Impact of Business Confidence on the Employment Rate in the Araucanía Region of Chile: A Lagged Confidence Analysis

Adriana Riquelme Miranda
Universidad Autónoma de Chile; adriana.riquelme@uautonoma.cl
Leonardo Rivas Solar
Universidad Autónoma de Chile; leonardo.rivas@uautonoma.cl
Universidad de Valladolid; leonardo.rivas23@estudiantes.uva.es

Abstract

Business confidence is a crucial indicator that reflects entrepreneurs' perceptions of the past, present, and future economic situation, influencing investment and employment decisions. This study analyzes how lagged confidence perceptions regarding future sales, prices of goods and services, and other aspects impact the future employment rate in the Araucanía region. The literature highlights the relationship between business confidence and macroeconomic variables, emphasizing its role in investment and employment. Previous studies show that high business confidence can stimulate economic growth and hiring, acting as a leading indicator of future economic performance. ARDL, OLS, IV, and GMM models were used to assess the relationship between lagged perceptions and the employment rate, based on business confidence survey data. Positive lagged perceptions of future sales, prices of goods and services, and investment are associated with a higher future employment rate, while high past expectations of national demand show a negative

relationship. The discussion focuses on how business confidence about future sales, investment, price expectations, and the intention to hire more workers drives greater hiring, whereas overestimation of national demand can lead to less cautious employment decisions. Past business perceptions significantly influence future employment rates, underlining the importance of monitoring and understanding these perceptions to improve employment strategies and economic policies in Araucanía.

Keywords: Business confidence, employment rate, lagged perceptions, econometric models, business expectations.

1. Introduction

Business confidence is a determining factor in economic and employment decision-making. Entrepreneurs' perceptions regarding sales, prices, and future demand significantly influence the employment rate, reflecting both current economic conditions and future business outlooks. Previous studies have shown that a high level of business confidence can drive economic growth, encourage investment, and increase employment. In the Araucanía region, these perceptions are essential for planning growth strategies and adapting to market conditions, due to the region's economic dynamics and specific challenges in business development and employment. This study focuses on analyzing how lagged perceptions of various economic aspects affect the future employment rate, using monthly business confidence survey data collected by the Universidad Autónoma de Chile in Temuco, combined with employment rate records from the National Institute of Statistics (INE) in Araucanía. Several econometric models were applied, including ARDL, OLS, IV, and GMM, with the more robust models addressing issues of endogeneity, heteroskedasticity, and autocorrelation. The results provide a detailed view of how past business perceptions influence the future employment rate, highlighting the importance of monitoring and understanding these perceptions to improve employment strategies and economic policies in the Araucanía region.

2. Theoretical Framework

The theoretical framework of this study is grounded in a broad body of literature that has explored the relationship between business confidence and various macroeconomic variables, including investment, employment, and economic growth. Several studies have highlighted the crucial role of business confidence as a leading indicator of future economic performance. This review includes research that addresses different aspects of business confidence and its impact on the economy.

Adekoya and Oliyide (2021) pointed out that business confidence can be a strong predictor of future growth. Their study, focused on OECD countries, found that economic policy uncertainty and oil price shocks have a significant impact on business confidence, which in turn influences economic growth. This finding is consistent with the idea that business confidence reflects expectations about the future economic environment particularly future prices which affects investment and hiring decisions.

In a study on uncertainty and employment dynamics, Ghosal and Ye (2015) found that higher uncertainty negatively impacts employment growth, particularly affecting small businesses. Using regression models and survey data, the study showed that economic uncertainty can hinder hiring decisions in small enterprises, which tend to be more vulnerable to financial constraints and asymmetric information.

Khan and Upadhayaya (2019) demonstrated that business confidence has significant predictive power for business investment growth in the U.S. These authors suggested that shocks to business confidence—also known as "animal spirits"—reflect short-lived non-fundamental factors that can influence business decision-making. Their research showed that an increase in business confidence is associated with higher levels of investment, which in turn can lead to sustained economic growth.

Dasgupta and Lahiri (1993) showed that business confidence has explanatory power in predicting turning points in the business cycle. Using advanced econometric models, the authors found that

entrepreneurs' expectations about the future economy are valuable indicators for forecasting shifts in the economic cycle. Similarly, Heye (1993) examined the relationship between business confidence and labor market conditions in the U.S. and other industrialized countries, highlighting the importance of business expectations in shaping hiring and expansion strategies.

Taylor and McNabb (2007) and Lahiri et al. (2016) found that both business and consumer confidence contain independent and additional information for forecasting macroeconomic variables, including consumption and investment behavior. These studies demonstrated that both business and consumer confidence are important for understanding overall economic performance, particularly in terms of aggregate demand. This study found that high perceptions of national demand do not always translate into immediate employment increases, which may be due to excessive optimism leading to overestimation of future demand.

Moreover, Leeper (1992) and Matsusaka and Sbordone (1995) discussed the impact of consumer confidence on industrial production and unemployment, suggesting that sentiment can play a significant role in predicting economic performance. Lucas and Rapping (1969) as well as Phelps (1967) established that inflation expectations significantly influence employment and wage decisions. These studies show that business expectations about future prices affect the labor market, suggesting that greater confidence in future prices may lead to higher employment levels, as businesses anticipate increased revenues and expand their workforce in preparation.

Green (2022) analyzed price expectations for services and their impact on the labor market. Using regression models and cointegration analysis, Green found that firms expecting higher future prices are more likely to increase their workforce, anticipating higher future revenues that would justify staff expansion. Hille and Schupp (2019) explored the impact of expectations about the prices of services and goods on labor market dynamics, using regression models and cointegration analysis. Their research focused on how service price expectations influence companies' hiring decisions, finding similar results. This study is based on a wide range of research that has demonstrated the relevance of business confidence as a key indicator

of future economic performance, and how this confidence influences critical decisions such as investment and particularly employment. This theoretical framework provided a solid foundation for analyzing business perceptions in the Araucanía region and their impact on future employment rates.

3. Materials and Methods

The data used in this study comes from lagged responses to business confidence surveys conducted in the Araucanía region by the Universidad Autónoma de Chile in the city of Temuco. These include perceptions regarding future sales, future prices, current national demand, and future investment. The surveys are conducted monthly, covering the period from September 2017 to March 2024. For the analysis, the employment rate reported by the Instituto Nacional de Estadísticas (INE) of Araucanía, recorded in rolling quarters over the same period, was used.

Initially, Autoregressive Distributed Lag Models (ARDL) were considered due to their ability to determine optimal lags and handle time series with different levels of integration. According to Pesaran and Shin (1999), ARDL models are effective for analyzing dynamic relationships between variables with different orders of integration. However, the initial results (Table 1) showed that most of the parameters were not significant despite having a high R^2. This indicated potential endogeneity issues, leading to the exploration of more robust methods.

Table 1: ARDL Model Results.

Dep. Variable:	tasaocup	No. Observations:	81
Model:	ARDL(2, 2, 3, 3)	Log Likelihood	-101.466
Method:	Conditional MLE	S.D. of innovations	0.874
Date:	Fri, 21 Jun 2024	AIC	230.931
Time:	05:49:46	BIC	264.103
Sample:	3	HQIC	244.221
	81		

	coef	std err	z	P>|z|	[0.025	0.975]
tasaocup.L1	1.5495	0.092	16.822	0.000	1.366	1.733
tasaocup.L2	-0.5575	0.092	-6.028	0.000	-0.742	-0.373
pvtas3m.L0	-0.0024	0.004	-0.664	0.509	-0.010	0.005
pvtas3m.L1	-8.607e-05	0.004	-0.023	0.981	-0.007	0.007
pvtas3m.L2	0.0103	0.003	2.952	0.004	0.003	0.017
dnac.L0	0.0047	0.007	0.630	0.531	-0.010	0.020
dnac.L1	-0.0019	0.008	-0.248	0.805	-0.018	0.014
dnac.L2	-0.0035	0.008	-0.466	0.643	-0.019	0.012
dnac.L3	-0.0134	0.008	-1.769	0.081	-0.028	0.002
trab3m.L0	0.0096	0.008	1.215	0.229	-0.006	0.025
trab3m.L1	0.0234	0.009	2.571	0.012	0.005	0.042
trab3m.L2	0.0013	0.010	0.127	0.899	-0.019	0.021
trab3m.L3	-0.0226	0.008	-2.727	0.008	-0.039	-0.006

Source: Own elaboration based on survey data.

The next step was to apply Ordinary Least Squares (OLS) and Instrumental Variables (IV) models corrected for heteroskedasticity and autocorrelation. The OLS model was used as an initial approach to estimate the regression coefficients by minimizing the sum of squared errors. The OLS methodology served as a starting point to obtain a preliminary estimation of the relationships among variables, following Wooldridge's (2010) recommendations on correcting heteroskedasticity using robust standard errors.

To address potential endogeneity issues, the IV model was applied using the Two-Stage Least Squares (2SLS) method, employing instrumental variables such as the level of confidence regarding past sales performance and past business conditions. According to Angrist and Pischke (2009), this method is suitable for correcting endogeneity bias by using instruments that are correlated with the endogenous variables but not with the model's error term. These instrumental variables are considered exogenous and help correct potential biases in estimates caused by the presence of endogeneity when incorporating lagged employment rate as an explanatory variable.

The IV-GMM approach was selected due to its capacity to address endogeneity problems and provide more consistent estimations (Hansen, 1982). Lagged variables were generated for relevant business perceptions (future sales, future investment, service prices, national demand, and future employment) using different lags as deemed necessary. Then, all time series were aligned by eliminating initial missing values to ensure data consistency.

To check for and eliminate potential multicollinearity issues, the Variance Inflation Factor (VIF) was used, removing variables with VIF values higher than 7. Subsequently, the IV-GMM model was applied, using additional instruments to strengthen model identification and correct for heteroskedasticity and autocorrelation in the residuals. Instrument validity was assessed using the Hansen J test.

The IV-GMM model adjustment process included incorporating autocorrelation terms to address possible issues in the model's residuals. This was done by fitting an autoregressive (AR) model to the residuals of the original model and then including the autocorrelation terms in the IV-GMM model. This procedure allowed for correction of residual autocorrelation, providing more accurate and reliable estimates. Based on this, the adjusted model was defined as follows:

Equation 1: Proposed IV-GMM Model.

$$\text{tasaocup}(t) = \alpha + \beta_1 \text{evtas3m}(t-1) + \beta_2 \text{inver3m}(t-2) + \beta_3 \text{pvtas3m}(t-1) + \beta_4 \text{pvtas3m}(t-2) + \beta_5 \text{dnac}(t-2) + \beta_6 \text{trab3m}(t-2) + \beta_7 \text{tasaocup}(t-1) + \beta_8 \text{residuals}(t-1) + \varepsilon(t)$$

The equation above expresses the relationship between the employment rate at time t and lagged business perceptions regarding future sales (evtas3m), future sales prices (pvtas3m), national demand (dnac), projected future employment (trab3m), the lagged employment rate (tasaocup), and lagged residuals derived from autocorrelation correction.

4. Results

The results (Table 2) show that positive perceptions about future sales and service prices are consistently associated with a higher future

employment rate across all three models. In contrast, high perceptions of national demand have a negative relationship with the employment rate, suggesting a potential overconfidence that does not immediately translate into increased employment. The positive coefficients for lagged future sales perceptions suggest that when firms anticipate increased sales, they tend to hire more employees. This is consistent with the theory that optimistic expectations regarding sales growth encourage workforce expansion.

The positive coefficients for perceptions about future service prices indicate that companies expecting higher future prices are more willing to expand their workforce. This may be due to the expectation of higher future revenues that justify additional hiring.

Table 2: Results of the OLS, IV, and GMM Models.

Variable	OLS	IV	GMM
const	6.2845**	21.8650***	20.3784***
dnac_lag2	-0.0157	-0.0220*	-0.0222**
evtas3m_lag1	0.0088	0.0182**	0.0170**
inver3m_lag1	0.0055	0.0157*	0.0151**
pvtas3m_lag1	0.0008	0.0010	0.0020
pvtas3m_lag2	0.0101	0.0181***	0.0172***
residuals_lag1	-	0.7907***	0.7624***
tasaocup_lag1	0.8693***	0.5574***	0.5847***
trab3m_lag2	0.0234*	0.0331***	0.0272***
R^2	0.9476	0.9301	0.9365
AIC	260.5670	277.8820	270.5044
BIC	279.5226	298.9762	291.5987

Note: *p<0.1; **p<0.05; ***p<0.01

Source: Own elaboration based on survey data.

The results obtained from the OLS, IV, and GMM models show significant differences in the coefficients of the independent variables, highlighting the importance of selecting the appropriate model for this

type of analysis. In the OLS model, the constant coefficient is 6.2845**, indicating that in the absence of other variables, the employment rate is relatively low. However, when IV and GMM models are used, this coefficient increases significantly to 21.8650*** and 20.3784***, respectively, suggesting that these models better capture the variability explained by business perceptions. For the lagged variable of national demand (dnac_lag2), the coefficients are negative across all three models: -0.0157 in OLS, -0.0220* in IV, and -0.0222** in GMM. This suggests that high perception of lagged national demand is associated with a lower future employment rate, possibly due to overconfidence that does not translate into immediate hiring.

Lagged perceptions about future sales (evtas3m_lag1) show positive coefficients in all models, with 0.0088 in OLS, 0.0182** in IV, and 0.0170** in GMM. This indicates that optimistic expectations about future sales encourage employee hiring. For the lagged investment variable (inver3m_lag1), the coefficients are also positive: 0.0055 in OLS, 0.0157* in IV, and 0.0151** in GMM. This suggests that positive perceptions of future investment are associated with an increase in the employment rate, reflecting companies' preparation for expansion.

The coefficients of the lagged variable on future service prices (pvtas3m_lag1) are low and not significant in all three models, which may indicate that short-term price expectations do not have a direct impact on the employment rate. However, the coefficient of pvtas3m_lag2 is positive and significant in the IV and GMM models (0.0181*** and 0.0172***, respectively), suggesting that expectations of higher prices have a positive effect on the employment rate over longer periods. The model residuals (residuals_lag1) show a positive and significant coefficient in the IV and GMM models (0.7907*** and 0.7624***), indicating an important autocorrelated component that these models capture.

Regarding the lagged employment rate variable (tasaocup_lag1), it shows highly significant and positive coefficients in all models: 0.8693*** in OLS, 0.5574*** in IV, and 0.5847*** in GMM, indicating high persistence of the employment rate over time. Due to the greater number of significant parameters compared to the other models, the robustness and efficiency of the IV-GMM econometric model were assessed through additional testing using bootstrap sampling and sensitivity tests.

The bootstrap sampling method, proposed by Efron and Tibshirani (1993), was used to obtain coefficient estimates and their standard deviations by generating multiple resampled datasets from the original data. The model was adjusted for each of these resampled datasets. This allows estimation of the variability of the model coefficients. The bootstrap results show that the means and standard deviations of the coefficients are consistent with those obtained from the original model, reinforcing its robustness. Sensitivity tests were conducted by removing one observation at a time from the dataset and adjusting the model to the remaining subset. This allows for evaluating the influence of each observation on the model's results. The results of the sensitivity tests show that the means and standard deviations of the model coefficients are consistent, suggesting that the model results are not influenced by individual observations.

Although the AIC and BIC values are not the lowest for the GMM model, the number of significant parameters and the model's ability to correct for autocorrelation and heteroskedasticity support its selection as the most robust and consistent. Cross-validation, bootstrap sampling, and sensitivity tests demonstrated that the estimated coefficients are stable and reliable. The model was further evaluated through Wald tests and Granger causality tests to verify the significance and causality of the explanatory variables. These tests confirmed that lagged business perceptions of future sales, prices of goods and services, and national demand have a significant impact on the future employment rate in the Araucanía region.

5. Discussion

The study results confirm that past business perceptions significantly impact the future employment rate in the Araucanía region. The positive association between perceptions of future sales and service prices with the employment rate indicates that optimistic expectations about economic performance encourage proactive hiring decisions. This finding aligns with previous studies such as those by Khan and Upadhayaya (2019) and Dasgupta and Lahiri (1993), which demonstrated that business confidence can influence investment

and employment decisions, reflecting expectations about the future economic environment.

On the other hand, the negative coefficients for perceptions of national demand suggest that overconfidence in future demand may lead to less cautious hiring decisions. This result is consistent with research by Taylor and McNabb (2007) and Lahiri et al. (2016), who found that high perceptions of national demand do not always translate into immediate employment increases due to potential overestimation of future demand. Additionally, these findings reflect the studies by Leeper (1992) and Matsusaka and Sbordone (1995) on the relationship between consumer confidence and economic performance, suggesting that expectations significantly influence business decisions.

The robustness of the IV and GMM models in addressing issues of endogeneity and autocorrelation strengthens the validity of the findings. Lucas and Rapping (1969) and Phelps (1967) established that inflationary expectations influence employment and wage decisions, which aligns with the evidence that business expectations of future prices affect the labor market. Green (2022) and Hille and Schupp (2019) also found that expectations of service prices influence hiring, suggesting that firms adjust their staffing strategies based on anticipated future income.

The detailed analysis using the IV-GMM approach showed that perceptions of future sales, future investment, and service prices have significant and positive coefficients, indicating that companies anticipating better economic conditions tend to hire more personnel. The application of advanced econometric models such as ARDL, OLS, IV, and GMM follows methodologies established by authors such as Pesaran and Shin (1999) for ARDL, Wooldridge (2010) for OLS and IV, and Hansen (1982) for GMM, ensuring the robustness and consistency of the estimates. These approaches adequately address issues of endogeneity, heteroskedasticity, and autocorrelation in the data, providing a more solid interpretation of the effects of business perceptions on the future employment rate in the Araucanía region. Together, these results highlight the importance of monitoring and understanding business perceptions to improve employment strategies and economic policies in the Araucanía region. Business perceptions not only reflect current economic conditions but also expectations

about the future, which are crucial for strategic planning and business decision-making.

6. Conclusions

The results of this study underscore the importance of considering the measurement of past business confidence to analyze the future employment rate in the Araucanía region. The evidence suggests that optimistic expectations about future sales, increased investment, a higher number of workers, and service prices drive hiring decisions, while overconfidence in national demand may have adverse effects. These findings reinforce the relevance of using robust econometric models such as IV and GMM, which address problems of endogeneity and autocorrelation, providing more accurate estimates. Consequently, the need to closely monitor business perceptions is highlighted in order to formulate effective employment strategies and economic policies. The application of these methods in future studies will allow for a deeper understanding of the dynamics between business confidence and employment, contributing to regional economic development. These results also suggest that policies promoting greater transparency and economic stability can improve business perceptions and confidence, and consequently, the employment rate. Araucanía, with its particular economic dynamics, would especially benefit from studies that explore the relationship between transparency, expectations, business confidence, and employment, thus providing a solid foundation for regional economic policy and development strategies. Moreover, the need for continued research is emphasized to better understand how business expectations and confidence across different economic aspects interact and affect employment, which will significantly contribute to improved economic planning and public employment policies in the region.

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