DEMAND SHOCKS, INFLATION AND THE BUSINESS CYCLE

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ABSTRACT

This paper examines how firms adjust output and prices in response to changes in demand and costs, paying particular attention to the role that capacity utilisation plays in affecting these relationships. It primarily uses qualitative survey data on manufacturing firms' actual and expected outcomes for these variables, and traces through the short-term effects of changes in demand on costs, output and prices. The survey data also enables an analysis of how firms respond to unexpected shocks to costs and demand.

The paper finds that strong demand growth leads to increases in both output and prices, and there is some evidence that capacity constraints do affect this relationship. When capacity utilisation is high, changes in demand have a smaller effect on output and a larger effect on prices, than when capacity utilisation is low.

The paper distinguishes between the direct effect that changes in demand have on prices, through changes in margins, and the indirect effect, through demand-induced changes in firms' costs. It finds that inflationary pressures are predominantly driven by increases in input costs. While margins appear to move pro-cyclically, there is a degree of asymmetry in their behaviour. Movements in margins appear to be largest in recessionary periods with margins falling as the economy goes into recession and then being rebuilt relatively early in the recovery. In boom times pressures on prices come largely through increases in costs, with little additional contribution from changes in margins.

TABLE OF CONTENTS

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1. INTRODUCTION

The links between demand growth, capacity utilisation and inflationary pressures are at the heart of macroeconomics. One of the most basic issues facing macro-economists is what factors determine how an increase in nominal demand is "split" between an increase in prices and an increase in output. The predominant view is that in the long run, expansionary demand policies simply increase the price level, but in the short run, they can lead to both output growth and increases in prices. These short-run linkages are the focus of this paper. By using survey data, rather than macroeconomic data, we examine the relationships between changes in demand and costs, and changes in output and prices. We pay particular attention to the role that capacity utilisation plays in affecting these relationships.

One of the stylised facts underlying much of the New Keynesian economics is that changes in demand often have much larger effects on output than they do on prices, at least in the short run. This "fact" has generated considerable theoretical work aimed at explaining the relatively muted price changes. Underlying this work is the notion that the economy's short-run supply curve is relatively flat, so that changes in demand generate relatively large changes in output. Models which attempt to explain this flat supply curve focus on menu costs, co-ordination failures and the existence of monopolistically competitive markets.

While these models have been useful in explaining developments in some individual markets, they have not been widely adopted by macroeconomic policy-makers who typically rely on some concept of the output gap (that is, the difference between potential output and current output) when assessing demand-induced inflationary pressures. The idea is that an increase in demand when output is high (relative to potential output) will increase prices more, and output less, compared to the situation in which output is low. This idea has received some empirical support, with measures of the output gap helping to predict inflation in a number of different countries.[1]

There are two important channels which might explain this relationship between inflation and changes in demand relative to potential output. The first of these is

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1 See Blundell-Wignall *et al* (1992), McElhattan (1985), Bauer (1990), and Chadha and Prasad (1994) for examples.

that increases in demand put pressure on firms' costs. The second channel is that increased demand leads to higher prices as firms increase their margins. There may also be some feedback from increased margins to costs, if higher margins lead workers to demand higher nominal wages to maintain their real wage.

By using data from the Australian Chamber of Commerce and Industry (ACCI)/Westpac Survey of Industrial Trends, we attempt to discriminate between these two channels for firms in the manufacturing industry. We do this by examining the impact that changes in demand have on manufacturing firms' costs and margins, and thus on their prices, and how this impact varies with the level of capacity utilisation. In the survey, firms are asked about the actual outcomes for a range of variables over the previous quarter, and their expectations for these variables over the following quarter. Amongst others, these variables include new orders (which we interpret as demand), output, prices and costs. Firms are also asked whether they are operating above or below "normal" capacity. By explicitly distinguishing between demand and output on the one hand, and prices and costs on the other, the data set allows us to trace through the effects of changes in demand on costs, output and prices.

In addition, since data exist on both actual and expected outcomes, we can explore the impact of unexpected changes in costs and demand on prices and output. Directly observing these shocks allows us to overcome some of the pitfalls that arise when the shocks are estimated with the aid of an econometric model. This helps in identifying the way in which demand shocks are transmitted to the output and pricing decisions of firms in the manufacturing sector.

The central results in our paper are as follows. Increased capacity utilisation does lead to inflationary pressures. These pressures occur primarily through increased costs. However, margins also appear to be pro-cyclical - that is, margins are higher in booms than in recessions. However, the movement in margins appears to be larger in recessions than in booms - as the economy goes into recession, margins fall and are then rebuilt as the economy enters the recovery phase. This rebuilding of margins does not lead to higher inflation immediately as downward pressure on cost increases is still being exerted by the high levels of excess capacity. Once margins have been restored, the additional demand associated with a boom generates relatively small additional increases in margins. Thus, in boom times, the pressures on prices come predominantly through increased costs. Our results also suggest that when capacity utilisation is high, changes in demand have a smaller effect on output (and a larger effect on prices) than when capacity utilisation is low.

The remainder of the paper is organised as follows. In Section 2 we provide some background to the general issues. Section 3 follows with our discussion of the survey, and the benefits and limitations of using the survey data. Section 4 then begins with an overview of the methodology we use in the empirical investigation and then presents and discusses our estimation results. Finally, we offer some concluding remarks in Section 5.

2. BACKGROUND

Much of New Keynesian economics is built around the "stylised fact" that, given wages, changes in demand have no (or little) effect on prices.[2] As Blanchard and Fisher (1989) note, the simplest explanation is that given wages, marginal cost is flat so that firms have no reason to increase prices as demand increases. An alternative explanation is that marginal costs increase as output increases, but that markups are counter-cyclical so that prices remain unchanged.

There is considerable debate about both the theoretical and empirical justification for believing that markups narrow when demand and output are high. At the theoretical level, various arguments have been advanced to justify this relationship. First, there may be some price-smoothing, whereby the seller agrees not to change the price fully in line with production costs, especially when changes in costs are seen as temporary. Second, the elasticity of demand facing a firm may be pro-cyclical, so that market power is reduced when demand is high. Third, it may be more difficult for firms to collude when demand is strong, as the benefit from cheating is likely to increase as demand rises.[3]

On the other hand, "customer markets" models suggest that markups should increase as demand rises. In these models, a firm that lowers its price sells more to existing customers and expands its customer base. In so doing, it also increases future sales. Lower prices are thus an investment in market share. Such investments are likely to be more profitable, the higher is the ratio of future to current sales. As a result, discounting will be more common at low levels of

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[2] This stylised fact leads Blanchard and Fisher (1989) to ask "Why are shifts in demand largely accommodated by changes in quantities rather than by changes in relative prices?" (p. 427) or more specifically "why [do] shifts in the demand for goods lead mostly to movements in output rather than movements in prices given wages" (p. 427).

[3] For a review of various models of the mark-up see Rotemberg and Woodford (1991).

demand and thus markups should decline when demand falls.[4] When demand is high (relative to potential) the cost of losing customers is reduced and margins should widen.

The empirical evidence on the relationship between markups and demand is mixed. There is no strong consensus about whether the markup is pro or counter-cyclical, or which theories of the markup are most empirically relevant. Rotemberg and Woodford (1991), Bils (1987), and Benabou (1992) find that the markup is counter-cyclical in the US. On the other hand, Ramey (1991) finds that US markups are pro-cyclical. Rae and Wong (1992) find a similar result for New Zealand, while Morrison (1988) finds that markups are pro-cyclical for manufacturing firms in the United States but counter-cyclical for manufacturing firms in Japan.

In a study concentrating on French and German manufacturing firms, Konig and Nerlove (1983) find that firms' actual and expected price changes were largely independent of actual and expected demand changes. This was particularly the case for French firms. Price changes were found to be driven largely by costs, with firms reacting to demand changes by altering production levels. Even in the presence of capacity constraints, this study found that firms are more likely to revise production, rather than prices, in response to an unexpected change in demand. Buckle and Meads (1991) find similar results in their investigation of the behaviour of manufacturing firms in New Zealand.

If it is correct that markups are counter-cyclical, then the power of the output gap in explaining prices rests on the link between the level of output and costs. This link is simply the familiar Phillips Curve relationship between unemployment (or the output gap) and wages growth.

An increase in the level of output may increase costs in one of two ways - marginal costs may increase because of decreasing returns (at least in the short run), or factor prices may rise, increasing production costs, even if firms are operating under constant returns to scale.

With some factors of production fixed in the short run, marginal cost may increase quite quickly (even with constant factor prices), especially once production exceeds normal capacity. Machines are worked at above normal capacity, increasing wear

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[4] See for example, Phelps and Winter (1970) and Greenwald and Stiglitz (1988).

and tear, bottlenecks may occur in the production process, and new workers may be less skilled than the firm's existing workers. In addition, Bils (1987) argues that marginal costs rise with output, not solely because the capital stock is fixed in the short run, but also because high capacity utilisation requires the use of relatively expensive overtime. He finds that marginal costs increase with output. In contrast, Ramey (1991) and Flaig and Steiner (1989) find that marginal costs decline with output.

While this first link between capacity and costs holds at the level of individual firms, the second link (that is, increasing factor prices) depends upon a high level of capacity utilisation for the economy as a whole. In such cases, aggregate demand for factors of production (including labour, capital and raw materials) is relatively high. Just as is the case for final goods, strong demand puts upward pressure on input prices. This pressure can arise through increasing costs of producing inputs and through higher margins on various factors of production. Stronger demand for raw materials, for example, may require firms to exploit higher-cost sources, leading to higher marginal costs. In the labour market, stronger demand increases the market power of unions and this may be translated into increases in wages. If the markup in the labour market is defined as the difference between the actual wage and workers' reservation wage, there is little reason to believe that the markup is counter-cyclical - in fact, the reverse is probably true. Thus with pro-cyclical markups in factor markets and increasing marginal costs of producing inputs, strong demand should lead to higher factor and output prices, even if producers of final goods operate under constant returns to scale in the short run.

There is considerable empirical support for the idea that increased capacity utilisation increases price pressures in the economy. Bauer (1990) finds that in the United States, inflationary pressures increase when the Federal Reserve's capacity utilisation series rises above 80 per cent. These pressures appear to be stronger in goods markets than in markets for services and are attributed to increasing marginal costs as capacity constraints are reached. McElhattan (1985) finds similar results, but argues that the link between capacity utilisation and inflation arises from markups being pro-cyclical. She also finds that capacity utilisation is a better predictor of inflationary pressures than the unemployment rate (a measure of excess capacity in the labour market). In a comprehensive review of the effect of capacity constraints on output and prices in the US, Shapiro (1989) shows that prices do rise when capacity utilisation rises, but not more so than that suggested by the increase in wages. The implication is that marginal productivity is not decreasing with output and that markups are not pro-cyclical. Indeed, in some industries studied by Shapiro, prices rise less than costs at high levels of capacity utilisation.

In Australia, Blundell-Wignall, Lowe and Tarditi (1992) find that the inclusion of the output gap in an autoregressive model of inflation significantly improves the equation's explanatory power. They argue that excess capacity typically precedes troughs in inflation, while increasing inflation typically follows periods when output is above some notion of "potential" output. The most notable exception to this relationship appears to be in the late 1980s, when the Prices and Incomes Accord was moderating wage pressures that might normally have been expected when the level of output was high and increasing. By holding down wage increases, the Accord was able to reduce the rate at which firms' costs were increasing. This allowed inflation to actually decline slightly in a period of very strong demand growth and declining unemployment.

Finally, before turning to the survey data, we examine the relationship between the output gap in manufacturing and manufacturing price inflation using output and price data for the manufacturing sector. To do this, we estimate the following equation:

$$\Delta p = a + l_1 \sum_{i=1}^{n} \Delta p_{t-i} + l_2 \sum_{i=0}^{m} gap_{t-i} + n_t \qquad (1)$$

where Δp is the quarterly percentage change in the price of manufactured goods and *gap* is a measure of the output gap in the manufacturing sector. Lags of quarterly inflation are included to capture the fact that inflation rates are often characterised by a considerable degree of inertia. Changes in costs are excluded, as the output gap variable should capture cost pressures.

The output gap is the gap between the actual and potential levels of manufacturing output. We calculate potential output using the method developed by Hodrick and Prescott (1980) and also by using a time trend through the log of actual output. Both methods have the undesirable property that the measure of potential output for the last few observations in the sample can be excessively influenced by the current level of actual output. In an attempt to obtain a better measure of potential output, we assume that manufacturing output will grow at a quarterly rate of 2 percent over each of the next 5 quarters. Having made this assumption we estimate both measures of potential output using a sample period that runs from September 1968 to September 1995. Equation (1) is then estimated over the period September 1977 to June 1994.

We initially include the contemporaneous value and four lags of the output gap as explanatory variables, as well as four lags of quarterly manufacturing prices inflation. We sequentially eliminate insignificant lags. For both measures of the output gap this leaves us with a specification which includes two lags of quarterly inflation and the contemporaneous output gap. The estimated results are reported in Table 1.

Table 1: Output Gap and Inflation for the Manufacturing Sector

	Hodrick-Prescott Output Gap	Trend-Adjusted Output Gap
Constant	**0.54**** (2.83)	**0.63**** (3.13)
Inflation$_{(t-1)}$	**0.40*** (2.42)	**0.38*** (2.31)
Inflation$_{(t-2)}$	**0.25** (1.91)	**0.23** (1.80)
Output Gap	**5.71*** (2.22)	**5.74*** (2.30)
$\overline{R}^2$	**0.39**	**0.40**
Diagnostic Test: Serial Correlation	**1.88** {0.39}	**1.81** {0.41}

Notes: White corrected t-statistics are reported in parentheses. Numbers in brackets {} are p-values for a test of the null that regressions are first or second-order serially correlated.

The results confirm an important role for the output gap in influencing price changes in the manufacturing sector. The contemporaneous output gap coefficient is positive and statistically different from zero. While the results suggest that high capacity utilisation will lead to immediate price pressures, there are also important delayed effects. A one percentage point decline in the output gap for the manufacturing sector, for just one quarter, results in an immediate decline in the quarterly rate of price inflation for manufactured goods of 0.06 of a percentage point. After one year, the price level will be 0.12 percent lower than otherwise would have been the case.

3. THE SURVEY

The above aggregate data for the manufacturing sector provide a useful summary of the relationship between capacity utilisation (or the output gap) and changes in inflation, however, it leaves us without answers to two important questions. First, how are demand pressures transmitted into increased price pressures? Second, to what extent do firms react differently to unexpected and expected changes in demand? We turn to survey data in an attempt to shed some light on these two questions.

The survey data we use are from the ACCI/Westpac Survey of Industrial Trends. This survey is conducted quarterly and typically includes responses from around 200 manufacturing firms, drawn from a sample of over 400 firms each period. The sample is designed to reflect, as closely as possible, the size and industrial composition of the manufacturing sector.

Each firm is asked questions regarding its actual and expected new orders, prices, costs, output etc. These questions are qualitative and the majority are directed at the firm's experience over the previous three months and their plans, or expectations, for the next three months. Firms are asked to abstract from normal seasonal variations, and indicate whether a particular variable has increased, decreased or stayed the same over a given period. The percentage of firms reporting an "increase", "decrease" or "no change" is published for each question. In the following analysis, we focus on the questions relating to new orders received (our demand variable), output, average selling prices and average cost of production. We also use the responses to the question which asks whether firms are operating at, above, or below normal capacity.[5]

An advantage of using this type of survey data is that it allows direct observation of both expected and actual outcomes. This permits us to avoid some of the pitfalls involved in generating expectations using macroeconomic data. In particular, using the residuals from an econometric model of demand as a measure of unexpected demand changes and then correlating those changes with unexpected changes in inflation generated in a similar way, may lead to misleading results regarding the

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5 This question was changed into its current form in December of 1987. The question had previously asked firms: "Are you operating at a satisfactorily full rate of operation? Yes/No". The change in the nature of the question does not appear to lead to a break in the series, nor does it appear to affect the behaviour of the series or any of the results reported in the following section.

underlying correlation between the two shocks. This is problematic if some information which is actually used by firms in forming expectations is omitted from each equation. In this case, any correlation in the estimated shocks may simply reflect this omitted information.[6] In addition, the survey data allow us to distinguish output from demand, which is often difficult with macro-economic data.

On the other hand, using this type of survey data has a number of problems. First, the survey results are aggregated across firms, preventing comparisons of individual firms' expectations and outcomes. The second problem is the conversion of the qualitative survey data into a form that can be used in quantitative analysis. The most commonly used procedure for this type of survey data is to use the "balance statistic" (Theil (1952)). This statistic is defined as the difference between the proportion of firms experiencing (expecting) an increase in the relevant variable and the proportion experiencing (expecting) a fall. If movements in this statistic are to accurately reflect movements in the underlying series, a number of restrictive assumptions must be satisfied.[7] These include that the underlying series (say price changes) has a constant variance and is uniformly distributed across firms. Furthermore, the threshold level at which firms report that a change has occurred must be constant through time and across firms.

A number of modifications of the balance statistic have been proposed. The two most widely used were developed by Carlson and Parkin (1975) and Pesaran (1985). The Carlson and Parkin method involves computing the sample mean and variance from the aggregated response data, making explicit assumptions about the distribution followed by the underlying series. Pesaran adopts a regression-based approach which involves estimating the appropriate weights on the "increase" and "decrease" responses when calculating the net balance statistic. The details of these and other more complicated procedures are discussed in Pesaran (1987) and Smith and McAleer (1990).

Unfortunately, a consensus has not been reached as to which is the superior method of quantification. Pesaran (1987) argues that the appropriate summary statistic depends upon the particular circumstances being investigated, but that many of the approaches yield very similar estimates and conclusions. Other studies have been even less conclusive. Defris and Williams (1979) and Batchelor (1986), compared the results of surveys which used quantitative expectations of price movements with

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6 See Flood and Lowe (1993) for a more detailed discussion of this issue.

7 See Batchelor (1986) pp. 103-5 and p. 108 and references cited therein.

those using summary measures calculated from qualitative surveys. They found that the balance statistic and the Carlson-Parkin mean tracked the year-to-year movements in average expectations reasonably well, but not shorter-term movements. In empirical work, however, the balance statistic was found to be systematically biased, and led to an incorrect rejection of the hypothesis of rationality.

Smith and McAleer (1990) used the ACCI/Westpac data to compare the properties of the various statistics. Their focus was on which measure was most useful in a forecasting context and on determining whether the broad conclusions concerning rational expectations were robust to alternative procedures. While they found a lack of robustness across different procedures, they did conclude that all of the measures provided information which was useful for forecasting.

An additional potential problem arises from the fact that the balance statistic (and many of its variations) is bounded. The balance statistic must lie between negative and positive one hundred. As a result, the dependent variable in many of our regressions is not normally distributed and may be truncated. This is essentially the same problem as the one encountered with the modelling of frequency data, and thus the same issues concerning the relative merits of linear probability and probit models are relevant here.[8] In our case there are unlikely to be any benefits from using a non-linear estimation technique which takes account of these constraints, as the simple OLS regressions that we report do not yield any predicted values outside the -100 to 100 range.

Keeping the potential short comings in mind, we use the balance statistic to convert qualitative data to quantitative data in this paper.[9] The correlation between the net balance statistic for output and the quarterly change in manufacturing output (from the national accounts) is 0.47, while the correlation between the net balance statistic for prices and quarterly changes in the prices of goods produced by manufacturers is 0.68. The alternatives to the balance statistic did not generate

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[8] See Konig and Nerlove (1983) and Zimmerman (1986) for examples of the use of log linear probability models. Heckman (1978) and Hausman and Wise (1978) discuss the relative merits of their use.

[9] To examine the sensitivity of choosing the net balance statistic method over alternative statistics the regressions corresponding to Tables 2, 5 and 6 were conducted using the ratio of net balance to no change responses (see Pesaran (1987)). The results were not qualitatively different from those obtained using the net balance statistic. Details of these regressions are available from the authors.

consistently higher correlations. In addition, a regression of the Hodrick-Prescott adjusted output gap for the manufacturing sector on the survey measure of capacity utilisation produced a positive coefficient, with a t-statistic of 8.33 and an $\overline{R}^2$ of 0.51.

4. THE LINKS BETWEEN DEMAND, COSTS, PRICES, AND OUTPUT

This section is divided into two parts; the first outlines our empirical strategy and the second presents and discusses the results.

4.1 The Empirical Framework

We begin by modelling *actual* price and output changes as a function of changes in demand and costs. Using the simplest specification we can write:

$$\Delta P_t = a + b_1 \Delta D_t + b_2 \Delta C_t + m_t \qquad (2)$$

$$\Delta Y_t = d + g_1 \Delta D_t + g_2 \Delta C_t + j_t \qquad (3)$$

where P denotes the average selling price, D new orders received, C the average cost per unit of output and Y the level of output.

We can write analogous equations for firms' expectations of price and output changes. These equations can be estimated as the survey asks firms about their expected outcomes.

$$\Delta P_t^e = a^* + b_1^* \Delta D_t^e + b_2^* \Delta C_t^e + m_t^* \qquad (4)$$

$$\Delta Y_t^e = d^* + g_1^* \Delta D_t^e + g_2^* \Delta C_t^e + j_t^* \qquad (5)$$

Where superscript e denotes the expected value of the relevant variable.

We can also estimate equations explaining *unexpected* changes in prices and output, in terms of unexpected changes in demand and costs. The unexpected changes are derived simply by subtracting the expected change from the actual change:

$$\Delta P_t - \Delta P_t^e = (a - a^*) + b_1^*(\Delta D_t - \Delta D_t^e) + b_2^*(\Delta C_t - \Delta C_t^e) + (b_1 - b_1^*)\Delta D_t + (b_2 - b_2^*)\Delta C_t + (m_t - m_t^*) \qquad (6)$$

$$\Delta Y_t - \Delta Y_t^e = (d - d^*) + g_1^*(\Delta D_t - \Delta D_t^e) + g_2^*(\Delta C_t - \Delta C_t^e) + (g_1 - g_1^*)\Delta D_t + (g_2 - g_2^*)\Delta C_t + (j_t - j_t^*) \qquad (7)$$

This framework allows us to examine the impact of changes in costs and demand on prices and output. If an increase in demand leads to higher prices through an increase in margins (given costs) then we should see a positive coefficient on the actual, expected and unexpected changes in demand in equations (2), (4) and (6) respectively. If the impact of changes in demand on prices works solely through a change in costs, then the change in demand should not be a significant explanator of the change in prices. Similarly, if an increase in production costs leads to an increase in output prices, the coefficient on the actual, expected and unexpected change in costs in equations (2), (4) and (6) respectively, should be positive and significant.

If higher production costs also lead to a decline in output, g_2 and g_2^* should be negative and significant, while if higher demand generates an increase in output, g_1 and g_1^* should be positive and significant.

We suggested in Section 2 that the output and price responses may be a function of the level of capacity. To allow for the possibility that changes in demand have differential effects on output and prices depending upon whether firms are above or below capacity, we allow the β and γ coefficients to vary, depending on whether or not a positive net balance of firms is operating above normal capacity. This is done by introducing dummy variables into the various equations. These dummy variables allow the slope coefficients to vary with the level of capacity utilisation.

A similar procedure is followed to allow for asymmetric effects of changes in costs on prices. Here, however, the interaction between costs, prices and capacity is a little more difficult to capture. The coefficient on costs is, in a sense, the pass-through parameter - that is, given that a number of firms are experiencing an increase in costs, how many are putting up their prices. It may well be the case that the degree of pass-through does not depend on capacity, but rather that the number of firms actually experiencing a cost increase is a function of the level of capacity utilisation. To examine this possibility we directly examine the effect that capacity has on cost changes.

When there is high background inflation, more firms will be putting their prices up for a given increase in demand, than would be the case in a low-inflation environment. To control for the effect of background inflation, we initially include the 12-month-ended percentage change in the Private Consumption Deflator in the equations explaining actual changes in prices and output.[10] Where it is insignificantly different from zero we remove it from the specification and re-estimate the model. In the "expected" and "unexpected" equations, we include expected and unexpected inflation where the expected rate of inflation is estimated from a simple AR(4) model.

Lags of the relevant dependent variable are also included in the estimated specifications. These are included to capture the fact that price and output responses to changes in demand and costs may not be instantaneous. In both equations (2) and (3) four lags are initially included and then insignificant lags are excluded sequentially. In both equations this procedure results in just one lag being included. The same specification is then used for the "expected equations". In the unexpected equations, if the same model describes actual and expected outcomes, then the lagged level of price changes (or output changes), the constant and the contemporaneous changes in demand and costs should not enter the equation. We do however include these variables and test the hypothesis that the coefficients are jointly equal to zero (the constant term is excluded from these tests).

While the ACCI/Westpac Survey was first conducted in 1961, questions concerning costs were not introduced until June 1966. Thus our sample period starts at the third quarter of 1966 and runs until the second quarter of 1994, giving a total of 112 observations.

The 6 equations comprising the price and output equations are estimated jointly using the SUR technique. The structure of the equations means that the residuals within each block (that is, the price block and the output block) are closely related - at least conceptually, the residuals from the "unexpected change" equation are equal

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[10] To allow for the possibility that firms adjust their prices in response to changes in manufacturing prices we re-estimate these equations using the four-quarter change in manufacturer's output prices. As these data are available over a shorter sample period we re-estimate the equations over the shorter period for both measures of inflation. The results are not qualitatively different.

to the residuals from the "actual change" equation less the residuals from the "expected change" equation. While this implies a particular structure to the variance-covariance matrix, this structure is not imposed, and the matrix is estimated freely. The SUR technique also takes into account the correlation between residuals in the price and output equations - the highest correlation is 0.23 and is between the residuals in the equations for unexpected price changes and unexpected output changes.

Basic descriptive statistics for actual, expected and unexpected changes in prices, output, demand and costs are reported in Appendix 1.

4.2 The Results

4.2.1 The Price Response to Changes in Demand and Costs

The estimation results for equations (2), (4) and (6) are presented in Table 2.

Table 2: Equations Explaining Price Changes

	Actual Change	Expected Change	Unexpected Change
Constant	**-15.03**** (-8.33)	**-3.85*** (-2.27)	**-11.28**** (-7.40)
Change in $Price_{t-1}$	**0.32**** (5.50)	**0.37**** (6.88)	**-0.05** (-1.03)
Actual Change in Demand	**0.20**** (8.41)		**0.09**** (3.87)
Actual Change in Costs	**0.51**** (10.73)		**0.00** (0.00)
Expected Change in Demand		**0.11**** (4.53)	
Expected Change in Costs		**0.51**** (9.51)	
Unexpected Change in Demand			**0.12**** (5.06)
Unexpected Change in Costs			**0.53**** (10.27)
Actual Inflation Rate	**1.15**** (3.78)		**0.86**** (3.41)
Expected Inflation Rate		**0.28** (1.07)	
Unexpected Inflation Rate			**0.12** (0.40)
$\overline{R^2}$	**0.92**	**0.92**	**0.60**
Hypothesis Test:			
Actual Variables in Unexpected Equation are jointly zero			**31.39** {0.00}

Notes: The test that the coefficients on the actual variables (that is, the lagged change in actual price, actual changes in demand and costs and the actual inflation rate) in the unexpected price equation are jointly zero excludes the constant term. t-statistics are reported in parentheses - **(*) indicates that the coefficient is significantly different from zero at the 1%(5%) level. Numbers in {} are p-values.

Clearly, both demand and cost factors are important in generating increases in output prices. Given the number of firms that report a change in costs, the higher the number of firms that report an increase in demand, the higher the number of firms that report an increase in prices - that is, demand and margins move together positively. In the equation explaining actual price changes, the coefficient on the actual change in demand is positive and significant. Similarly, the greater the number of firms that *expect* an increase in demand, the greater the number of firms that *expect* to increase their prices. Finally, when firms find that demand is unexpectedly strong, they appear to increase their prices by more than they had initially intended, even after accounting for any unexpected increase in costs.

Changes in costs also play an important role in firms' decisions to change prices. The estimates suggest that if an additional 10 firms report an increase in costs (and demand is unchanged), 5 of those firms will increase their price in the same quarter. This is regardless of whether the cost increase is expected or unexpected. However, not all the adjustment in prices occurs in the same quarter as the increase in demand and costs. The final response is around 1.5 times the initial effect.

Over the sample period the average number of firms reporting an increase in costs in a particular quarter is greater than the average number reporting an increase in prices; the average net balance statistic for changes in prices is +32, while that for costs is +56. This does not mean that costs increased faster than prices. Rather it reflects the fact that a change in just one of a firm's cost components leads the firm to report an increase in costs. If this component is small, and the resulting increase in total costs is also small, the firm may not increase its output price, preferring instead to wait until it experiences a larger increase in costs. As a result, more firms report increases in costs than increases in prices. This is consistent with the Ss pricing models.[11] In these models, the existence of costs to changing prices ("menu costs") means that firms will only change prices when the actual price has moved a specified amount away from the optimal price. It is also worth noting that the percentage of firms reporting a change in prices averaged 50 per cent over the sample period, and in some quarters as few as 16 per cent of firms reported "no change". This suggests that, when necessary, firms are prepared to change prices relatively frequently.

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[11] For example see Barro (1972), Caplin and Sheshinski (1987), Sheshinski and Weiss (1983) and Caplin and Leahy (1991).

The results also confirm that the initial impact of changes in demand and costs on prices is less than the eventual impact. In addition, the higher is the background inflation rate, the greater will be the number of firms increasing their prices in any given quarter. Unexpectedly high inflation, however, does not seem to be associated with an unexpectedly large number of firms putting up their prices in the same quarter.

The hypothesis that the coefficients are the same in the equations explaining actual and expected price change is clearly rejected. The constant in the regression explaining unexpected price changes is negative and significant. The net balance of firms that expect to be able to increase their prices is systematically larger than the net balance actually reporting an increase in prices. This optimism is also reflected in expectations of output where, on average, the average net balance of firms recording an increase in demand is less than the average net balance expecting an increase in demand (see Appendix 1).

The table also reports the result of testing the hypothesis that the coefficients on lagged actual changes in price, actual inflation and actual changes in demand and costs are jointly zero in the equation explaining unexpected changes in price. The hypothesis is clearly rejected. In particular, the coefficient on actual changes in demand in the equation explaining actual price changes is significantly higher than the coefficient on the unexpected change in demand in the equation explaining unexpected price changes. This suggests that, systematically, the actual realisation of a change in demand has a greater effect on prices than was anticipated.

We now turn to an examination of how capacity constraints influence the price response to a change in demand. As was discussed above, this is done by allowing different price responses depending upon whether a net balance of firms is reporting that they are operating above or below capacity. In the sample used, 26 of the 112 observations are characterised by production in excess of normal capacity.[12] The estimation results are reported in Table 3.

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[12] There are 3 cases in which the net balance for the capacity variable is zero. These are included in the "above normal" capacity category. We also used an alternative estimate of full capacity; that is, full capacity was defined to occur when the net balance statistic was greater or equal to -10. This expanded the number of cases of above normal capacity to approximately one third of the sample. All qualitative results remained unchanged.

Table 3: The Impact of Capacity Constraints on Price Changes

	Actual Change	Expected Change	Unexpected Change
Constant	**-13.95**** (-7.94)	**-2.24** (-1.35)	**-11.75**** (-7.87)
Change in Price$_{t-1}$	**0.34**** (5.83)	**0.41**** (7.75)	**-0.07**** (-1.35)
Actual Change in Demand			
Above Normal Capacity	**0.06** (1.33)		**0.07** (1.56)
Below Normal Capacity	**0.24**** (8.53)		**0.09**** (3.62)
Actual Change in Costs			
Above Normal Capacity	**0.51**** (10.40)		**0.04** (0.74)
Below Normal Capacity	**0.50**** (10.35)		**0.00** (0.06)
Expected Change in Demand			
Above Normal Capacity		**-0.01** (-0.16)	
Below Normal Capacity		**0.14**** (5.38)	
Expected Change in Costs			
Above Normal Capacity		**0.47**** (8.42)	
Below Normal Capacity		**0.49**** (9.60)	
Unexpected Change in Demand			
Above Normal Capacity			**0.01** (0.26)
Below Normal Capacity			**0.15**** (5.38)
Unexpected Change in Costs			
Above Normal Capacity			**0.49**** (6.42)
Below Normal Capacity			**0.51**** (9.97)
Actual Inflation Rate	**1.09**** (3.62)		**0.95**** (3.80)
Expected Inflation Rate		**0.10** (0.40)	
Unexpected Inflation Rate			**-0.08** (-0.24)
$\overline{R}^2$	**0.93**	**0.93**	**0.60**
Hypothesis Tests:			
Actual Variables in the Unexpected Equation are Jointly Zero			**39.53** {0.00}
Demand Effect Independent of Capacity			**7.60** {0.01}
Cost Effect Independent of Capacity			**0.10** {0.75}

Notes: The test that the coefficients on the actual variables in the unexpected equation are jointly zero excludes the constant term. t-statistics are reported in parentheses - **(*) indicates that the coefficient is significantly different from zero at the 1%(5%) level. Numbers in {} are p-values.

In the equation explaining actual price changes, the coefficient on changes in demand when output is above capacity is small and insignificantly different from zero. In contrast, the coefficient on changes in demand when most firms are operating below capacity is positive and significant. These results suggest that changes in demand have their greatest impact on manufacturers' margins when output is below capacity. It does not appear to be the case that extremely high levels of demand (relative to capacity) put significant upward pressure on margins. Instead, the principal downward (upward) pressure on margins comes when demand is already low and falling (rising) - such periods are usually associated with recessions. A similar picture emerges from the equation explaining expected price changes: when the number of firms expecting demand to increase is relatively high, firms do not expect to increase their prices by more than the change in costs would have suggested.

To gain further insight into the relationship between margins and capacity we split the sample again. First, we distinguish between periods when more firms report that demand is rising than falling. We then cross-classify the observations by the degree of excess capacity. Three cases are used: no excess capacity (the net balance capacity variable is greater than or equal to zero), normal excess capacity (net balance between -45 and 0) and high excess capacity (net balance equal to or less than -45). To control for the effect of costs on prices, we regress the price change variable on a constant, its own lagged value, the cost change variable and inflation. The residuals from this regression represent price changes that are not explained by changes in costs; one interpretation is that they represent the direct demand effects on prices. A negative residual implies that fewer firms raised prices than was predicted by the simple model which excludes demand, while a positive residual implies that a greater number of firms raised prices than can be explained by this simple model. The average residual for each of our six (2×3) categories is presented in Table 4.

Table 4: Average Pressure on Margins

	High Excess Capacity	Normal Excess Capacity	No Excess Capacity
Rising Demand	**5.30** (6)	**2.69** (37)	**1.66** (22)
Falling Demand	**-6.02** (19)	**-2.36** (24)	**0.81** (4)

Note: Numbers in parentheses indicate the number of observations in each category.

Clearly, the most significant downward pressure on margins comes when demand is falling and there is already a large amount of excess capacity - the average residual in this case is -6.02. A fall in demand appears to have a larger effect on prices (independent of the cost channel), the higher is the level of excess capacity. The results also indicate that when many firms have high excess capacity, but more firms are reporting rising rather than falling demand, then the number of firms putting up prices will be greater than that suggested by the number of firms experiencing an increase in costs. This suggests that it is not only the level of excess capacity that influences the decision to change margins, but also the direction of change in demand. Even when there is considerable excess capacity, provided demand is increasing, firms appear to be willing to rebuild the margins that were squeezed as demand fell. Once capacity utilisation has recovered to levels approaching "normal", further increases in demand appear to lead to smaller increases in margins.

These results suggest that both the level of demand (relative to capacity) and the change in demand are important for understanding the behaviour of margins in the manufacturing sector. While the size of margins is positively correlated with the level of the output gap, most of the movement in margins takes place in recessions, when margins narrow when demand is falling and then widen as demand begins to increase.[13]

Do these results throw any light on the various theories explaining markups? It may well be that there are two countervailing forces. The customer markets theory suggests that when demand is high, the value to a firm of maintaining its customer base declines. As a result, firms will be willing to increase their margins and their profits; this phenomena is sometimes described by the somewhat colourful term "price gouging". Opposing this force is the idea that when demand is strong, competitive pressures increase and firms increase prices by less than the increase in costs. In addition, if a firm believes that demand is going to be strong for only a relatively short period of time, it may not be prepared to "gouge" its customers, for fear that the customers will leave them permanently.

When demand is very low, the picture seems a little different. In this case, the customer markets explanation appears to dominate. Faced with falling demand,

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[13] The correlation between the change in margins (that is, the residuals used in Table 4) and the change in the Hodrick-Prescott measure of the output gap is 0.38 (t-statistic of 3.31). The correlation is 0.42 with a t-statistic of 3.74 for the trend-adjusted measure. These correlations are estimated over the period 1977 quarter 3, to 1994 quarter 2.

firms find it attractive to engage in discounting to keep existing customers and to attract new customers who will be likely to stay with the firm in the up-swing. This leads to a narrowing of margins. In addition, faced with low and falling demand, firms are likely to have heightened concerns about their ability to survive. Such concerns may also lead to discounting. Once demand starts increasing, although the level of demand is low, discounting appears to lessen. If the initial increases in demand indicate a period of continuing demand growth, concerns about survival and the need to attract new customers through price reductions decline. The result is that most rebuilding of margins appears to be done in the early stage of the recovery.

While the effect of a demand change on prices appears to depend upon the level of capacity utilisation, the results in Table 3 suggest no such dependence for the pass-through of a cost increase to prices. The coefficients on the change in cost variable do not depend upon the level of capacity - the coefficients are not significantly different from one another and are quite close in magnitude. This is the case in both the actual and unexpected price change equations. As discussed earlier, this does not mean that capacity constraints have no influence on prices through costs, for the level of capacity may influence the number of firms reporting a cost increase, while having no influence on the pass-through of any given cost increase. To test this proposition we estimate the following equation for the actual change in costs:

$$\Delta C_t = a + \sum_{i=1}^{2} d_{t-i} \Delta C_{t-i} + b_1 \Delta D_t + b_2 CAPACITY_{t-1} + b_3 p_t + m_t \qquad (8)$$

where *CAPACITY* is the net balance of the capacity variable and *p* is the inflation rate. The estimation results are presented in Table 5.

Table 5: Actual Change in Costs

	Actual
Constant	**6.13**** (2.62)
Change in $Costs_{t-1}$	**0.66**** (8.02)
Change in $Costs_{t-2}$	**0.14*** (2.02)
Actual Change in Demand	**0.03** (0.88)
$Capacity_{t-1}$	**0.13**** (3.63)
Actual Inflation	**0.95**** (3.65)
$\overline{R}^2$	**0.89**

Notes: t-statistics are reported in parentheses - **(*) indicates that the coefficient is significantly different from zero at the 1%(5%) level.

The level of capacity is a significant explanator of the change in costs. The higher the number of firms reporting that they are operating at normal or above capacity at the beginning of the quarter, the greater will be the number of firms registering increases in average costs during the quarter. An increase in demand during the quarter, however, appears to have no additional effect on costs - the coefficient on the actual change in demand is small and insignificantly different from zero. As was the case for margins, the level of demand seems to matter, but unlike the margins case, the number of firms reporting changes in demand in a particular quarter seems to have little direct impact.

The estimates also suggest that the full impact on costs is substantially greater than the initial effect: a movement of five firms from reporting that they are operating below capacity to reporting that they are operating above capacity (a change in the net balance of 10) will lead to just one (10 x 0.13) additional firm recording an increase in costs in the same quarter. However, at the end of four quarters, an additional 4 firms will have reported an increase in costs. One way to interpret this lagged response is that capacity constraints lead to higher costs through increases in factor costs, but that factor costs increase with some lag, perhaps due to the time taken to re-negotiate contracts. The earlier results suggested that once the cost increases have taken place they are passed through to prices relatively quickly, although again the eventual price response is larger than the initial response.

Similar to the results for prices, the results show that an increase in general inflation leads to more manufacturing firms experiencing an increase in costs.

4.2.2 The Output Response to Changes in Demand and Costs

We now turn to the effect of changes in demand and costs on output. The estimation results for equations (3), (5) and (7) are presented in Table 6.[14]

Clearly, the number of firms reporting demand changes is of critical importance in determining the number of firms reporting output changes - the coefficient on the actual change in demand is large and highly significant. Similarly, the greater the number of firms that expect an increase in demand, the higher the number of firms expecting output to increase. When more firms experience a demand increase than expected, this translates into a higher number of firms experiencing output increases than had been expected. These results suggest that when firms experience an increase in demand, they are able to change output relatively quickly, with most of the output response occurring in the same quarter as the demand change.

The evidence on the impact of changes in costs on output is mixed and difficult to interpret. On the one hand, actual changes in costs do appear to have a role in influencing firms' actual production decisions. The more firms experiencing a cost increase, given the change in demand, the smaller the number of firms experiencing an increase in output. The effect is, however, quite small. On the other hand, if more firms are expecting an increase in costs, there is no evidence that this makes more firms pessimistic about their output decisions. Similarly, the results for the equation explaining unexpected changes in output suggest that cost shocks play no significant role in explaining unexpected changes in output.

Again, we reject the restriction that the coefficients on the actual variables in the unexpected output equation are jointly zero. In addition to the fact that the effect of costs differs in the actual and expected equations, firms seem to place greater

[14] The inflation rate is excluded as the coefficient was found to be insignificantly different from zero.

weight on the previous change in output when forming their forecasts of future changes in output than is actually warranted. This is suggested by the negative coefficient on the lagged change in output in the equation explaining the unexpected change in output.

Table 6: Equations Explaining Output Changes

	Actual Change	Expected Change	Unexpected Change
Constant	**6.79**** (4.72)	**2.15** (1.33)	**4.49**** (2.63)
Change in Output$_{t-1}$	**0.12**** (2.81)	**0.21**** (6.04)	**-0.09*** (-2.02)
Actual Change in Demand	**0.75**** (19.80)		**0.01** (0.33)
Actual Change in Costs	**-0.05*** (-2.28)		**-0.09**** (-3.23)
Expected Change in Demand		**0.74**** (20.94)	
Expected Change in Costs		**0.04** (1.39)	
Unexpected Change in Demand			**0.72**** (19.96)
Unexpected Change in Costs			**0.04** (1.03)
$\overline{R}^2$	**0.93**	**0.89**	**0.60**
Hypothesis Test:			
Actual Variables in the Unexpected Equation are Jointly Zero			**17.08** {0.00}

Notes: The test that the coefficients on the actual variables (that is, the lagged change in output and the actual changes in demand and costs) in the unexpected output equation are jointly zero excludes the constant term. t-statistics are reported in parentheses - **(*) indicates that the coefficient is significantly different from zero at the 1%(5%) level. Numbers in {} are p-values.

We now turn to examining the link between changes in output and capacity. Work by Shapiro (1989) using the US Federal Reserve's Capacity Utilisation Index finds no evidence in support of the idea that high levels of capacity utilisation limit output expansion. Shapiro concludes that one possible explanation is that supply is very elastic, and that periods of high demand and output are typically periods of low-cost production. In contrast, the results reported in Table **Error! Bookmark not defined.** suggest that capacity constraints do limit the output response to changes in demand. The table contains results of regressions which allow for different output responses to changes in demand and costs, depending upon whether a net balance of firms is operating above or below capacity.

Again, the first column explains actual output changes. When a net balance of firms is operating above normal capacity, a change in demand generates a smaller increase in output than is the case when a net balance of firms is operating below normal capacity. This difference is significantly different from zero at the 1 per cent level, and indicates that capacity constraints do bind, limiting the output response (at least, in the short run) to rising demand.[15] A similar result is suggested by the expected output equation - a greater number of firms expect an increase in output, given the number that expect an increase in demand, when demand is below capacity than when it is above capacity. There appears to be no asymmetry in the impact of changes in costs on the decision to change output.

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[15] When the equations for unexpected changes in prices and output were estimated jointly, but without the equations for actual and expected outcomes in the system, the results were essentially unchanged. The largest change occurred in the equation explaining unexpected output changes. In this less restricted system, the asymmetry in the effect of demand shocks was considerably larger, with the coefficient on unexpected changes in demand when capacity is above normal falling to 0.25.

Table 7: The Impact of Capacity Constraints on Output Changes

	Actual Change	Expected Change	Unexpected Change
Constant	**7.59**** (5.55)	**2.93** (1.91)	**4.41**** (2.99)
Change in Output$_{t-1}$	**0.11*** (2.55)	**0.17**** (4.47)	**-0.05** (-1.26)
Actual Change in Demand			
Above Normal Capacity	**0.57**** (10.93)		**0.05** (0.86)
Below Normal Capacity	**0.80**** (20.32)		**-0.02** (-0.53)
Actual Change in Costs			
Above Normal Capacity	**-0.04** (-1.33)		**-0.12**** (-3.57)
Below Normal Capacity	**-0.06*** (-2.50)		**-0.07**** (-2.80)
Expected Change in Demand			
Above Normal Capacity		**0.54**** (9.90)	
Below Normal Capacity		**0.83**** (22.01)	
Expected Change in Costs			
Above Normal Capacity		**0.10**** (2.66)	
Below Normal Capacity		**0.01** (0.55)	
Unexpected Change in Demand			
Above Normal Capacity			**0.46**** (7.98)
Below Normal Capacity			**0.82**** (20.69)
Unexpected Change in Costs			
Above Normal Capacity			**0.02** (0.21)
Below Normal Capacity			**0.03** (0.69)
$\overline{R}^2$	**0.93**	**0.90**	**0.68**
Hypothesis Tests:			
Actual Variables in the Unexpected Equation are Jointly Zero			**21.89** {0.00}
Demand Effect Independent of Capacity			**30.58** {0.00}
Cost Effect Independent of Capacity			**0.02** {0.89}

Notes: The test that the coefficients on the actual variables (that is, the lagged change in actual output and the actual changes in demand and costs) in the unexpected output equation are jointly zero excludes the constant term. t-statistics are reported in parentheses - **(*) indicates that the coefficient is significantly different from zero at the 1%(5%) level. Numbers in {} are p-values.

5. SUMMARY AND CONCLUSIONS

In the long run, inflation is a monetary phenomena. Few economists, however, believe that monetary expansion (or low real interest rates) generates instantaneously higher prices. The standard view is that stronger demand growth as the result of expansionary macro-economic policies causes output to increase faster than capacity and, in response, prices rise in order to choke-off the excess demand. There are lags at both stages; that is, it takes time for the initiation of easier policies to affect demand and it takes time for the increase in demand to affect prices.

In the paper we examine the short-run relationship between demand growth, capacity utilisation and price increases using data from surveys of manufacturing firms. The results are broadly supportive of the idea that the breaching of capacity constraints generates inflationary pressures. Predominantly, these pressures come through increased input costs. As capacity utilisation increases, demand for various factors of production rises and input prices increase. In addition, firms may face declining marginal productivity. The important point is that faced with higher costs, firms' output prices rise.

In recessions, the deflationary forces exerted by falling input costs are amplified by falling margins. While margins appear to be pro-cyclical (being larger in booms than in recessions) they do not appear to behave symmetrically over the course of the business cycle. Margins appear to be squeezed when demand is falling and the manufacturing sector is already in recession. Rebuilding of the margins appears to take place relatively early in the recovery. Once the recovery is well under way, the movements in margins tend to be smaller and price increases are predominantly driven by changes in costs.

There is some evidence that capacity constraints do limit increases in output. When demand rises, and firms are already above capacity, the output response is smaller than when firms are operating below normal capacity. This smaller output response is not driven solely by the fact that costs are higher, making production more expensive. To some degree, it reflects the difficulty of working the capital stock harder and the difficulty of obtaining important inputs. Given these difficulties, it is not surprising that when manufacturing firms are operating at high levels relative to capacity, a given increase in demand is reflected more in an increase in prices than an increase in output.

The rise in costs associated with an increase in capacity utilisation occurs with some lag. This suggests that the increase in costs is driven by higher input prices, rather than the existence of fixed factors of production and falling marginal productivity. Increased demand for inputs takes some time to be reflected in factor prices, as renegotiation of contracts needs to take place. However, once cost increases have occurred, they appear to translate into price increases relatively quickly.

While the results in the paper suggest some interesting conclusions they are not without qualification. For the survey data to accurately summarise the underlying macro-economic variables requires that firms answer the questions accurately, and that a number of restrictive assumptions hold regarding the across-firm distribution of changes in the relevant variables. While it is not possible to test these restrictions, they are unlikely to hold exactly. The nature of the survey data also makes it difficult to determine a relationship between the size of the estimated coefficients and the underlying macroeconomic variables of interest. In addition, the response of the manufacturing sector to changes in demand may not be representative of the economy as a whole.

Nevertheless, the basic qualitative results seem quite strong. Demand growth, without expansion in underlying capacity, generates inflationary pressures. These pressures come primarily through increases in firms' costs and occur with some lag. This suggests that changes in firms' input prices (including the cost of labour) are a key ingredient to understanding short-run inflation dynamics. This strong link between costs and prices also suggests that higher costs, due to factors unrelated to capacity utilisation, will generate higher inflation, at least in the short run.

APPENDIX 1: DATA MEANS AND STANDARD DEVIATIONS

	Actual		Expected		Unexpected	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Prices	32.47	23.48	37.77	21.18	-5.30	7.80
Output	4.14	21.40	10.63	20.12	-6.49	11.11
Demand	-0.12	24.41	7.50	21.16	-7.62	13.98
Costs	55.98	22.75	51.88	22.13	4.11	8.14
Inflation	7.66	3.92	7.66	3.85	0.00	0.78
Capacity	-21.51	24.62				

APPENDIX 2: DATA SOURCES

Survey data used are from the "Survey of Industrial Trends", undertaken by the Australian Chamber of Commerce and Industry and Westpac Banking Corporation. Data are collected by mail surveys sent out to approximately 400 potential respondents per quarter. The response rate varies around 50 per cent.

Manufacturers' output prices are from the ABS Price Indexes, Articles Produced by the Manufacturing Sector, catalogue number 6412.0. Total manufacturing output data are from the ABS National Accounts, catalogue number 5206.0, in 1989/90 prices.

The inflation rate used is the four-quarter ended percentage change in the Private Consumption Deflator. This is sourced from the ABS National Accounts, catalogue number 5206.0.

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