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Architects as Forecasters of Housing Construction[1]

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Brian Silverstone
University of Waikato, Hamilton
and Research Associate NZIER, Wellington
silver@waikato.ac.nz

James Mitchell
NIESR, London
j.mitchell@niesr.ac.uk

Mark Holmes
University of Waikato, Hamilton
holmesmj@waikato.ac.nz

Abstract

For more than four decades, the NZIER has conducted a two-question, quarterly survey of architect forecasts of public and private sector construction expenditure. This paper covers selected aspects of this unexplored series with particular reference to housing construction. Specifically, we consider several qualitative-to-quantitative conversion methods, in-sample and out-of-sample performance, cyclical features and respondent dynamics. Although our work relates to architects - a sub-sector of the service industry - our results have a wider application to business survey questions using ordered qualitative responses.

JEL Codes
E30; E32; E37; C82

Keywords
business surveys; qualitative-to-quantitative conversion;
residential construction; forecasts; respondent dynamics

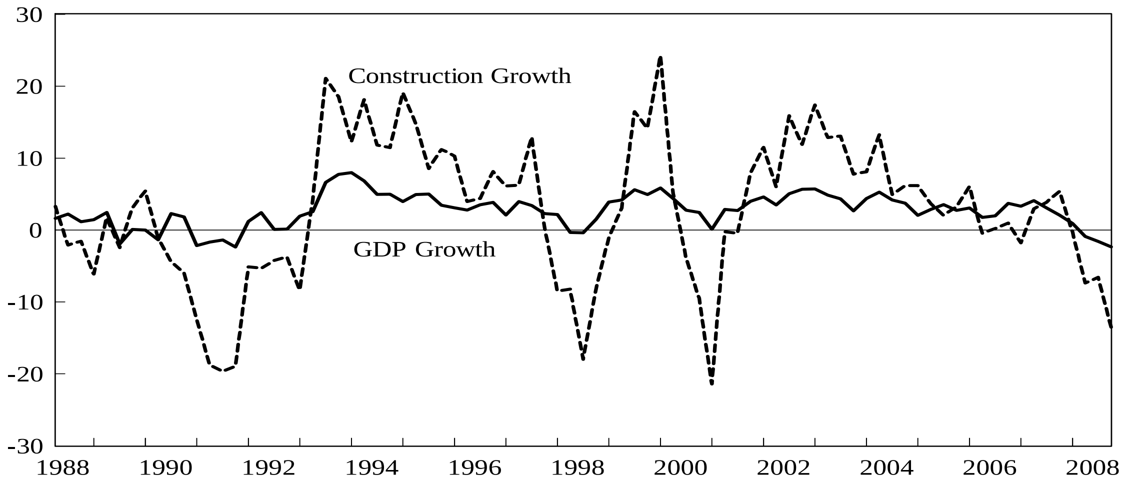
[1] Access to the panel data used in this study was provided by the New Zealand Institute of Economic Research (NZIER) under conditions that maintained the confidentiality of respondent firms. The authors are grateful for access to this data. The study was also supported by University of Waikato Research Grant X554. The results and views presented in this study are the work of the authors and not the NZIER.

'Housing is the most important sector in [US] economic recessions, and any attempt to control the business cycle needs to focus especially on residential investment. … The best time to fight the housing cycle with tight monetary policy is when the wave is starting to rise, not when it is cresting' (Leamer 'Housing is the Business Cycle' 2007, pp.150-151).

1. Introduction

Construction expenditure on housing, apartments, commercial premises and public buildings is a significant and relatively volatile component of real GDP in most economies. New Zealand is a typical example. Construction expenditure is around a third of fixed investment outlays and around ten percent of real GDP. Its volatility relative to GDP is illustrated in Figure 1. Because construction expenditure has significant short-term activity and employment effects and long-run capacity-enhancing effects, accurate forecasting of construction is important for both private and public sector decision-making and for monetary policy.

Figure 1. Real GDP and Construction Growth in New Zealand 1988-2008
Quarterly, Seasonally Adjusted, Percent



Source: Statistics New Zealand.

One source of forecasting information on construction prospects is the quarterly survey of architect opinion published since 1964 by the New Zealand Institute of Economic Research (NZIER). The initial panel comprised around 30 respondents. Panel attrition led to the addition of 60 new panelists in 1991 and 65 in 2000. The average response rate is around 60 percent of the possible membership with almost half answering more than 75 percent of the surveys held between 2000 and 2009.[2] The prompt publication of each survey (usually within seven days of the end of each quarter and well ahead of most construction data) gives the opinion of architects real-time or nowcasting status.

The survey asks just two main questions with 12 sub-questions. Specifically, architects are asked to forecast expenditure one-and-two years ahead for three classes of construction: housing, commercial buildings and flats and central and local government building. They are

[2] New Zealand's active participation of around 60 architects (from a population of four million people) compares vary favourably indeed with the 300 active participants in a United States survey (from a population of 300 million people). See Baker and Saltes (2005, p.68).

requested to give their forecasts from two perspectives: from work in their own office and from the work of architects in their area. Responses are aggregated to produce a net balance statistic (that is, the percentage of respondents replying ‘up’ less the percentage replying ‘down’). Table 1 shows the survey results for March 2009 where, for example, the net balance on own-office housing construction 12 months ahead (Question 1a) is -45 percent. Figure 2 plots this series against seasonally-adjusted real GDP housing growth between 1984 and 2009. The contemporaneous correlation is 0.52.

Table 1. Architect Forecasts of Construction Expenditure
March Quarter 2009, Percent of 61 Replies

1. Based on *work in your own office*, and supposing construction will commence on projects now at the working-drawing and sketch-plan stages, what changes would you expect in total expenditure on housing, commercial and public buildings?

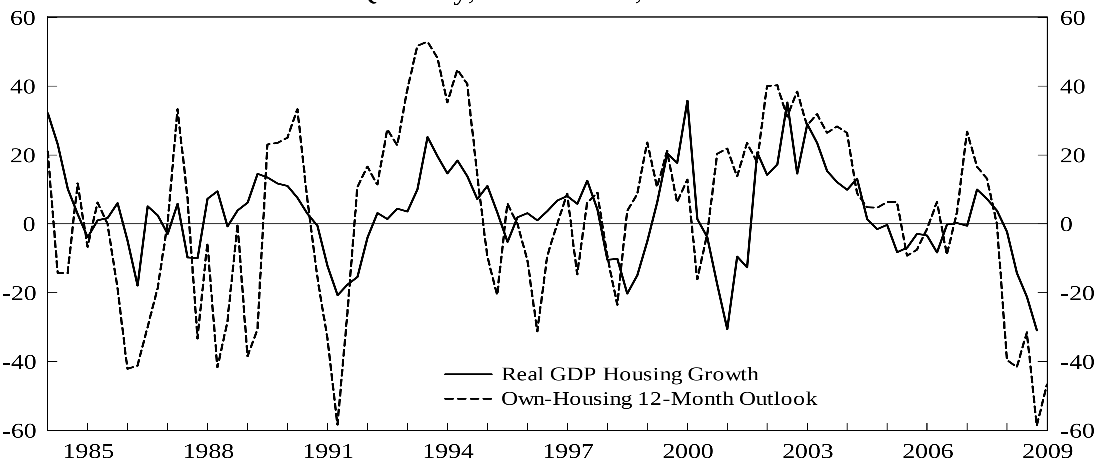
Expenditure **next 12** months compared with past year					Expenditure next **12 to 24** months compared with past year			
Up	Same	Down	NA		Up	Same	Down	NA
7	39	52	2	(a) Residential Construction	12	36	49	3
8	32	55	5	(b) Commercial Buildings & Flats	10	35	48	7
13	45	27	15	(c) Central & Local Government	12	39	34	15

2. Based on your knowledge of the *work of architects in your area*, and supposing construction will commence on projects now at the working-drawing and sketch-plan stages, what changes would you expect in total expenditure on housing, commercial and public buildings?

Expenditure **next 12** months compared with past year					Expenditure next **12 to 24** months compared with past year			
Up	Same	Down	NA		Up	Same	Down	NA
3	16	76	5	(a) Residential Construction	12	13	67	8
0	13	83	3	(b) Commercial Buildings & Flats	9	15	69	7
3	29	59	8	(c) Central & Local Government	7	35	48	10

Note: NA means ‘not applicable’.
Source: NZIER *Quarterly Survey of Business Opinion* 192, March 2009, p.31.

Figure 2. GDP Housing Growth and Architect 12-Month Outlook 1984-2009
Quarterly, March Years, Percent



Sources: Statistics New Zealand and NZIER.

Apart from reporting net balances, and presenting charts and commentaries in Institute publications, we have found no published studies using the Institute's architect series in either its aggregated or panel form. This is surprising as architects might be expected to be relatively accurate in their forecasts of construction expenditure and, as a result, to have their responses monitored and researched. In a United States study of architect opinion, Baker and Saltes (2005) found that architect billings were highly correlated (0.74) with subsequent construction with a lead of about two quarters. They also found, using net balances, that the correlations and leads varied significantly across sectors and regions and that American architects were more accurate at anticipating construction downturns than upturns.

We extend Baker and Saltes in three main respects. First, we experiment with alternative quantification measures in addition to the net balance statistic to determine the best in-sample and out-of-sample measure of architect forecasts of residential construction. Secondly, we use more rigorous methods to consider turning points and forecasts. Thirdly, we considered selected aspects of respondent dynamics. Overall, we are interested in whether or not the NZIER architect survey is a value-added and timely source of forecasting information on construction expenditure. Although our work relates to a sub-sector of the service industry, our results have a wider application to business survey questions using ordered qualitative responses.

2. Qualitative-to-Quantitative Conversion

There is an extensive literature on the information content of business surveys, especially from central banks. (See, for example, Aylmer and Gill 2003, Cunningham 1997, Deitz and Steindel 2005, Harris *et al.* 2004 and Larsen and Newton-Smith 2001). At least three themes are covered in this literature: the desirable qualities of a business survey indicator, using survey data to forecast macroeconomic variables and data measurement. Desirable qualities of a business survey indicator include prompt availability, cyclical sensitivity, relative reliability compared to other indicators and value-added information. Additional qualities include an absence of confidence interval bias (that is, mistaken 'up', 'same' or 'down' responses) and the absence of revisions, sample bias and volatility relative to official statistics. The forecasting theme covers mainly the added-value of survey data compared to autoregressive forecasting, other data sources and models.

The third theme - measurement - includes alternative methods for converting the individual qualitative survey responses to quantitative macro data. These methods include the net balance approach of Theil (1952), the probability approach of Carlson and Parkin (1975), the regression approach of Pesaran (1984, 1987) and the reverse-regression approach of Cunningham, Smith and Weale (1998). These four methods all use aggregate survey proportions. A fifth method, the panel approach of Mitchell, Smith and Weale (2002), uses disaggregated, firm-level data. The first task in our paper, then, is to outline these methods briefly, calculate quarterly architect series for each approach and compare their in-sample and out-of-sample performance against GDP housing construction. (For detailed surveys see, for example, Cunningham 1997, Driver and Urga 2004, Matheson *et al.* 2009, Mitchell *et al*. 2002, 2005 and 2006, Nardo 2003 and Pesaran and Weale 2006).

Net Balance Approach

The net balance (N) approach, popularised by Theil (1952), is the method used in most business surveys to convert qualitative responses to a quantitative measure. It is calculated using equation (1):

$$N = \left(\frac{U - D}{U + S + D - NA} \right) 100 \qquad (1)$$

where U, S, D and NA represent the percentage of respondents replying 'up', 'same', 'down' and 'not applicable' or 'no answer', respectively. The merits of the net balance statistic include simplicity and relatively few 'false calls' for many of their underlying (latent) variables. Shortcomings include the potential loss of information from aggregation, different interpretations of 'same' and the likelihood of bias from the assumption of symmetry, that is, equal values of 'up' and 'down' having equal absolute effects. When plotted against the actual change in a variable, such as GDP housing investment (X_t), the implicit relationship between survey data and official data using net balances is:

$$X_t = \beta N_t + \varepsilon_t \qquad (2a)$$

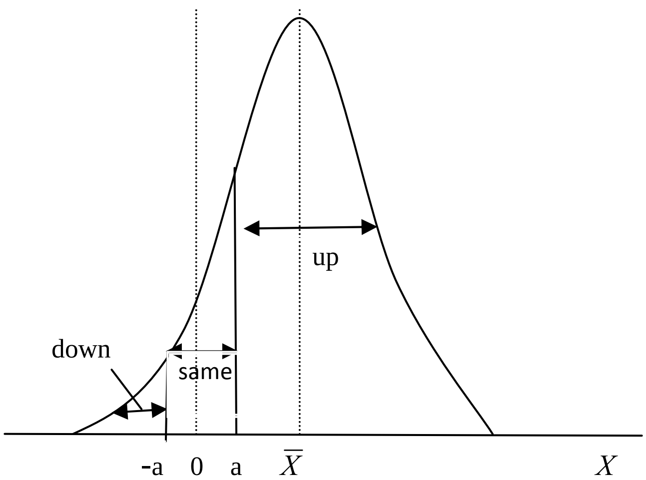
where ε_t is a random error term. Following the argument in Cunningham (1997), average bias can be corrected by adding a constant term to equation (2a):

$$X_t = \alpha + \beta N_t + \varepsilon_t \qquad (2b)$$

Probability Approach

The basic idea underlying the probability approach of Carlson and Parkin (1975) is that there is an 'indifference interval' around zero where firms report 'same' (or 'no change') in their responses to survey questions. Outside this interval, they report a change of either 'up' or 'down'. These responses are assumed to lie on a probability distribution (such as the normal or logistic). Figure 3 illustrates these ideas with a continuous probability distribution where $\overline{X}$ is the mean of X and the indifference interval is symmetric around $X = 0$.

Figure 3. Indifference Intervals



Regression and Reverse Regression Approaches

The regression approach of Pesaran (1984) relates, in its basic form, the actual change in a variable, such as GDP housing investment (X_t), to the aggregate proportions U_t and D_t, that is,

$$X_t = \alpha + \beta U_t - \delta D_t + \varepsilon_t \tag{3a}$$

The coefficients *α* and *δ* can be estimated via a regression of X_t on U_t and D_t. This approach, which does not impose symmetry, can be used to test for symmetry. This occurs when the coefficients attached to U_t and D_t are equal and opposite in sign.

The reverse regression approach of Cunningham, Smith and Weale (1998) makes the aggregate proportions U_t and D_t the dependent variables. The basic form is a system of two equations:

$$\begin{aligned} U_t &= \alpha_U + \beta_U X_t + \varepsilon_t \\ D_t &= \alpha_D + \beta_D X_t + \varepsilon_t \end{aligned} \tag{3b}$$

'Once this system has been estimated, the two equations can be rearranged to generate two transformations of the survey responses. Both give quantitative estimates of the economic variable which are then used to produce a single weighted average. The weights are chosen to minimise the variance of any errors in the estimate. The final estimate is a transformation of the survey data. It is not part of a behavioural model of the official data. Nor is the estimation an attempt to maximise the fit of an equation 'explaining' the official data' (Cunningham 1997, p.297).

Panel Approach

The basic idea underlying the panel approach of Mitchell, Smith and Weale (MSW 2005, 2006) is that aggregate survey data may not necessarily be the best way of constructing forecasts. They argue that quantification that allows for heterogeneity among firms could exploit survey responses more efficiently than traditional approaches. A key feature of the panel approach is that it gives more weight to firms whose answers have a closer link to official data than to those whose experiences correspond only weakly or not at all. (For an application of the panel approach to New Zealand, see Matheson, Mitchell and Silverstone 2009).

Equation (4) is MSW's non-parametric disaggregated indicator $\left(\hat{X}_t^{ND}\right)$. Formally, it is an estimator for the conditional expectation $E[X_t \mid (j_{it-1})_{i=1}^{N_{t-1}}]$ which may be based on the conditional empirical distribution function. Define the indicator function $I(X_t \leq X, j_{it-1} = j \mid i) = 1$ if $X_t \leq X$ and 0 otherwise (*j* = 1, 2, 3). Let $T_i^j = \sum_{s=2}^{T} y_{i,s-1}^j$ represent the number of times firm *i* gives response *j* in the survey. Hence $T_i^j/(T-1)$ is the sample proportion for response *j* by firm $i(j = 1,2,3)$. The conditional empirical distribution function of X_t given response *j* for firm *i,* is given by $\hat{F}(X \mid j,i) = \sum_{s=2}^{T} I(X_s, \leq X, j_{is-1} = j \mid i) / T_i^j$ (*j* = 1,2,3) which assigns equal weight to each sample value. Assuming $T_i^j \rightarrow \infty,$ and thus $T \rightarrow \infty, T_i^j \rightarrow \infty, T_i^J/(T-1) \xrightarrow{\text{p}} P(j \mid i),$ the probability of observing response *j* for firm *i*, and

$\sum_{s=2}^{T} I(X_s, \le X, j_{is-1} = j \mid i)/T-1) \xrightarrow{p} F(X, j \mid i)$, if, given firm i, X, and $j_{is\text{-}1}$ may be regarded as stationary random variables with joint conditional c.d.f. $F(X, j \mid i)$. Hence, $\hat{F}(X \mid j,i) \xrightarrow{p} F(X \mid j,i) = F(X, j \mid i)/P(j \mid i)$ is the conditional c.d.f. of X_t given response j and firm i. Therefore, the mean of $\hat{F}(X \mid j,i), \sum_{s=2}^{T} y_{i,s-1}^{j} X_s / T_i^j,$ is a consistent estimator for $E(X_t \mid j,i)$. Defining $w_{it-1} > 0$ as the weight assigned to firm i at time t-1, the non-parametric indicator is defined as:

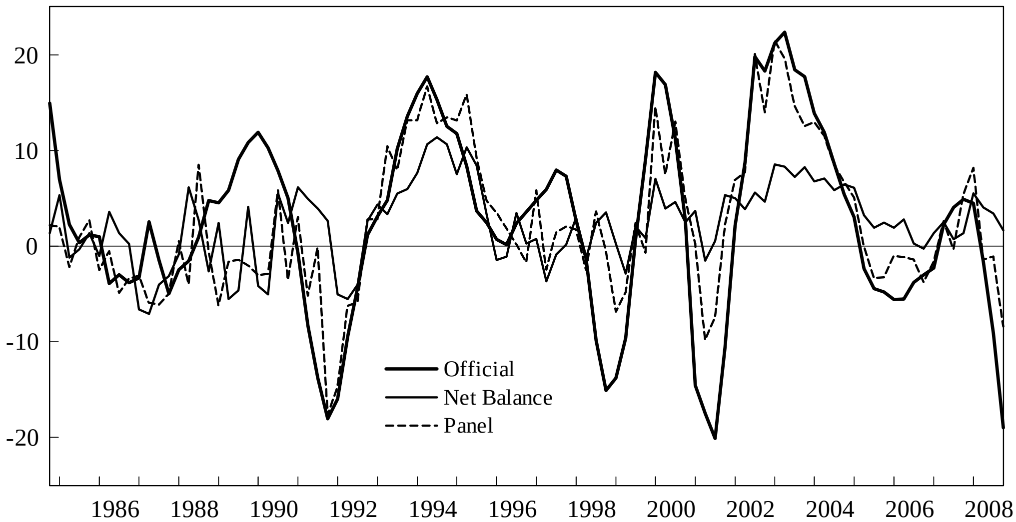
$$\hat{X}_t^{ND} = \sum_{i=1}^{Nt-1} w_{it-1} \sum_{s=2}^{T} j_{i,s-1}^{j_{it-1}} X_s / T_i^{j_{it-1}} \tag{4}$$

Results

Figure 4 plots year-on-year growth in real, seasonally-adjusted GDP housing growth against two of our underlying (latent) indicators, namely, net balance and panel. (The regression indicator is excluded due mainly to the similarity of its time path to the net balance indicator). Among the indicators, the net balance tracks the actual outcome reasonably well, but it is too smooth. Indeed, all indicators are adapting too slowly (even in-sample) to enable them to identify the current recession. Even if the balance of opinion is very low, this need not translate into a sufficiently low forecast of actual construction growth if the coefficient on an indicator is too low.

Figure 4. Real GDP Housing Growth and Architect Indicators 1984-2008

Percent



Source: NZIER and authors' calculations.

Tables 2 and 3 summarise the in-sample and out-of-sample performance, respectively, of our indicators against the growth in real GDP housing expenditure. Their performance is assessed initially by comparing the correlation of each indicator and its root mean squared error (RMSE) against the official outcome. The mean and standard deviation of the forecasts over the sample period are also presented. The panel approach uses responses from architects with at least 20 (not necessarily consecutive) observations. 76 architects replied at least 20 times to Question 1a (in Table 1) and 68 of them to Question 2a (out of a total of 138 architects). There are two MSW variants in the out-of-sample case, one of which involves recursively re-scaling MSW as discussed in Mitchell *et al*. (2005).

Table 2. Real GDP Housing Growth and Latent Measures
In-Sample Statistics, 1984:4 - 2008:4

Approach		Author(s)	Mean	S.D.	Correlation	RMSE
Question 1a (Table 1)						
Official GDP Housing Growth			2.40	9.72	1.00	0.00
Net Balance	(BAL)	Theil	2.40	4.10	0.42	8.77
Probability	(CP)	Carlson & Parkin	2.40	10.77	0.44	10.82
Regression	(PES)	Pesaran	2.40	4.19	0.43	8.73
Reverse Regression	(CSW)	Cunningham *et al.*	2.40	22.50	0.37	20.81
Panel	(MSW)	Mitchell *et al.*	2.69	1.34	0.78	6.06
Question 2a (Table 1)						
Official GDP Housing Growth			2.40	9.72	1.00	0.00
Net Balance	(BAL)	Theil	2.40	5.04	0.52	8.27
Probability	(CP)	Carlson & Parkin	2.40	13.79	0.50	12.26
Regression	(PES)	Pesaran	2.40	5.06	0.52	8.26
Reverse Regression	(CSW)	Cunningham *et al.*	2.40	20.70	0.44	18.51
Panel	(MSW)	Mitchell *et al.*	2.80	1.75	0.79	5.90

In sample, the indicators track official housing construction growth well, with Question 2a appearing to offer more information than Question 1a. The disaggregated MSW indicator does best.

Out-of-sample evaluation is over the period 1999:1-2008:4 (40 quarters) with the indicators computed recursively. Accuracy is summarised by the RMSE of the indicator against the subsequent realisation for year-on-year construction growth. A one-quarter delay in the publication of the official data is assumed. This means that the forecasts of the benchmark AR (random walk) model are equal to the official outcome five quarters previously: a four-quarter ahead forecast plus one quarter to account for the delay in publication of the national accounts.

Table 3. Real GDP Housing Growth and Latent Measures
Out-of-Sample RMSE 1999:1 – 2008:4

Approach		Author(s)	Question 1a (Table 1)	Question 2a (Table 1)
Random Walk	(AR)		19.11	19.11
Probability	(CP)	Carlson & Parkin	256.18	8.86
Regression	(PES)	Pesaran	10.69	10.04
Reverse Regression	(CSW)	Cunningham *et al.*	14.88	Na
Panel	(MSW)	Mitchell *et al.*	12.99	15.66
Panel (Rescaled)	(MSW)	Mitchell *et al.*	15.66	13.85

The out-of-sample outcome is less satisfactory than the in-sample outcome. The PES indicator does best with the CP indicator and CSW indicators somewhat unstable due to scaling problems. Reassuringly, PES does best, that is, it has a lower RMSE than the AR benchmark. This is not the toughest benchmark perhaps. It is widely used, however, since it is known to be robust to certain types of structural break. The MSW indicator does not do as well as PES. This is consistent with Matheson *et al.* (2009) that structural breaks and other instabilities throw the disaggregated indicator off-track. But while PES does best (in terms of the lowest RMSE), it is too smooth. MSW (once rescaled) is far more volatile (like the official outcome), but lags the outcome. It is not a leading indicator. The standard deviation of the official outcome over 1999:1-2008:4 is 11. It is the RMSE of a forecast equal to the *ex post* unconditional mean. The fact that PES barely improves on this outcome indicates how volatile housing construction growth has been.

We conclude, initially, that the computed QSBO forecasts appear to be lagging rather than leading indicators. The traditional aggregated and MSW disaggregated indicators suggest that 'off the shelf' application of these methods may not work as well in this instance. Some modification of the MSW methodology may be necessary, such as taking averages over rolling samples rather than taking averages over the whole sample. This is a simple means of discarding 'old' data and allowing for breaks in the data. This modification, however, appeared only to weaken the performance of the indicator in the current application.

3. Forecasting and Turning Points

Using seasonally adjusted real GDP data, we now compare naïve forecasts (the expectation that the sign of the change in real expenditure will remain unchanged over the next 12 and 18-24 month periods) with the corresponding net balance statistic. Table 4 reports *p*-values based on the Diebold-Mariano Forecast Comparison Test which posits the null that the two methods have the same forecasting ability against the alternative that one method is superior.

Table 4. Diebold-Mariano Forecast Comparison Test

Forecasting Method		*P*-values	
1	2	1=2 *vs* 1 better than 2	1=2 *vs* 2 better than 1
12 month horizon			
Naive12	Net Balance (Q1a12)	0.306	0.694
Naive12	Net Balance (Q2a12)	0.500	0.500
Net Balance	Net Balance (Q1a12)	0.744	0.256
18-24 month horizon			
Naive24	Net Balance (Q1a24)	0.930	**0.070**
Naive24	Net Balance (Q2a24)	0.972	**0.028**
Net Balance	Net Balance (Q2a24)	0.782	0.219

Note: Q1a12, Q1a24, Q2a12 and Q2a24 correspond to questions 1a and 2a in Table 1.

These results suggest that the forecast based on net balances dominates the naïve forecasts over the 18-24 month horizon. This applies to architects' predictions about work done in their own office (Q1a24) as well as work done in their area (Q2a24). Over the 12 month horizon, however, the Diebold-Mariano tests indicate equal forecasting ability between the naïve methods and the net balance calculations.

Markov-switching approach

One approach to evaluating the turning point forecasting performance of net balances is to consider the relationship between the prior net balance calculation and the inferred probability of remaining in a particular regime. In this section, we use a Markov regime-switching model to assess the turning point forecasting ability of architects in the context of the inferred probabilities associated with recessionary and expansionary housing construction regimes. Suppose a discrete random variable S_t takes two possible values $S_t = [0,1]$ and serves as an indicator for the state of expenditure growth at time *t*. If y denotes expenditure growth, then the expected value of *y*, conditional on the value of S_t, is given by equation (5):

$$E(y_t \mid S_t) = [(1 - S_t)\mu_0 + S_t\mu_1] + \sum_{i=1}^{m} \lambda_i y_{t-i} + \varepsilon_t \qquad (5)$$

where $\varepsilon_t \sim i.i.d.N(0, \sigma^2)$. The unobserved indicator variable, S_t, can evolve according to the following first-order Markov-switching process described in Hamilton (1989). We allow for the transition probabilities between regimes to be time-varying as follows:

$$\begin{aligned} P[S_t = 0 \mid S_{t-1} = 0, NetBalance_{t-j}] &= p_t = \Phi(\delta_0 + \gamma_0 NetBalance_{t-j}) \\ P[S_t = 1 \mid S_{t-1} = 1, NetBalance_{t-j}] &= q_t = \Phi(\delta_1 + \gamma_1 NetBalance_{t-j}) \end{aligned} \qquad (6)$$

where *j* denotes the forecast horizon of either four or six-to-eight quarters and $\Phi(\cdot)$ refers to the cumulative density function of the standard normal distribution. This function ensures that the transition probabilities p_t and q_t lie in the open interval (0,1). If we find that γ_0 and/or γ_1 is significantly different from zero we have evidence that net balance calculations can assist in the forecast of turning points between regimes.

Table 5 reports the estimation of our Markov-switching model where *y* is defined as the annual growth in seasonally adjusted GDP real housing expenditure. The transition probabilities are modeled as time-varying and influenced by the net balances from Question 2a (in Table 1). The variables enter equation (5) having been lagged four quarters (*j* = 4) so as to facilitate a direct comparison between the forecast for 12 months ahead and the outcome. The results indicate that $\mu_0 > \mu_1$, suggesting that Regime 1 (Regime 0) can be regarded as the recessionary (expansionary) regime.

We find, first, that the net balance statistic assists in predicting the likely housing expenditure regime (recessionary or expansionary). Secondly, knowledge of net balances can deliver better forecasts of housing growth than the basic Hamilton model with no time-variation in the transition probabilities. This is confirmed with $\gamma_0 > 0$, which implies that the probability of remaining in the expansionary Regime 0 is positively related to the net balance calculation four quarters earlier. In contrast, we find that $\gamma_1 = 0$, which suggests that architects are relatively less able to predict when forecasting from within a recessionary environment.

Table 5. Estimation of Markov-Switching Model

Coefficient	Output
Regime 0: *Expansionary*	
$(1-S_t)\mu_0$	0.162***
Regime 1: *Recessionary*	
$S_t\mu_1$	-0.013
Regime-invariant	
λ_1	0.769***
σ	0.006***
Transition Probabilities	
δ_0	-577.581***
δ_1	2.539***
γ_0	0.002***
γ_1	-0.007
Tests of Restrictions	
$\mu_0 = \mu_1$	13.302***

Note: Estimates are for the regime-switching models described by equations (5) and (6). Chi-square statistics are reported for the hypothesis tests. ***, ** and * denote rejection of a zero null at the 1, 5 and 10 percent significance levels, respectively.

4. Respondent Agreement and Dynamics

The net balances for Question 1a (in Table 1) for the March and June quarters of 2008 remained much the same at -40 percent and -42 percent, respectively. This 'no change' outcome, however, could conceal useful information regarding the dispersion of responses and respondent dynamics between these quarters. We consider each dimension briefly.

One measure of the dispersion or agreement among respondents is the so-called entropy[3] index. It can be expressed, following Driver *et al.* (2004, p.119), as:

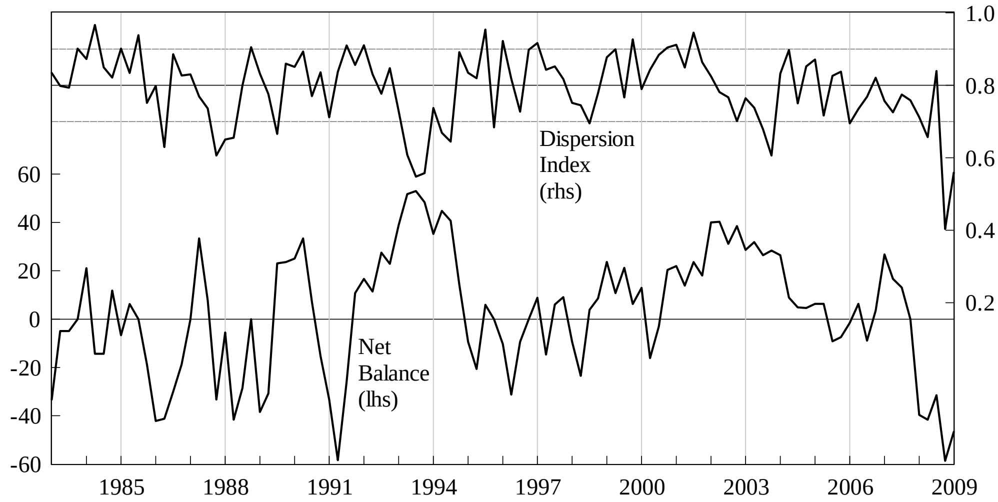
$$disp_t = \sum_{j=1}^{3}[P_{jt}\log_3 P_{jt}] \tag{7}$$

where $disp_t$ is dispersion at time t, P_{jt} is the share of each of the three response categories j (up, same, down) at time t and $\log_3$ is the logarithm to base 3. A value of unity occurs if respondents are equally distributed across the three responses while a value of zero occurs if all respondents select the same answer. Figure 5 illustrates the dispersion index for architect net balances for Question 1a between 1983 and 2009 together with the net balance statistic. It shows that the dispersion around the mean (of 0.8) and one standard deviation is within a relatively narrow range but subject, on occasions, to relatively abrupt changes. A downward trend indicates a tendency for architects to move towards giving the same answer - that is, a tendency towards greater agreement - and conversely.

[3] Entrophy: a measure of the degree of disorder existing in a system.

The entropy values for 2008:1 and 2008:2 were 0.71 and 0.65, respectively, indicating a movement towards an increased level of agreement among respondents even although the net balances in both quarters were much the same.

Figure 5. Dispersion Index and Net Balance Indicator 1983-2009
Question 1(a) Table 1, March Years



Source: NZIER *Quarterly Survey of Business Opinion.*

Another dimension of respondent behaviour concealed by aggregate survey indicators is the extent to which respondents change their opinion between surveys. As mentioned above, the net balance on Question 1a (Table 1) was much the same for the March and June quarters of 2008. When, however, the respondents who answered both the March and June quarters are matched (as shown in Table 6), just 29 percent gave 'same' as their response in both quarters, while around 70 percent changed their outlook (either in a different direction, from, say, down-to-up or in the same direction, say, down-to-down). (See Silverstone 2000 for further analysis on survey dynamics and related probabilities).

Table 6. Change in Housing Outlook between March and June 2008
Percent of Respondents Replying to Question 1a (Table 1)

	June 2008			
March 2008	Up	Same	Down	Total
Up	0 %	2 %	4 %	7 %
Same	4 %	29 %	18 %	51 %
Down	3 %	7 %	33 %	42 %
Total	7 %	38 %	55 %	100%

Note: 45 architects responded in both quarters as opposed to the full sample responses of 53 in 2008:1 and 60 in 2008:2. As a result, the net balances for the matched respondents (-38 percent and -49 percent, respectively) differ from the full sample net balances of -40 percent and -42 percent for 2008:1 and 2008:2, respectively.
Source: NZIER and authors' calculations.

5. Conclusions

Leamer (2007) entitled his paper 'Housing *is* the Business Cycle'. While there may be disagreement with the certainty of his statement (see, for example, Ghent and Owyang 2009), there is probably broad agreement that housing construction prospects should normally be included in any assessment of recessions and recoveries. Although architects are responsible for only a proportion of housing construction, the early availability of their opinion on housing prospects one-to-two years ahead may be a useful supplement to other data such as building consents, building starts and comparisons with other construction forecasts.

Our paper considered three main themes: quantification methods, forecasting and turning points and respondent dynamics. We have reached several preliminary conclusions from our initial work with the NZIER survey of architect opinion. First, the indicators track official housing construction growth relatively well in-sample with the best performance from the disaggregated panel (MSW) indicator. Out-of-sample, the outcome is less satisfactory. Secondly, forecasts based on net balances dominate naïve forecasts over the 18-24 month horizon. Over the shorter 12-month horizon, both methods have equal forecasting ability. With respect to turning points, we find that architects are relatively less able to predict when forecasting within a recessionary environment. Thirdly, the entropy (or disagreement) index and the information from matched responses, gives insights into respondent dynamics not revealed by the aggregated data.

Further work includes additional forecasting tests, extending the project to private and government construction, comparison of architect forecasts with other forecasters and other data (such as building consents), working with nominal rather than real data and further analysis of the dynamics of individual firm responses.

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