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MODELLING AGGREGATE LABOUR DEMAND

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ABSTRACT

We derive a conditional long-run labour demand equation via a representative firm-level profit maximising problem, where production takes place according to a constant elasticity of substitution (CES) production function. This theoretical framework is augmented by cyclical explanatory variables to form an error correction model, which is then estimated using standard econometric methods. Estimates of important labour demand parameters, such as the elasticity of substitution between capital and labour, are consistent with previous Australian studies.

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1. INTRODUCTION

Employment is a fundamental economic variable that is relied on as both a gauge of the current state of the economy and a measure of societal wellbeing. In light of its central role, it is essential that policymakers understand the factors that drive this important variable so that they can reliably update their forecasts of economic activity and estimate the likely outcome of a policy change or unanticipated economic disturbance.

At its most basic level, employment is the market clearing quantity implied by the intersection of labour supply and demand, so the literature has either focused on the factors that drive supply or demand. This paper concentrates on the factors that drive labour demand. It adds to a number of recent Australian studies by updating estimates of key labour demand parameters and clarifying their interpretation.[3]

This project is the first part of a larger research effort with the ultimate goal of modelling short- and long-run labour demand on both a heads (that is, the number of persons employed) and total hours worked basis. For ease of exposition, we have limited this paper to modelling heads which allows us to avoid complexity associated with measuring total hours worked.

Following the broader aggregate labour demand literature, we derive a conditional long-run labour demand equation via a representative firm-level profit maximising problem, where production takes place according to a constant elasticity of substitution production function[4]. This theoretical framework is augmented by cyclical explanatory variables to form an error correction model, which is then estimated using standard econometric methods.

Our estimates of important labour demand parameters, such as the elasticity of substitution between capital and labour, are consistent with previous Australian studies.

We add to the current stock of knowledge by demonstrating that the typical strategy of identifying labour-augmenting technical change via a deterministic time trend is at odds with observed data. We do this by showing that model-based estimates of the growth rate of labour augmenting technical change greatly exceed the prediction of theory that it be equal to the trend growth rate of observed productivity and/or real wages. We go on to demonstrate that despite this weakness this strategy remains a valid approach to estimating all other key labour demand parameters.

The remainder of this paper is organised as follows: section 2 derives the long-run labour demand relationship; section 3 describes the data used in estimating the labour demand equation; section 4 provides details of the econometric method and reports parameter estimates; and section 5 summarises the analysis and outlines plans for future work.

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3 See, for example, Debelle and Vickery (1998), Dungey and Pitchford (1998), Downes and Bernie (1999), Lewis and MacDonald (2002, 2004), Dowrick and Wells (2004), Dixon, Freebairn and Lim (2005) and references therein.

4 See, for example, Lucas and Rapping (1970), Altonji (1982), and Hamermesh (1986).

2. THEORY

Lewis and MacDonald (2002) and a host of others have demonstrated that long-run aggregate demand for labour in Australia is well-approximated by the first order condition for labour derived by solving a standard profit maximisation problem of a representative firm subject to a constant elasticity of substitution (CES) production function. The representative firm's profit maximisation problem can be presented as follows:

$$\max_{N_t, K_t} \Pi_t = p_t Y_t - w_t(1+\tau_t)N_t - q_t K_t \tag{1}$$

subject to a constant returns to scale and CES production function:

$$Y_t = A_t\left[\theta(X_t N_t)^{\frac{\sigma-1}{\sigma}} + (1-\theta)K_t^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}} \tag{2}$$

where: Π_t is profit at time *t*; p_t is output prices; Y_t is output (volume); w_t is nominal wages; τ_t is the payroll tax rate; N_t is employment; q_t is the rental rate of capital; K_t is capital; A_t is Hicks-neutral technical change; $0<\theta<1$ is a weighting parameter; X_t is labour-augmenting technical change (Harrod-neutral); and $\sigma>0$ is the elasticity of substitution between capital and labour.

For ease of exposition and without loss of generality, we assume that the firm's production function is always binding, which allows us to solve the following problem:

$$\max_{N_t, K_t} \Pi_t = p_t A_t\left[\theta(X_t N_t)^{\frac{\sigma-1}{\sigma}} + (1-\theta)K_t^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}} - w_t(1+\tau_t)N_t - q_t K \tag{3}$$

The resulting necessary first order condition for labour $\left[\frac{\partial \Pi_t}{\partial N_t}=0\right]$ implies:

$$\begin{aligned} w_t(1+\tau_t) &= \theta p_t A_t X_t \left(X_t N_t\right)^{\frac{-1}{\sigma}}\left[\theta\left(X_t N_t\right)^{\frac{\sigma-1}{\sigma}} + (1-\theta)K_t^{\frac{\sigma-1}{\sigma}}\right]^{\frac{1}{\sigma-1}} \\ &= \theta p_t (A_t X_t)^{\frac{\sigma-1}{\sigma}} N_t^{\frac{-1}{\sigma}}\left\{A_t^{\frac{1}{\sigma}}\left[\theta\left(X_t N_t\right)^{\frac{\sigma-1}{\sigma}} + (1-\theta)K_t^{\frac{\sigma-1}{\sigma}}\right]^{\frac{1}{\sigma-1}}\right\} \end{aligned} \tag{4}$$

Substituting (2) into (4):

$$w_t(1+\tau_t) = \theta p_t (A_t X_t)^{\frac{\sigma-1}{\sigma}} N_t^{\frac{-1}{\sigma}} Y_t^{\frac{1}{\sigma}} \tag{5}$$

and solving for labour (N_t) implies:

$$N_t = \theta^{\sigma} \mathrm{Y_t} (A_t X_t)^{\sigma-1} \left(\frac{w_t(1+\tau_t)}{p_t} \right)^{-\sigma} \tag{6}$$

Taking logarithms gives the following labour demand relationship, conditional on the level of output, labour-augmenting technical change and real wages:

$$\begin{aligned} \ln N_t &= \sigma \ln(\theta) + \ln Y_t - (1-\sigma)\ln(A_t X_t) - \sigma \ln\left(\frac{w_t(1+\tau_t)}{p_t} \right) \\ &= \left[\sigma \ln(\theta) + (1-\sigma)\ln(A_t) \right] + (\ln Y_t - \ln X_t) - \sigma \left\{ \ln\left(\frac{w_t(1+\tau_t)}{p_t} \right) - \ln X_t \right\} \end{aligned} \tag{7}$$

This expression can be simplified further by noting that there are no cyclical fluctuations over the long-run, so in the long-run A_t will be at its average level A, which yields the following long-run labour demand equation:

$$\begin{aligned} \ln N_t &= \left[\sigma \ln(\theta) + (1-\sigma)\ln(A) \right] + (\ln Y_t - \ln X_t) - \sigma \left\{ \ln\left(\frac{w_t(1+\tau_t)}{p_t} \right) - \ln X_t \right\} \\ &= \alpha + (\ln Y_t - \ln X_t) - \sigma \left\{ \ln\left(\frac{w_t(1+\tau_t)}{p_t} \right) - \ln X_t \right\} \end{aligned} \tag{8}$$

where: $\alpha = \left[\sigma \ln(\theta) + (1-\sigma)\ln(A) \right]$

Equation (8) gives the logarithm of long-run labour demand as equal to three terms: a constant, the logarithm of real output adjusted for labour-augmenting technical change, and the elasticity of substitution multiplied by the logarithm of the real wage adjusted for labour-augmenting technical change (that is, the logarithm of long-run real unit labour costs). The effect of an increase in the level of labour-augmenting technical change on labour demand depends on the size of the elasticity of substitution between capital and labour: other things equal, labour demand decreases if $\sigma < 1$ and increases if $\sigma > 1$.

3. DATA

Employment

Labour Force Survey total civilian employment (ABS Cat. No. 6202.0) includes all persons aged 15 years and over who are in full- or part-time employment, except members of the permanent defence forces, certain diplomatic personnel of overseas governments, overseas residents in Australia, and members of non-Australian defence forces (and their dependants) stationed in Australia.[5] The Labour Force Survey civilian employment series is published on a monthly basis. This is aggregated to quarterly data by taking the average seasonally adjusted level of employment over the three months of the quarter.

Output

Total GDP chain volume, seasonally adjusted, is published quarterly in the Australian System of National Accounts (ABS Cat. No. 5206.0).

Wages

Average Earnings National Accounts (AENA) is published in the Australian System of National Accounts (ABS Cat. No. 5206.0). It is calculated by dividing Non-farm Compensation of Employees by the sum of Total Employees and Defence Employment (ABS Cat. Nos 5206.0, 6291.0 and 0911.0).[6] Our model adjusts the average wage by an effective payroll tax rate, which is calculated by dividing total payroll taxes (ABS Cat. No. 5206.0) by total non-farm compensation of employees.

Note that the Total Employees series excludes owners of unincorporated businesses and a small number of contributing family workers working without pay (ABS Cat. No. 6291.0), which together account for around 11 per cent of total employment. Due to the difficulty of distinguishing between profits and wages among owners of unincorporated businesses, we take the average wages of the total employees group plus defence employment as a measure of aggregate average wages.

Output prices

The GDP deflator is calculated by dividing the seasonally adjusted National Accounts measures of quarterly total nominal GDP by the seasonally adjusted measure of quarterly total real GDP (ABS Cat. No. 5206.0).

4. Results

Econometric method

Empirical labour demand model

Following other researchers we estimate Australian labour demand using an error-correction approach. The long-run desired level of employment is determined by the relationship derived above (8), with the resulting error correcting term captured by the expression in [] brackets in equation (9) below. The speed at which actual employment approaches its desired level is determined by $\delta < 0$. Short-run dynamics are captured by the addition of lagged first differences of log employment, and

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5 For details of the Labour Force survey, see the ABS publication *Labour Statistics: Concepts, Sources and Methods* – 6102.0.55.001 – Apr 2007.

6 ABS Catalogue Numbers 1210.0 and 0911.0 are provided to Treasury by special request with the quarterly Australian System of National Accounts.

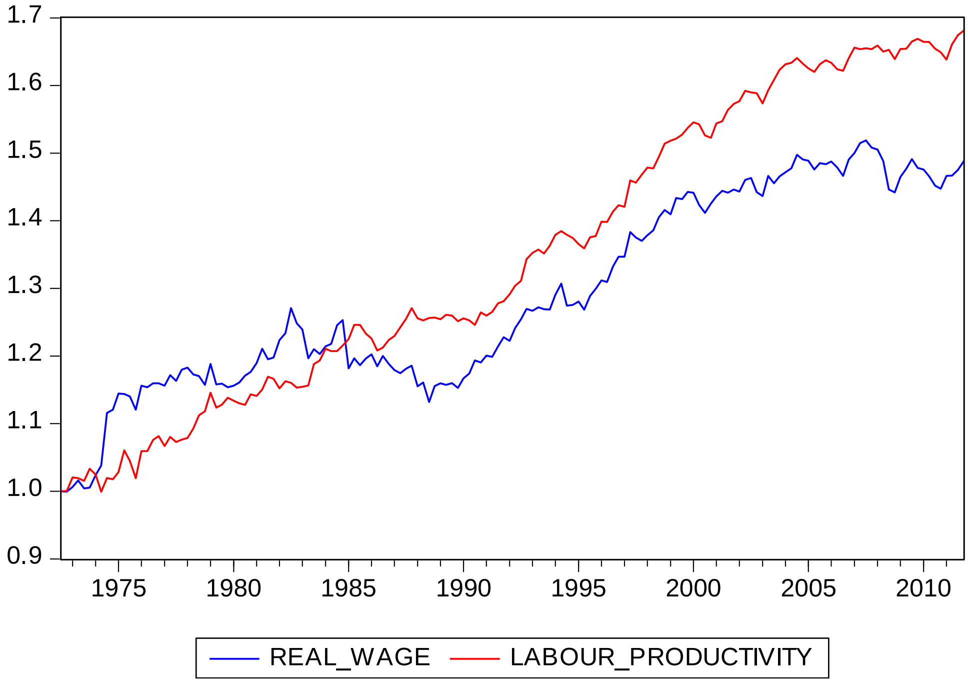
contemporaneous and lagged first differences of log output and log real wages. The general error-correcting model we consider is as follows:

$$\Delta \ln N_t = \delta\left[\ln N_{t-1} - \alpha - (\ln Y_{t-1} - \ln X_{t-1}) + \sigma\left\{\ln\left(\frac{w_{t-1}(1+\tau_{t-1})}{p_{t-1}}\right) - \ln X_{t-1}\right\}\right]$$
$$+\sum_{i=0}\beta_{1i}\Delta \ln Y_{t-i} + \sum_{i=1}\beta_{2i}\Delta \ln N_{t-i} + \sum_{i=0}\beta_{3i}\Delta \ln\left(\frac{w_{t-i}(1+\tau_{t-i})}{p_{t-i}}\right) + \varepsilon_t \qquad (9)$$

Identifying and estimating labour-augmenting technical change

Before we can take this model to the data we must impose additional assumptions to identify labour-augmenting technical change X_t, which is an unobserved component. Neoclassical growth theory offers a guide to the general nature of this process. According to this theory, labour-augmenting technical change has the same trend as the observed real wage and labour productivity (that is, output per worker). If this prediction holds in the data, X_t can simply be estimated as a common trend of labour productivity and the real wage. In contrast to the theory, Chart 1 shows that over the estimation period (1972-2011), productivity has grown at a faster rate than the real wage. This suggests the common trend approach would not be fruitful as there appears to be an additional stochastic trend driving the real wage.

Chart 1: Real wages and average labour productivity



Work-in-progress by Treasury on wage determination suggests that the gap between productivity and real wage growth was due to the rapid rise in unemployment over the 1980s which weakened the bargaining power of employed workers.[7]

Australian labour demand research (see, for example, Lewis and MacDonald (2002)) has typically overlooked this issue by assuming that X_t can be identified as the trend that causes the term in [] to be a cointegrating relationship (that is, the common trend of labour productivity and real wages). Specifically, they have assumed that X_t is a deterministic linear time trend:

$$\ln X_t = \mu + \lambda t \tag{10}$$

where: μ is a constant; and λ is the trend growth rate. Substituting (10) into (9) implies the following error correction model:

$$\begin{aligned}\Delta \ln N_t = \delta\left[\ln N_{t-1} - \alpha - (\ln Y_{t-1} - \mu - \lambda t) + \sigma\left\{\ln\left(\frac{w_{t-1}(1+\tau_{t-1})}{p_{t-1}}\right) - \mu - \lambda t\right\}\right] \\ + \sum_{i=0} \beta_{1i}\Delta \ln Y_{t-i} + \sum_{i=1} \beta_{2i}\Delta \ln N_{t-i} + \sum_{i=0} \beta_{3i}\Delta \ln\left(\frac{w_{t-i}(1+\tau_{t-i})}{p_{t-i}}\right) + \varepsilon_t\end{aligned} \tag{11}$$

While this is a valid econometric approach it can only yield an estimate of the growth rate of labour augmenting technical change if labour productivity and real wages have the same trend. To see this it is important to note that in the context of the model λ is estimated as a weighted average of the trend growth rates of productivity γ and the real wage φ:

$$\lambda = \frac{\gamma - \sigma\varphi}{1-\sigma} \tag{12}$$

which implies $\lambda = \gamma = \varphi$ irrespective of the value of σ. However, when $\gamma > \varphi$ and $\sigma < 1$ (12) implies $\lambda > \gamma > \varphi$.

Given that the typical estimate of σ is less than one and productivity has grown at a faster rate than the real wage, model based estimates of λ will exceed the observed trend growth rate of labour productivity and the real wage which is at odds with the underlying theory. In light of this finding we argue that X_t does not have a structural interpretation (that is, labour-augmenting technical change) and is best described as a reduced-form trend.

Another potential limitation of the basic deterministic trend assumption is that the trend growth rates of labour productivity and the real wage have varied significantly over time. As outlined in the Intergenerational Report 2007 (IGR), average labour productivity growth in Australia has varied significantly over the last four decades. Relatively strong growth was experienced during the 1970s and

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7 This analysis updates the work of Gruen, Pagan and Thompson (1999) to 2011 data and finds that their estimates are preserved in the large data sample, with the 1980s characterised by large gaps between the actual unemployment rate and the NAIRU.

1990s, while weaker growth was experienced during the 1980s and 2000s. Reflecting the conclusions of the IGR we allow for trend breaks in the estimation of X_t at 1980, 1990 and 2000:

$$\ln X_t = \mu + \lambda_2 T1980 + \lambda_3 T1990 + \lambda_4 T2000 + (\lambda_1 + \lambda_2 D1980 + \lambda_3 D1990 + \lambda_4 D2000)t \tag{13}$$

where:
T1980 = t for t (1980:1), = 0 elsewhere
T1990 = t for t (1990:1), = 0 elsewhere
T2000 = t for t (2000:1), = 0 elsewhere
D1980 = 1 for t (1980:1 to 2011:4), = 0 elsewhere
D1990 = 1 for t (1990:1 to 2011:4), = 0 elsewhere
D2000 = 1 for t (2000:1 to 2011:4), = 0 elsewhere

Estimation Results

Model with no trend breaks

We begin by estimating the long-run relationship between employment, output and wages given by equation 8, treating X_t as a deterministic trend (see equation 10).

Table 1 reports that the slope of the reduced-form trend (λ) is 0.0165, implying 1.65 per cent average annual increase over the estimation period, with the elasticity of substitution between wages and capital (σ) of 0.33 suggesting that capital and labour are gross complements in the long-run. Augmented Dickey Fuller (ADF) tests applied to the model's residuals fail to reject the null hypothesis that the residuals of the long-run equation have a unit root (that is, it is not a cointegrating relationship) at a 5 per cent significance level.

Table 1: Two-step estimation: long-run results with no trend break

Method: Least Squares
Sample: 1972Q3 2011Q4

	Coefficient	Std. Error	t-Statistic	Prob.
σ	-0.331177	0.035622	-9.296944	0.0000
μ	-0.554413	0.521788	-1.062524	0.2897
λ	0.016569	0.000433	38.28854	0.0000

R-squared	0.993255	Mean dependent var	8.963825
Adjusted R-squared	0.993168	S.D. dependent var	0.209544
S.E. of regression	0.017321	Akaike info criterion	-5.255027
Sum squared resid	0.046501	Schwarz criterion	-5.196876
Log likelihood	418.1471	Hannan-Quinn criterion.	-5.231411
Durbin-Watson stat	0.276670		

The second step is to estimate the coefficients on the short-run adjustment terms of the error correction model. Table 2 reports that the coefficient on the short-run adjustment term (δ) is -0.10, implying that 10 per cent of the gap between the actual and the desired level of employment closes per quarter. The coefficient on the first difference of log contemporaneous output (β_1) implies that a 1 per cent rise (fall) in output is associated with a 0.12 per cent rise (fall) in employment. The coefficient on the lagged first difference of log employment (β_2) implies that a 1 per cent rise (fall) in the lagged employment is associated with a 0.40 per cent rise (fall) in contemporaneous employment. The coefficient on the contemporaneous first difference of log real wages (β_3) implies that a 1 per cent rise (fall) in wages output is associated with a 0.14 per cent fall (rise) in employment.

Table 2: Two-step estimation: short-run results with no trend break

Method: Least Squares
Sample: 1972Q4 2011Q4

	Coefficient	Std. Error	t-Statistic	Prob.
δ	-0.104862	0.018585	-5.642156	0.0000
β_1	0.115360	0.031948	3.610849	0.0004
β_2	0.402459	0.060669	6.633645	0.0000
β_3	-0.140102	0.021724	-6.449200	0.0000

R-squared	0.553914	Mean dependent var	0.004477
Adjusted R-squared	0.545167	S.D. dependent var	0.005307
S.E. of regression	0.003579	Akaike info criterion	-8.402150
Sum squared resid	0.001960	Schwarz criterion	-8.324284
Log likelihood	663.5687	Hannan-Quinn criterion.	-8.370525
Durbin-Watson stat	2.055190		

Table 3: One step error correction model with no trend break

Method: Least Squares
Sample: 1972Q4 2011Q4

	Coefficient	Std. Error	t-Statistic	Prob.
δ	-0.107599	0.018684	-5.758732	0.0000
σ	-0.437707	0.072869	-6.006798	0.0000
μ	-2.404735	1.508597	-1.594021	0.1130
λ	0.017669	0.001164	15.17733	0.0000
β_1	0.117142	0.032008	3.659805	0.0003
β_2	0.375325	0.063015	5.956081	0.0000
β_3	-0.144460	0.022191	-6.509934	0.0000

R-squared	0.561641	Mean dependent var	0.004477
Adjusted R-squared	0.544107	S.D. dependent var	0.005307
S.E. of regression	0.003583	Akaike info criterion	-8.381407
Sum squared resid	0.001926	Schwarz criterion	-8.245141
Log likelihood	664.9405	Hannan-Quinn criterion.	-8.326065
Durbin-Watson stat	2.026453		

We now estimate the error correction model using a single step method. The estimated coefficients reported in Table 3 are similar to those estimated using the two-step approach. The elasticity of substitution between wages and capital is somewhat higher (in absolute terms) at -0.44, while the reduced-form trend's growth rate is larger at 1.76 per cent. ADF tests applied to the residuals of the long-run demand equation also fail to reject the null hypothesis that it is not a cointegrating relationship at a 5% significance level.

Model with trend breaks

Estimating the model with X_t as a linear deterministic trend generates long-run residuals that are clearly non-stationary with persistent deviations from zero occurring during the 1990s, when the Australian economy experienced a period of rapid productivity growth, and the subsequent slowdown in productivity growth during the 2000s. As discussed above, this may be due to breaks in trend labour productivity identified in the IGR, which we explore here by introducing decade long structural breaks in the reduced-form trend at 1980, 1990 and 2000.

Table 4: One step error correction model with three trend breaks

Method: Least Squares
Sample: 1972Q4 2011Q4

	Coefficient	Std. Error	t-Statistic	Prob.
δ	-0.156972	0.023741	-6.611907	0.0000
σ	-0.333888	0.100664	-3.316857	0.0011
μ	-0.621929	1.460830	-0.425737	0.6709
λ_2	-0.002046	0.004556	-0.449175	0.6540
λ_3	0.003265	0.003839	0.850405	0.3965
λ_4	-0.008205	0.002600	-3.155417	0.0019
λ_1	0.018097	0.002131	8.493971	0.0000
β_1	0.133119	0.031387	4.241247	0.0000
β_2	0.317678	0.064009	4.962995	0.0000
β_3	-0.130795	0.023090	-5.664621	0.0000

R-squared	0.595960	Mean dependent var	0.004477
Adjusted R-squared	0.571223	S.D. dependent var	0.005307
S.E. of regression	0.003475	Akaike info criterion	-8.424715
Sum squared resid	0.001775	Schwarz criterion	-8.230050
Log likelihood	671.3401	Hannan-Quinn criterion.	-8.345655
Durbin-Watson stat	1.999231		

Table 4 suggests that the trend breaks between the 1970s and 1990s are not statistically significant. Re-estimating the model with a single trend break at 2000 gives the following final set of estimates reported in Table 5.

The inclusion of the trend break results in a higher 'speed of adjustment' coefficient (δ) of -0.15. This implies that around 15 per cent of the gap between the actual and the optimal level of employment is eliminated each quarter. By comparison, Downes and Bernie's (1999) TRYM model estimate displayed a higher speed of adjustment of 19.8 per cent per quarter.

Table 5: One step error correction model estimation with one trend break

Method: Least Squares
Sample: 1972Q4 2011Q4

	Coefficient	Std. Error	t-Statistic	Prob.
δ	-0.148297	0.021600	-6.865504	0.0000
σ	-0.400971	0.051069	-7.851574	0.0000
μ	-1.718589	0.933547	-1.840923	0.0676
λ_2	-0.005966	0.001500	-3.977937	0.0001
λ_1	0.018457	0.000861	21.44554	0.0000
β_1	0.131177	0.031188	4.206066	0.0000
β_2	0.316862	0.063212	5.012681	0.0000
β_3	-0.138063	0.021516	-6.416706	0.0000

R-squared	0.593711	Mean dependent var	0.004477
Adjusted R-squared	0.574623	S.D. dependent var	0.005307
S.E. of regression	0.003461	Akaike info criterion	-8.444641
Sum squared resid	0.001785	Schwarz criterion	-8.288909
Log likelihood	670.9043	Hannan-Quinn criterion.	-8.381393
Durbin-Watson stat	1.994711		

Our estimate of the elasticity of substitution between capital and labour is 0.40, which lies at the lower of end of previous Australian estimates (for example, Debelle and Vickery (1998), Dungey and Pitchford (1998)). Again, Downes and Bernie's (1999) TRYM model estimate is somewhat larger at 0.82. The difference likely reflects the fact that TRYM incorporates greater capital/labour substitutability by modelling total hours worked and unfilled vacancies.

The estimated coefficient on the lagged first difference of log employment (β_2) implies modest serial correlation, with a 1 per cent rise (fall) in employment causing a 0.32 per cent rise (fall) in employment growth next period. The estimated coefficient for contemporaneous output growth (β_1) implies that a 1 per cent rise (fall) in output is associated with a 0.13 per cent rise (fall) in employment growth, and the estimated coefficient for real wages (β_3) implies that a 1 per cent fall (rise) in wages is associated with a 0.14 per cent rise (fall) in employment.

ADF tests reject the null hypothesis that the residuals of the error correction term have a unit root at a 5 per cent significance level, which implies the long-run demand equation is a cointegrating relationship.

Finally, we explore the endogeneity of variables used in this analysis by estimating a vector error correction model using the cointegrating relationship estimated above. In light of Pagan and Pesaran (2008), we find that the three variable system (excluding the reduced form trend) can be usefully characterised by two trends (that is, the unit root processes governing output and the real wage) and one cointegrating relationship (that is, the long-run demand relationship with trend breaks). This analysis reconfirms the earlier finding of Dixon, Freebairn and Lim (2005) that output and the real wage are weakly exogenous to this system of equations thereby alleviating concerns relating to endogeneity bias.

5. Conclusion

This paper concentrates on the factors that drive labour demand. It adds to a number of Australian studies conducted in the late 1990s/early 2000s by updating estimates of key labour demand parameters and clarifying their interpretation. Following the broader aggregate labour demand literature, we derive a conditional long-run labour demand equation via a representative firm-level profit maximising problem, where production takes place according to a constant elasticity of substitution production function. Our estimates of important labour demand parameters, such as the elasticity of substitution between capital and labour, are consistent with previous Australian studies.

We have limited this paper to modelling the demand for heads (that is, number of workers) largely to avoid complexity associated with measuring total hours worked. Our future research must address these measurement challenges so that we can meet our ultimate goal of modelling the short- and long-run relationships between the number of persons employed (heads) and average hours worked.

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Appendix A: Data

Data sources

Australian Bureau of Statistics. 2011. Table 2 — Key National Accounts Aggregates: Seasonally Adjusted: GDP — Chain Volume Measures. *National Accounts: National Income, Expenditure and Product — September Quarter 2011. ABS Catalogue 5206.0.* Australian Bureau of Statistics: Canberra. 6/12/2011

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Australian Bureau of Statistics. 2011. Total employees. *Labour Force Detailed — November 2011. ABS Catalogue 6291.0.* Australian Bureau of Statistics: Canberra. 6/12/2011

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