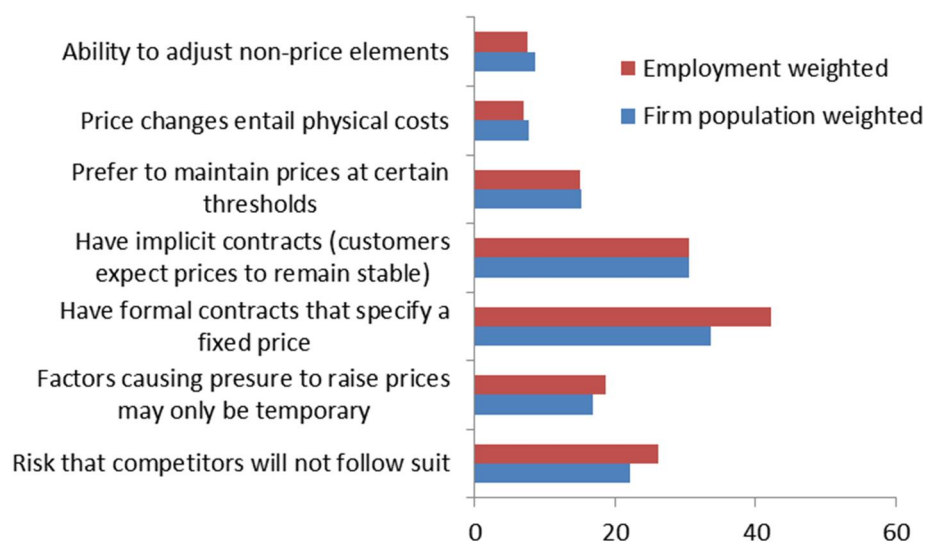
Sources: Fabiani *et al.* (2006), Greenslade and Parker (2010).

5 Sources of sticky prices

There are many potential reasons proposed in the literature on the causes of price stickiness.¹⁰ Since many of these theories are observationally equivalent using price quote data, it has been difficult to differentiate between them. The advantage of a survey is that it is possible to ask firms to rate some of these factors in terms of their importance in preventing price increases, and their impact on the price review process.

Explicit and implicit contracts are most widely recognised as being ‘very important’ for causing price stickiness (figure 5). 49 percent of large firms cite explicit contracts as ‘very important’ for preventing price increases. Strategic complementarity, where firms are reluctant to raise prices for fear that competitors will not follow suit, is the third most recognised. Physical menu costs are not widely perceived as being a factor preventing price increases.

Figure 5: Factors that prevent price increases (percent of firms citing factor as very important)



In the rest of this section, differing theories of price stickiness are explored in greater detail using firms’ responses to the survey.

¹⁰ See Fabiani *et al.* (2006) pp27-29 for a fuller description of these theories.

5.1 Explicit and implicit contracts

Explicit contracts are where the firm agrees with its customers to fix the price of its good or service for a period of time. Contributions to this theory include Fischer (1977) and Barro (1977). There is little empirical evidence for explicit contracts – studies based on price quotes are unable to distinguish whether a price remains unchanged because of a contract or otherwise.

Firms were asked what proportion of customers are on long-term (as least one year) contracts. Half of firms had no customers on long-term contracts, whereas a fifth had more than half of their customers on such contracts. Use of long-term contracts is more prevalent among larger firms, with 29 percent of large firms having the majority of their customers on long-term contracts compared with 18 percent of small firms.

Table 11 shows the average marginal effects from an ordered probit on the proportion of customers that a firm has on long-term fixed price contracts. Firms were split into three categories – those with no customers on fixed price contracts, those with a minority of customers on long-term contracts, and those with a majority (51 percent or more). Larger firms are more likely to have the majority of customers on long-term contracts, as are those in the services sectors and those selling to government (table 11). Firms in the trade sector, those selling to households and those facing higher levels of competition are less likely to use long-term contracts.

Table 11: Average marginal effects on proportion of customers on long-term contracts

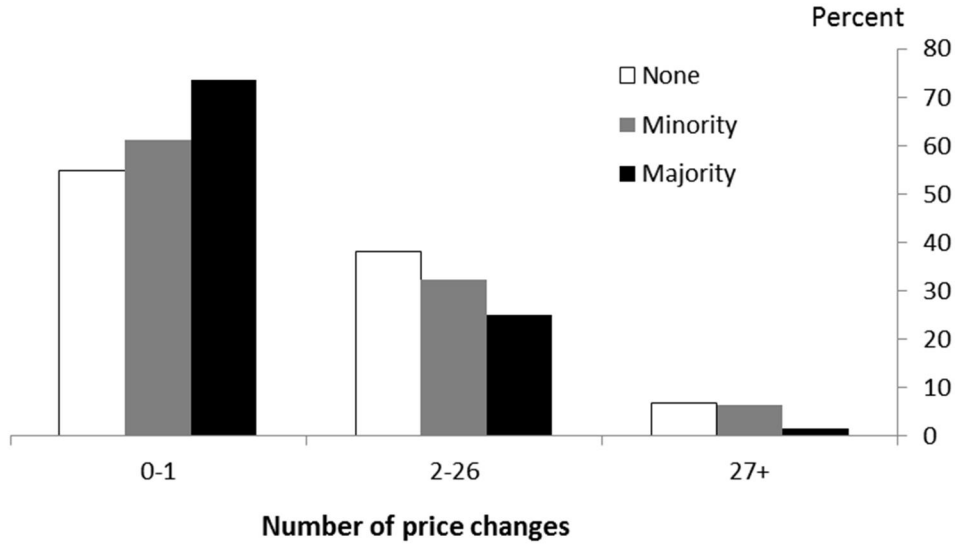
Evaluated at:	None	Minority	Majority
<i>Firm size</i>			
Small	-	-	-
Medium	-0.0844***	0.0135***	0.0709***
Large	-0.1447***	0.0137***	0.1310***
<i>Sector</i>			
Primary	-	-	-
Industry	0.0469*	-0.0112*	-0.0357
Construction	-0.0692*	0.0089*	0.0604*
Trade	0.1269***	-0.0385***	-0.0885***
Private services	-0.1381***	0.0066	0.1315***
Gov't services	-0.1635***	0.0023	0.1611***
<i>Main customer</i>			
Firms within group	-	-	-
Households	0.2243***	-0.0250***	-0.1993***
Retailers	0.0319	-0.0036	-0.0283
Firms outside group	0.0451**	-0.0050**	-0.0400**
Government	-0.1298***	0.0145***	0.1153***
<i>Perceived performance</i>			
Lower profitability	0.0135	-0.0015	-0.0120
Higher profitability	-0.0059	0.0007	0.0053
Lower productivity	0.0041	-0.0005	-0.0036
Higher productivity	-0.0440***	0.0049***	0.0391***
Perceived competition	0.0347***	-0.0039***	-0.0309***
Multiple products	0.0257	-0.0029	-0.0229

*Significant at 10 percent level, ** at 5 percent and *** at 1 percent.

Firms that have a majority of their customers on long-term contracts exhibit a greater degree of price stickiness. Only 27 percent of firms with the majority of their customers on long-term contracts changed price more than once, compared with 39 percent of firms who had a minority of customers on long-term contracts and 45 percent of firms with no long-term contracts (figure 6).¹¹

¹¹ 7 percent of firms answered “don’t know” to this question. The price change behaviour of these firms was similar to those who answered “none”.

Figure 6: Number of price changes in preceding year, by share of customers on long-term price contracts



Even in the absence of binding legal contracts, firms may choose to not change their price to protect ongoing relationships with customers, termed ‘implicit’ contracts. This theory originates from Okun (1981), who assumes that there are some search costs involved for customers to switch suppliers, so customers will have some inertia in their choice of supplier. Firms encourage this inertia by avoiding actions which would trigger a search by customers for a new supplier. This theory also considers concepts of ‘fairness’ – that customers accept price increases caused by increases in costs, but are ‘angered’ by price increases following higher demand (e.g. Rotemberg, 2005).

Implicit contracts are the second most commonly cited factor for preventing price increases, with 31 percent of firms citing it as being ‘very important’. If firms have implicit contracts and are reluctant to change prices for fear of losing customers, then they are unlikely to react to temporary changes in factors causing price changes. 29 percent of firms who cite implicit contracts as ‘very important’ also cite temporary factors as being ‘very important’, compared with 9 percent of firms who placed less importance on implicit contracts.

5.2 Strategic complementarity

The optimal price for a firm may depend on the prices set by other firms – termed strategic complementarity. For example, following a positive monetary shock the optimal price will rise. Following such a shock, firms should increase prices once they have the ability to reset. Yet if other firms in the sector have yet to reset their price, customers could mistake the price increase as a real increase, resulting in lower market share. In this scenario the firms who are able to reset may choose to not do so, creating stickiness in prices.

Ball and Romer (1990) show that strategic complementarity can increase nominal rigidity and so the effectiveness of monetary policy. Gertler and Leahy (2008) show that when strategic complementarity is strong enough price stickiness in a state-dependent model can match that of a time-dependent model. Indirect attempts to estimate the extent of strategic complementarity (e.g. Kryvstov and Midrigan, 2013, and Bils, Klenow and Malin, 2012) find little or no evidence of its presence.

Strategic complementarity is the third most common factor cited by firms as being ‘very important’ in preventing price increases. It is cited by 22 percent of firms, rising to 26 percent of firms weighted by employment. This strategic complementarity is reflected in the method firms chose to set their prices. The dominant price setting method (53 percent of firms) for firms citing strategic complementarity as ‘very important’ is ‘influence of competitors’ prices’. For firms that do not cite strategic complementarity as important, only 23 percent use this pricing strategy. The importance of strategic complementarity is also reflected in firms’ response to the importance of competitors’ prices in determining price changes (section 3.2 above). Only 3 percent of firms who view strategic complementarity as ‘very important’ view competitors’ prices as being important for neither price increases or decreases, compared with 28 percent of other firms.

5.3 Menu costs

Menu costs are frequently used to motivate nominal rigidities in economic models (e.g. Sheshinski and Weiss, 1977, Akerlof and Yellen, 1985, and Mankiw, 1985). With costs involved in changing prices, firms will typically only change once the optimal price diverges sufficiently from the current price, resulting in sticky prices. Taking the narrowest definition of menu costs – the cost of physically changing prices – there is little evidence that it is a major factor. Just 8 percent of firms cite menu costs as being ‘very important’, the least recognised factor in the survey.

Firms were also asked about the importance of pricing thresholds (e.g. keeping prices at \$4.99 rather than \$5). Such pricing thresholds would act in a similar fashion to menu costs, delaying the price change until the next pricing threshold were reached. Widening the definition of menu costs to include pricing thresholds results in 16 percent of firms citing menu costs as being very important in preventing price increases – still less important than the other factors discussed above.

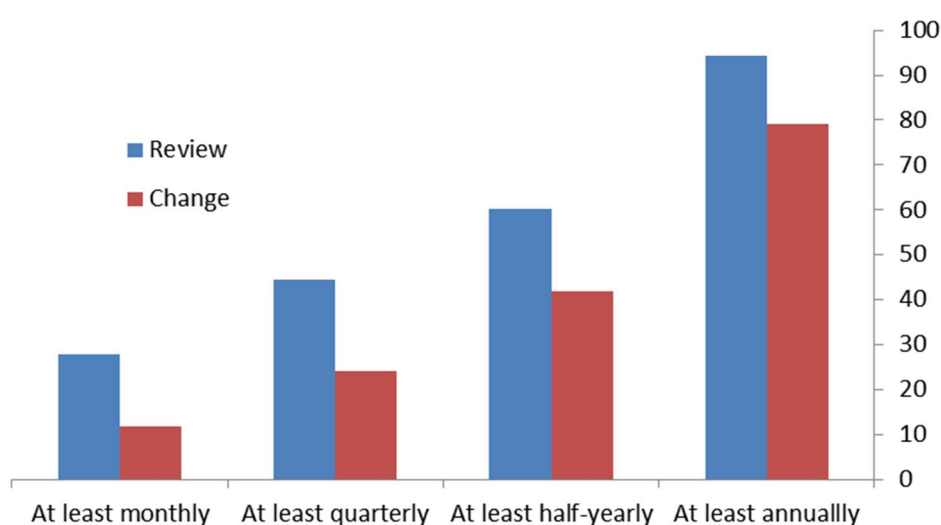
Some authors interpret menu costs as being the cost of managerial time and gathering information (e.g. Ball and Mankiw, 1994). Such an interpretation suggests that the costs lie at the review, not price change, stage. Section 5.4 below considers whether the price review stage is the source of price stickiness.

5.4 Sticky information

There are a number of theories that point to the review stage as the source of price stickiness. These theories posit that the costs of gathering and processing the information required to assess the optimal price prevent the regular updating of prices. Mankiw and Reis (2002) propose a model of sticky information. In this model, firms receive infrequent updates to the information required to assess optimal prices. In the absence of new information, firms continue along their previous pricing schedule – a case of ‘sticky price plans’ rather than sticky prices. It follows that firms with sticky information would change more frequently than review prices since planned changes would take place even in the absence of new information.

There is little support for sticky information in the survey. Price reviews are notably more frequent than price changes. The number of firms that review prices at least every month is double the number of firms that actually change them (Figure 7). 60 percent of firms review prices at least every six months, but only 42 percent of firms change prices that frequently.¹² Overall, the median number of reviews is twice per year, but the median number of changes is just once.

Figure 7: Frequency of price reviews and changes (percent of firms)^(a)



(a) Note the totals exclude the purely state-dependent firms.

Table 12 shows the responses of firms to both the frequency of review and price change questions. The sticky information quadrant lies below the diagonal, shaded in light grey. Just 7 percent of firms lie in this area. The sticky prices area, defined here as changing prices less frequently than reviewing them, is shaded in dark grey. Nearly half – 47 percent – of New Zealand firms fall in this category. Of the remaining 31 percent of firms that review prices on a regular basis, most change prices once or not at all over the preceding year. This evidence points to sticky prices, rather than sticky information being the primary cause of nominal price rigidity in New Zealand.

¹² These figures exclude firms who are purely state dependent, since there are no data for how many reviews these firms carried out.

Table 12: Frequency of price reviews and changes, last financial year (percent of firms)

Price reviews	Price changes						
	More than 182 times	182 times or less	26 times or less	6 times or less	Twice	Once	Zero
Daily	2	1	1	1	0	0	0
Weekly	0	1	2	1	1	0	1
Monthly	0	0	2	4	3	2	1
Quarterly	0	0	0	2	5	5	1
Half-yearly	0	0	0	1	4	6	3
Annually	0	0	0	1	2	18	9
Less frequently than annually	0	0	0	0	0	1	3
Specific events only	0	0	1	2	1	4	6

To further underline this finding, firms were asked to explain why reviews were not carried out more frequently, and given a range of options. The most frequently cited reason was that factors affecting pricing decisions do not change more frequently (table 13). The second most-cited reason was that the firm would not change prices more frequently – again highlighting stickiness in the price change stage of the price-setting process. The unavailability of information required to carry out the review was cited by only a small number of firms.

Table 13: Reasons for not reviewing prices more frequently (percent of firms)^(a)

	Factors affecting pricing decisions do not change more frequently	Would not change prices more frequently	Other reason	Cost of managerial time	The information used to inform pricing decisions is not available more frequently	Other costs of the review process	Cost of non-managerial time
Firm size							
Small	53	29	22	9	6	6	3
Medium	57	30	22	10	8	6	4
Large	55	36	22	16	8	11	7
Sector							
Primary Industry	50	29	25	4	7	5	1
Trade	55	29	21	12	6	6	3
Private services	56	28	17	10	7	4	5
Government services	53	32	24	10	5	7	5
	54	35	23	7	7	3	3
Price review frequency							
Daily	29	34	26	12	8	5	6
Weekly	47	12	30	11	9	2	6
Monthly	63	21	14	13	11	8	5
Quarterly	61	31	14	14	7	8	7
Annual	52	37	25	6	4	6	3
Less frequently than annual	53	23	37	7	2	5	2
Specific events	46	25	35	6	5	6	2
Overall: pop. weighted	54	30	22	10	6	6	4
Overall: emp. weighted	55	32	23	12	7	9	5

(a) More than one response was possible.

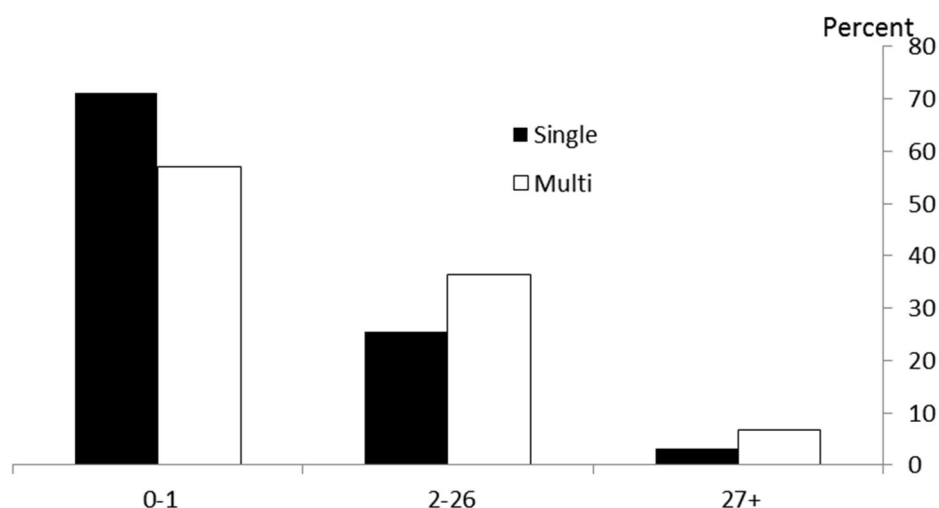
5.5 Multiproduct firms

Recent research highlights that the price-setting practices of multi-product firms diverge from those firms selling just one product. Multiproduct firms reset prices more frequently, and carry out a greater proportion of smaller price changes (Bhattarai and Schoenle, 2011). Midrigan (2011) models multiproduct firms assuming economies of scope in price-setting – once a firm changes one price it is able to reset its price for its other products without further costs. Alvarez and Lippi (2012) demonstrate analytically that such behaviour in multiproduct firms increases the size and duration of output effects from a monetary shock.

Firms were asked to respond to the survey in terms of their most important product. They were also asked whether the pricing strategy were representative of their other products. 23 percent of firms only sold one product. There is a marked divergence by firm size, with only 11 percent of large firms selling just one product.

Firms selling multiple products change prices more frequently than those selling a single product. 29 percent of firms selling a single product change price more than once, whereas 43 percent of multiproduct firms change the price of their main product more than once (figure 8). As shown in table 9 above, this more frequent price resetting persists even once other factors, such as firm size and sector, are taken into account.

Figure 8: price changes over previous financial year, by number of products (percent of firms)



These results on the frequency of price resets by multiproduct firms affirm the findings of Bhattarai and Schoenle (2011). The proposed mechanism – economies of scope in price resets resulting in lower menu costs – is not supported by the responses to the survey. Multi-product firms are more likely to cite menu costs as a reason for not resetting prices more frequently (table 14). Costs of managerial and non-managerial time are also more commonly cited by multiproduct firms as factors for not reviewing prices more frequently. This higher response rate by multiproduct firms for these factors also holds in general when further splitting by firm size or frequency of price changes (tables A2 and A3 in the appendix).

Table 14: Importance of menu costs for multi and single product firms (percent citing factor as ‘very important’)

	Single product	Multiproduct
Reasons for not reviewing more frequently		
Cost of managerial time	5	11
Cost of non-managerial time	2	4
Other costs of the review process	7	6
Reasons for not changing price more frequently		
Price changes entail physical costs	7	8
Prefer to maintain prices at certain thresholds	11	16

6 Implications for monetary policy

The findings from the survey have a number of implications for monetary policy. The relatively sticky nature of price-setting in New Zealand implies a potential for real effects of shocks, and a role for monetary policy in macroeconomic stabilisation. The difference in behaviour of multiproduct firms reaffirms this result, even in the presence of state-dependent pricing (see Alvarez and Lippi, 2012, and Midrigan, 2011).

Explicit contracts are the factor most widely recognised as being very important for preventing price changes. Wages are also typically only reset infrequently. Erceg et al. (2000) show that when there are long-term contracts in both product and labour markets, monetary policy is unable to recreate the flex-price equilibrium. In the presence of such rigidities, a strict inflation targeting regime can lead to large welfare losses. Taking into account wage and/or output deviations from optimum markedly improves welfare. Barro (1977) points out that it matters for monetary policy whether these contracts specify just price, or also volumes, with the first case being most important for monetary policy. The survey is unclear as to which type of contract is used.

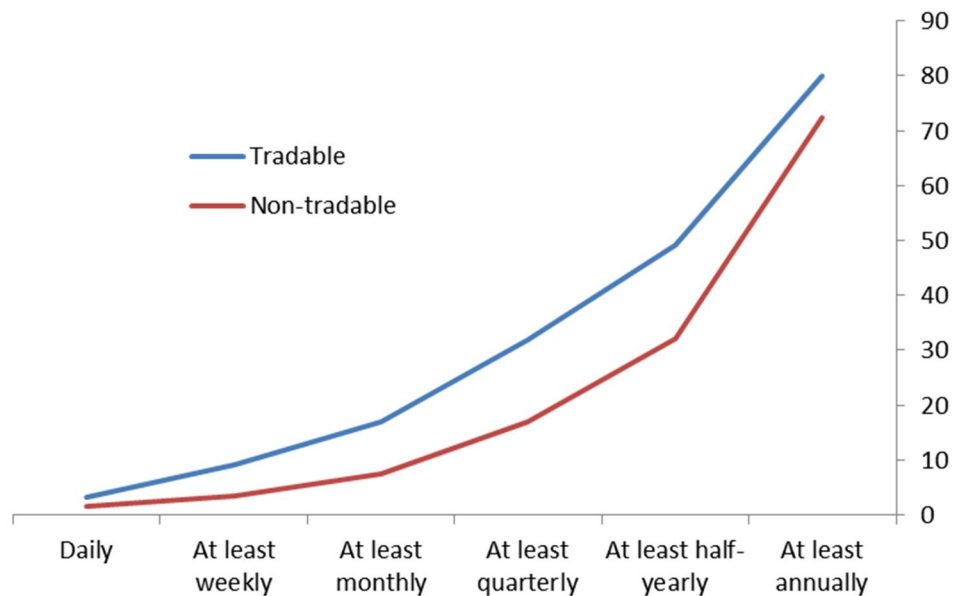
The existence of firms using state-dependent rather than time-dependent pricing can result in asymmetric reaction to shocks at both the firm and macroeconomic level. For example, Devereux and Siu (2007) develop a dynamic general equilibrium model of time-dependent firms which are also able to react to specific shocks (which describes the price-setting practices of the majority of firms in this survey). In their model firms react asymmetrically to shocks, with positive cost shocks more likely to cause firms to change prices than negative cost shocks. This asymmetry of responses to cost shocks is supported by the results here.

Further, Devereux and Siu find non-linearities in response to monetary policy, with positive monetary policy shocks resulting in smaller output expansions than contractions caused by a negative monetary policy shock of the same magnitude. This suggests that monetary policy may have to work harder to stabilise output following a negative shock than in response to a positive shock.

The heterogeneity of price setting behaviour between sectors also has implications for the policy trade-off between inflation and output volatility. Imbs *et al.* (2011) estimate sectoral Phillips curves for 16 industries in France. They show that there is aggregation bias in the estimation of the aggregate Phillips curve, such that for given values of volatility in inflation and nominal interest rates the aggregate model suggests up to double the volatility in the output gap.

With heterogeneity in sectoral stickiness, there arises the question of which prices monetary policy should target. Aoki (2001) and Benigno (2004) show in a two sector or two region model, respectively, that monetary policy should focus on the relatively stickier sector / region to maximise welfare. The relatively stickier sectors have been highlighted here, and broadly correlate with the sectors included in the non-tradable index of inflation (figure 9).

Figure 9: Cumulative frequency of price changes, tradable versus non-tradable^(a)



(a) tradable sectors are taken to be those in primary, industry and trade. Non-tradable sectors are construction, private and government services.

Finally, there may be valuable information for forecasting purposes in the difference in evolution of inflation between sectors. Millard and O’Grady (2012) construct a DSGE model with a sticky price and a flexible price sector. They show that the flexible price sector may help provide monetary policy makers with a more accurate estimate of the output gap, whereas the sticky price sector may provide better guidance on medium-term inflation expectations.

7 Conclusions

How firms set prices determines inflation dynamics within the economy and is important for understanding the monetary transmission mechanism and for microfoundations of price setting in macro models. This paper brings new insights into price-setting behaviour, using a large survey of New Zealand firms. This is the first behavioural survey for New Zealand, and the first survey internationally to cover all non-government sectors.

The survey results indicate that New Zealand firms are rarely strictly state-dependent price setters, but mostly use a mixed strategy of both reviewing prices periodically and also in response to specific events. The most common way of setting prices appears to be a mark-up over cost, but a significant minority of firms also base their prices on those set by competitors. Very few firms are purely forward looking when setting prices, supporting the use of a ‘hybrid’ NKPC.

The median number of price reviews is twice per year, but the median number of changes is just once. The perception of more intense competition and greater productivity are associated with more frequent repricing. Conversely, sectors where there are a larger number of repeat customers exhibit greater price rigidity.

There is marked heterogeneity in price-setting behaviour across firm sizes, with large firms reviewing and changing prices more frequently. Multi-product firms reset prices more frequently, even accounting for other firm characteristics. Yet these firms cite menu costs as a factor preventing price increases more frequently than single product firms, contrary to the assumption used in the literature.

The asymmetric response of prices to shocks, notably cost shocks, and the heterogeneity of price-setting behaviour both between and within sectors suggest caution when interpreting the results from linearised models based on representative agents.

Intermediate goods seem to exhibit higher price stickiness, while firms that sell direct to households appear to price more flexibly. This suggests that a focus on the flexibility of goods in the Consumer Price Index may underestimate the degree of price stickiness in the economy. The most recognised reasons for price stickiness are explicit and implicit contracts and strategic complementarity. Pure menu costs – treated as the physical cost of changing prices – are not widely recognised as an impediment to changing prices. Similarly, sticky information does not appear to be the main driver of nominal rigidities.

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Appendix 1 – additional tables

Table A1: Respondents to previous price-setting surveys

Country	Authors	Sample frame	Respondents (response rate, %)
Australia	Park <i>et al.</i> (2010)	CB contacts	700 (unknown)
Canada	Amirault <i>et al.</i> (2006)	CB contacts	170 (unknown)
Euro area ^(a)	Fabiani <i>et al.</i> (2006)	various	11,150 (46)
New Zealand		Nat. Stat. Inst.	5369 (82)
Sweden	Apel <i>et al.</i> (2005)	Nat. Stat. Inst.	626 (49)
United Kingdom	Greenslade & Parker (2012)	CB contacts	693 (30)
United States	Blinder <i>et al.</i> (1998)	3 rd party database	200 (61)

(a) The individual country surveys ranged from 330 to 2070 respondents. The response rate ranged from 30 percent to 69 percent.

Table A2: Importance of menu costs for multi and single product firms, by firm size

	Single product			Multiproduct		
	S	M	L	S	M	L
Reasons for not reviewing more frequently						
Cost of managerial time	4	6	11	10	11	17
Cost of non-managerial time	2	3	6	4	5	7
Other costs of the review process	7	5	5	5	7	12
Reasons for not changing price more frequently						
Price changes entail physical costs	7	4	8	8	7	7
Prefer to maintain prices at certain thresholds	12	7	9	17	15	17

Table A3: Importance of menu costs for multi and single product firms, by number of price changes

	Single product			Multiproduct		
	0-1	2-26	27+	0-1	2-26	27+
Reasons for not reviewing more frequently						
Cost of managerial time	2	7	5	17	13	9
Cost of non-managerial time	1	4	2	7	5	3
Other costs of the review process	2	11	6	9	7	5
Reasons for not changing price more frequently						
Price changes entail physical costs	1	11	6	8	9	7
Prefer to maintain prices at certain thresholds	19	20	8	15	21	14

Appendix 2 – survey questionnaire

Section C: Price and Wage Setting

- 1 Section C should be completed by the General Manager

Definition

- 2 The following section asks about factors that are important when this business reviews and sets prices. To answer these questions, apply the following definition.

Main product: The product (good or service) or product group from which this business gets its largest share of revenue.

If this business does not have a main product (eg in the case of large-format retail stores), provide answers that are most representative of this business's price-setting process.

Price reviews and changes

- 3 **Mark one oval. Which of the following is the main customer group that pays for this business's main product (good or service)?**

Note: This can be different to the end users of the product (eg government-funded services).

- individuals or households
- businesses within the business group (eg subsidiaries or parent companies)
- retailers or wholesalers outside the business group
- other businesses outside the business group
- government

- 4 **Please estimate what proportion of this business's customers have the prices they pay set by long-term (at least one year) formal contracts?**

- 0%
- 25% or less
- 50% or less
- 51% or more
- don't know

- 5 **Please estimate what proportion of this business's customers return for repeat business?**

- 0%
- 25% or less
- 50% or less
- 51% or more
- don't know

- 6 For the following questions, please apply the definition of main product provided in 2.
- 7 **Are all customers charged the same price for this business's main product (good or service)?**
- yes
 - no, but fixed pricing schedules are used for specific types of customers (eg preset volume discounts)
 - no, prices are set on a case-by-case basis
- 8 **Mark one oval. Who reviews and sets the price of this business's main product?**
- this business → go to 9
 - a parent business → go to 23
 - other → go to 23
- 9 **Mark one oval. When does this business typically review the price of its main product?**
- Note:* The review process must be sufficiently thorough that a price change could result.
- at regular intervals only, regardless of specific events
 - generally at regular intervals, but also in response to specific events (eg a substantial increase in costs)
 - in response to specific events only → go to 11
- 10 **Approximately how often does this business regularly review the price of its main product?**
- daily
 - weekly
 - monthly
 - quarterly
 - half-yearly
 - annually
 - less frequently than annually
- 11 **Mark all that apply. Which of the following are important reasons why this business does not review prices more frequently?**
- cost of managerial staff time
 - cost of non-managerial staff time
 - other costs of the review process
 - the factors affecting pricing decisions do not change more frequently
 - the information used to inform pricing decisions is not available more frequently
 - would not change prices more frequently
 - other reasons

12 Approximately how much staff time in total is spent on an average price review of this business's main product?

Include both managerial and non-managerial staff hours.

Note:

- if this business has staff whose full-time job is reviewing prices, you may enter the number of these staff members, instead of total staff hours spent on a price review.
- if less than one hour in total is spent on an average price review, please write **1**.

OR total staff hours _____ hrs
 number of staff whose full-time job is reviewing prices _____ staff

13 Mark all that apply. If during a price review, it becomes apparent that a relatively large price change may occur, is extra time spent on the review process?

- yes, extra managerial time
- yes, extra non-managerial time
- no extra time is spent on the review process
- don't know

14 During the last financial year, how many times did this business change the price of its main product?

- zero
- once
- twice
- 6 times or less
- 26 times or less
- 182 times or less
- more than 182 times

Apply the
definition of main
product provided in
2

15 For a typical price change of this business's main product, approximately how many hours in total are spent explaining the change to customers?

Include both managerial and non-managerial staff hours.

Note: If the answer is 'zero', please write **0**. If less than one hour in total is spent on explaining the change, please write **1**.

total staff hours _____ hrs

16 How important are temporary price reductions (ie sales) to the pricing strategy of this business?

- not at all important
- a little important
- moderately important
- very important
- don't know

17 Mark one oval. Which of the following methods best describes how this business sets the price of its main product?

- rule of thumb (eg change by a fixed amount or in accordance with inflation)
- costs plus a profit margin (a mark-up over costs)
- the influence of competitors' prices (eg matching market prices)
- other

18 Mark one oval. Do the pricing decisions for this business's main product primarily rely on:

- current economic conditions
- expected future economic conditions (eg likely demand, cost projections)
- current and expected future economic conditions are equally important
- don't know

19 Mark one oval for each item listed. How important are the following factors when considering price changes for this business's main product?

	only important for price <u>increases</u>	only important for price <u>decreases</u>	important for <u>both price</u> increases and decreases	not important for either	don't know
a change in labour costs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
a change in financing costs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
a change in other costs (eg purchase of goods from suppliers, rent)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
a change in demand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
a change in competitors' prices	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
a change in productivity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
a change in stock levels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
a change in the number of competitors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20 Mark one oval for each item listed. How important are the following considerations in preventing this business from raising the price of its main product?

	Not important	Moderately important	Very important	don't know
the risk that competitors will not follow suit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
the factors causing pressure to raise prices may only be temporary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
formal contracts specifying a fixed price	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
implicit contracts (customers expect prices to remain stable)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
preference for maintaining prices at certain thresholds (eg \$4.99 rather than \$5.00)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
price changes entail "physical" costs (eg printing catalogues)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
the ability to adjust non-price elements (eg the level of after-sales service)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

21 Mark one oval. Do the customers of this business view price increases resulting from increased costs as:

- less acceptable than price increases resulting from increased demand
- more acceptable than price increases resulting from increased demand
- no different to price increases resulting from increased demand
- don't know

22 Mark one oval for each item listed. Comparing the current pricing practices of this business with two years ago, which, if any, of the following have changed?

	decreased	stayed the same	increased	don't know
proportion of customers on long-term (at least one year) contracts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
frequency of price reviews	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
frequency of price changes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
profit margin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
sensitivity of customers to price changes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

23 Are the answers provided for this business's main product representative of the pricing process used for other products?

- yes
- no
- This business only sells one product

23 Has this business conducted, or is in the process of conducting, a price review specifically because of the announced GST increase?

- yes
- no, but this business plans to
- no, and this business does not expect to