

Exploratory Research into Government Regulation's Impact on Business-level Employment Growth

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Abstract

Recent structural reforms of the Australian economy have included a determination to reduce any excessive regulatory burden on businesses. Previous research has shown that the regulatory burden may adversely impact employment growth; however little empirical research has been conducted on the Australian context. This research, using the Australian Bureau of Statistics Business Longitudinal Database, finds mixed evidence for the impact of government regulation on employment. While no significant impact is found for job creation, this paper finds that government regulation has a disproportionate effect on job destruction for firms aged five years or less. For firms that report government regulation as a barrier to performance, the odds of a younger firm reporting job destruction are more than two times greater than for other firms. Given the dataset used, these findings mainly refer to small and medium sized businesses.

Keywords: Government regulation, Employment growth, Job creation, Job destruction, Australia, Small business

JEL classification: L5, L51, B52

1. Introduction

Below trend economic growth has increased interest in structural reforms to boost productivity, increase employment and competitiveness. One aspect of structural reform is regulatory reform that includes ensuring regulation is effective in achieving its intended outcomes and at a minimum cost (for example, lower compliance costs or reduced time interacting with a regulator). In particular, there has been renewed

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effort to reduce the overall impact of government regulation on business performance.¹ The drive to reduce the impact of government regulation on business has spread to many regions in the world, including Europe and North America (see, Wegrich, 2009; Greenstone, 2013; Canadian Government, 2012; and Chittenden, Kauser and Poutziouris, 2002).

There is anecdotal evidence in Australia of the cost of government regulation, however, there is limited empirical literature on the impact that government regulation has on business performance, and specifically employment. Examples of anecdotal evidence are given in various media reports on the issue (see, Lahey, 2005; Mazzarol, 2012; and Mitchell, 2014). This paper aims to address this gap in our knowledge by using an Australian Bureau of Statistics business longitudinal dataset. In particular, the paper estimates the firm level effect of regulation on job creation and job destruction. This is only one potential impact of regulation and needs to be compared with the benefits of a particular regulation, which are typically reviewed on a case by case basis.

The rest of this paper is broken down into four sections. A literature review reports how government regulation has been associated with business performance and specifically employment. The paper continues by examining through descriptive statistics how government regulation is associated with employment growth in Australia. The fourth section of the paper examines through an econometric analysis the impact of government regulation on employment growth. Finally, a conclusion summarises the main results and outlines possible next steps in research.

2. Literature Review and Theory

An institutional framework is the formal and informal rules within a country and an important part of this framework is regulation. New institutional economics illustrates how the long term prosperity of nations is influenced by this institutional framework (North, 1990). The institutional framework forms the incentive structure of countries, helping shape the growth trajectory of an economy. For example, empirical research has found that countries with less onerous regulation tend to grow faster (see, Loayza, Oviedo and Servén, 2004; and Djankov, McLiesh and Ramalho, 2006). Other research indicates that regulation thresholds, where firms have a large change in regulatory compliance for a particular firm size, can also create strong disincentives for firm growth (Garicano, Lelarge and Van Reenen, 2013).

Regulation can achieve desirable outcomes. This typically occurs when on balance the total benefits outweigh the total costs of regulation. Importantly, the benefits and costs of regulation may be distributed unevenly. For example, in some instances the cost of regulation may fall largely on businesses while benefits accrue to individuals. When discussing the effect of regulation on employment it is important to balance this specific effect with other potential impacts (such as improved health or environmental outcomes).

As Australian firms face continuing pressure from globalisation and structural change, excessive barriers on their capacity to act quickly and compete can cause important inefficiencies and increase their costs of doing business. In addition, any

¹ Government regulation here is synonymous with regulation and compliance costs.

changes to new or existing regulation may cause uncertainty amongst the business community. An increase in the cost of doing business as well as rising uncertainty may in turn cause firms to hire less people, lowering the overall level of employment. From a dynamic point of view, regulation may effect economic growth and employment through such areas as international competitiveness, entrepreneurship, the ability to develop and market new products, or productivity growth (Hall, 2013).

In the Australian context government regulation has been raised as a significant issue by business. For example, the Australian Chamber of Commerce and Industry found that 42.2 per cent of surveyed businesses estimate they spent more than \$10,000 complying with government regulations in the last year (ACCI, 2012). This is a significant amount of money especially for small or medium sized enterprises.

A crude measure of the burden of regulation on business, cited in a Productivity Commission (2007) report, looks at the increase in the volume of regulation over time. For example, between 2000 and 2004 as many pages of Commonwealth Government legislation was passed as during the period 1901 to 1969. International estimates of the cost of the administrative burden on business from government regulation are generally around two per cent of GDP, with the exception of the Netherlands (Productivity Commission, 2006).

Research typically finds that small to medium sized businesses are the most adversely affected by government regulation (Kitching, 2006). Australian taxation-focused research conducted by ATAX (1995) and Walpole *et al.* (1999) has shown that small businesses are significantly burdened with compliance costs, particularly in terms of the total number of hours taken up with compliance. The research found that 90 per cent of compliance costs are borne by small firms. More recent research demonstrates that smaller businesses' compliance costs as a percentage of sales are relatively higher than that of their larger counterparts, with more frequent reported difficulties in record keeping for taxation purposes and complying with Occupational Health and Safety laws (Lewis, Richardson and Corliss, 2015).

Lattimore *et al.* (1998) estimated the 'paperwork' compliance costs for Australian businesses to be approximately \$11 billion in 1994-95 (or 2.3 per cent of GDP) drawing on the results from a 1996 Small Business Deregulation Taskforce survey and Evans *et al.* (1997). Compliance costs were defined to include the costs of managers and staff time, costs of external advisers and incidental costs such as specific travel, stationary, postage and computer use. As part of an international study, the OECD (2001) estimated Australian compliance costs for small and medium enterprises (SMEs) – covering tax, employment and environmental regulation – to be approximately \$17 billion (2.9 per cent of GDP) in 1998. Lewis, Richardson and Corliss (2015) also estimated that the total cost to the Australian economy of regulation on small business is over \$10 billion. The authors defined compliance costs as the costs of becoming aware of, abiding by, and demonstrating compliance with, regulations.

Research indicates that the existing stock of regulation has a positive association with compliance costs (de Jong and Kloeze, 2013). The average firm in the authors' study faces compliance costs of approximately USD \$380,000 per year. Note that this sample includes Australian firms. Other important findings of this research include that a higher quality of regulation design reduces the companys costs

of regulatory compliance. Also the greater the predictability of regulatory application the lower the compliance costs.

Research has found that the impact of regulation on employment is typically small and has an ambiguous association (see, Coglianesi, 2013; and Coglianesi and Carrigan, 2014). Berman and Bui (2001) analysed the impact on manufacturing jobs of local air pollution regulations adopted in Southern California. The study found no substantive or statistically significant effects of local air pollution regulations on employment. Morgenstern, Pizer, and Shih (2002) evaluated whether reported spending by firms on environmental regulatory compliance correlated with changes in employment levels across four different industries. Two of the four sectors actually showed small, statistically significant increases in jobs in the face of increased regulatory compliance spending.

Walker (2011) found that overall employment in the more regulated sectors fell by about 15 per cent (relative to areas with less regulation) following the imposition of new clean air designations. Using other data and a different study design, Greenstone (2002) found a decrease on average of about 40,000 jobs per year in facilities located in non-attainment areas. Non-attainment areas are parts of the country declared to have 'dirty' air and therefore subject to more stringent air pollution requirements under the clean air act.

Regulation may impose a cost on job creation through reduced business entry. Job creation is mainly driven by small, young firms. If new business entry is slowed then job creation will be slowed (Haltiwanger, Jarmin and Miranda, 2010). For example, the average number of procedural steps needed to start a business in the sample by Djankov *et al.* (2002) was 10.48, taking at least 47.4 business days. These costs of regulation have been found to reduce the rate of new business entry (Ciccone and Papaioannou, 2007).

Research indicates, using data from 74 industrial and transition countries for the years 2000-2003, that anticompetitive business regulations affect the performance of the labour market. According to the regression results, they appear to increase unemployment rates and lower employment rates (Feldmann, 2008). For example, if Indonesia had the same flexibility in business regulation as Finland, its unemployment rate might have been 2.1 percentage points lower among the total labour force.

Theory

The impact of regulation on employment is ambiguous, however, in most explanations it is viewed as having a negative effect on employment (Mankiw, 2012). Regulation increases costs for the business and this leads to an increase in prices that the business charges to customers. In general, an increase in price will lead to a decrease in demand for the business goods and services. This leads to decreased revenue and lower production, and this leads to lower employment. Costs also take the form of allocative inefficiencies, where as a result of regulation, businesses change their behaviours and organise their factors of production to reduce costs while maintaining low prices for their goods and services (Lewis, Richardson and Corliss, 2015).

Regulation under particular circumstances may have a neutral or positive effect on employment (Morgenstern, 2000). If the regulation is employment intensive

and regular production is relatively less labour intensive, this may contribute to a net increase in employment. This in combination with a relatively inelastic demand for business goods and services may also contribute to positive gains in net employment.

Even when in some special circumstances regulation may lead to increased employment there are other potential economic losses to regulation (Hall, 2013). For example, there is a deadweight loss associated with the regulation's effect on production. There is also a deadweight loss associated with increased employment from regulation (related to compliance). However, regulation may still lead to a net benefit to society if the improved outcomes from regulation are greater than the aforementioned deadweight losses.

3. Descriptive Statistics

This research uses the Australian Bureau of Statistics Business Longitudinal Database (BLD) to analyse how Government regulation may effect employment for Australian businesses. The BLD was constructed from the ABS's yearly Business Characteristics Survey and is a longitudinal dataset that mainly refers to small to medium businesses. The BLD is split into three panels with the first starting in the financial year 2004-05 and ending in 2008-09; the second panel starting in 2005-06 and ending in 2009-10 and the third panel starting in 2006-07 and ending in 2010-11. The survey covers all major industries except Electricity, Gas, Water and Waste Services; Finance and Insurance Services; Public Administration and Safety; Education and Training; Health Care and Social Assistance and some Other Services.

Given this analysis focuses on small and medium enterprises, who are disproportionately affected by regulation, the hypothesis is that businesses that report an issue with Government regulation will be less likely to report job creation (and more likely to report job destruction).

The relevant question in relation to government regulation that is asked in the BLD is:

- Did any of the following factors significantly hamper other business activities or performance (Tick all that apply):
 - government regulation or compliance

The relevant question in relation to employment that is asked in the BLD is:

- Compared to the previous year, did any of the following decrease, stay the same or increase:
 - Total number of jobs or positions

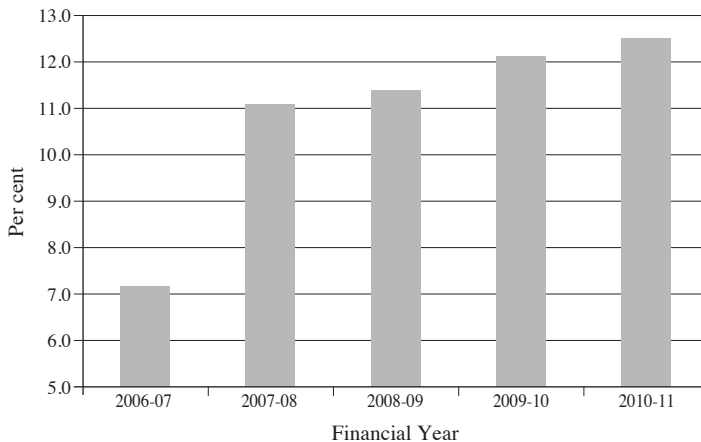
The employment variable of interest was only asked more than once in the second and third panel. The government regulation variable was asked in all waves. The questions were asked of a senior manager in the business. While these questions were asked in both panels, the two panels analysed are structurally different. The panels were stratified differently, with panel two stratified based on ANZSIC 1993 and panel three stratified based on ANZSIC 2006. This led to two more strata in panel three compared to panel two. The job destruction category of the panel two

employment question was only asked for the financial years of 2008-09 and 2009-10. This means that only two waves of panel two can be used in the job destruction analysis. Further, panel two was missing some valid controls required to isolate the effect of regulation, such as the age of firms, while also showing some inconsistent results in one of the waves, suggesting an inconsistency in data measurement. As a result, this paper will focus on panel 3.

Subjective measures of business performance are widely used in research and typically are interpreted as equivalent to objective measures. Research indicates that there is convergent validity, that the subjective measures are associated with corresponding objective measures (see, Wall *et al.* 2004; and Bommer *et al.* 1995). Discriminant validity and construct validity were also found to hold between subjective and objective measures of business performance.² This would suggest that it is valid to use subjective measures of employment change, even if this is not ideal.

As shown in figure 1, government regulation has become an increasing problem for business performance over time. For example, 7.1 per cent of businesses reported government regulation as hampering their performance in the 2006-07 financial year. This has increased to 12.5 per cent in 2010-11.

Figure 1 - Per cent of Businesses that Report Government Regulation as Negatively Impacting on Business Performance



Note: Normal units and non-respondents removed. Figures are weighted.

² Discriminant validity: for example, the relationship between subjective and objective measures of productivity, and between subjective and objective measures of profit, should be stronger than the relationships between subjective measures of productivity and profit or between objective measures of productivity and profit. Construct validity: the relationships of subjective and objective company performance measures with a range of independent variables were equivalent.

Table 1 shows business that report an issue with government regulation are more likely to report job destruction. For example, in the 2009-10 financial year 28.1 per cent of businesses that report an issue with government regulation also report job destruction. This compares with only 15 per cent of businesses with no government regulation issues.

Table 1 - Percentage of Businesses That Report Job Destruction by Government Regulation's Impact on Business Performance

<i>Financial year</i>	<i>No government regulation issue</i>	<i>Government regulation is an issue</i>
2008-09	15.5	22.9
2009-10	15.0	28.1
2010-11	18.3	25.0

Note: Normal units. Removed non-respondents. Figures are weighted.

Notably, as shown in table 2, an association is found when comparing government regulation to job creation. Firms reporting an issue with regulation are more likely to report job creation. For example, 8.4 per cent of businesses reporting job creation in the 2008-09 financial year reported no government regulation issue. This compares with 11.6 per cent of businesses reporting job creation and an issue with government regulation.

Table 2 - Percentage of Businesses That Report Job Creation by Government Regulation's Impact on Business Performance

<i>Financial year</i>	<i>No government regulation issue</i>	<i>Government regulation is an issue</i>
2008-09	8.4	11.6
2009-10	12.2	19.6
2010-11	7.8	12.8

Note: Normal units. Removed non-respondents. Figures are weighted.

A longitudinal analysis is important as it may show how a change in circumstances in relation to government regulation can affect firm performance. This analysis uses a comparison between two different situations:

- The first situation looks at businesses that report no government regulation issues in two consecutive financial years.
- The second situation is represented by businesses initially reporting no government regulation issues and then in the following financial year reporting an issue with government regulation.

Table 3 shows how government regulation as an issue across financial years interacts with the likelihood of reporting job creation compared to the previous year. Taking the initial year as 2007-08, when government regulation is not hampering business performance in both financial years, 13.7 per cent of businesses report job

creation. This compares with 14 per cent of businesses reporting job creation when government regulation moves from a non-issue in period one to becoming an issue in period two. Looking at this result along with the two other comparisons, we can see that the effects are ambiguous and negligible.

Table 3 - Percentage of Firms that Report Job Creation Compared to the Previous Year when Government Regulation becomes an Issue and when Government Regulation is Never an Issue

<i>Financial years</i>	<i>Government regulation not hampering in both periods</i>	<i>No problem in period 1, government regulation hampering in period 2</i>
2007-08 to 2008-09	13.7	14.0
2008-09 to 2009-10	16.2	17.2
2009-10 to 2010-11	13.5	13.2

Note: All units. Removed non-respondents. Figures are unweighted.

Table 4 shows how government regulation as an issue across financial years increases the likelihood of reporting job destruction compared to the previous year. Taking 2007-08 as the initial year, when government regulation is not hampering business performance in both financial years, 20 per cent of businesses report job destruction. This compares with 28 per cent of businesses reporting job destruction when government regulation moves from a non-issue in period 1 to becoming an issue in period 2. A similar association is apparent across the two other comparisons.

Table 4 - Percentage of Firms that Report Job Destruction compared to the Previous Year when Government Regulation becomes an Issue and when Government Regulation is Never an Issue

<i>Financial years</i>	<i>Government regulation not hampering in both periods</i>	<i>No problem in period 1, government regulation hampering in period 2</i>
2007-08 to 2008-09	20.0	28.0
2008-09 to 2009-10	19.0	20.9
2009-10 to 2010-11	18.5	24.6

Note: All units. Removed non-respondents. For panel 2 and panel 3 of the BLD. Figures are unweighted.

4. Regression Analysis

The regression analysis used two binary logit models, one for job creation and another for job destruction. Binary logit models are used because different processes are driving job creation versus job destruction within businesses. Following the Baum, Calabrese and Silverman (2000) approach, this study used Heckman's (1979) procedure to generate an inverse Mill's ratio that was then included in each regression model to control for attrition.

Variables

The dependent variable measuring employment change for the two binary logit regression models is as follows:

- 0 if the total number of jobs or positions has stayed the same compared to the previous year or
- 1 if the total number of jobs or positions has increased/declined compared to the previous year (for job creation and job destruction respectively).

The independent variable of interest is the same variable that was used for the descriptive analysis:

- Did any of the following factors significantly hamper other business activities or performance (Tick all that apply):
 - government regulation or compliance.

This is a binary variable, equal to 1 if a business perceived government regulation or compliance as significantly hampering other business activities or performance, and equal to zero otherwise.

Consistent with employment change analysis, whereby smaller businesses are expected to grow more quickly relative to larger businesses, it is necessary to include a lagged control variable for the size of the business at the beginning of the panel (see, Lewis, Richardson, and Corliss, 2015; and Davidsson *et al.* 2002). It is also likely that larger firms will experience more employee turnover, meaning that the employment changes for large firms may be arbitrary. Three binary control variables for business size at the beginning of the panels will be included – those with no employed workers; those with one to four workers; and those with five to 19 workers. Those businesses employing more than 19 workers will act as the reference group. Relative to the reference group, we would expect to see an increased likelihood of job creation in smaller firms and an increased likelihood of job destruction in larger firms.

Lewis, Richardson, and Corliss (2015) identified that smaller businesses are disproportionately affected by regulation due to a lowered capacity to comply and lower efficiencies in dealing with regulation. As such, an interaction term will be included between the regulation variable and each of the firm size variables. We would expect these interactions to show that smaller firms have a decreased likelihood of experiencing job creation as a result of regulation relative to larger firms. We would also expect that smaller firms have an increased likelihood of experiencing job destruction as a result of regulation relative to larger firms.

As indicated by Davidsson *et al.* (2002), the age of a business is a required control as older businesses are expected to grow more slowly. Further, older businesses are likely to have more experience in dealing with compliance to regulation and be less affected by regulation (de Jong and Kloeze, 2013). This analysis will therefore include controls for the age of a business, namely binary control variables for, those firms aged five years or less; those aged six years to 10 years; and those aged 11 years to 15 years. Those aged greater than 15 years will act as the reference group.

To analyse the differing effects of regulation between firms of different ages, an interaction term will be included between the regulation variable and each of the age variables. If regulation does disproportionately impact younger businesses,

we would expect to see, relative to the reference group, those younger businesses, on average, experiencing a decreased likelihood of job creation and an increased likelihood of job destruction.

Following regression analysis by de Jong and Kloeze (2013) and others, industry is added as a control variable. Regulation differs between industries and the relative magnitude of regulation may be considered greater in some industries. Employment conditions may also be different between industries and job creation and job destructions effects are likely to not be homogenous. Table 5 includes a full list of the industry controls used in the regression.

Table 5 - Industry Variables included in Regression

<i>Industries</i>
Agriculture, Forestry and Fishing
Mining
Manufacturing
Construction
Wholesale Trade
Retail Trade
Accommodation and Food Services
Transport, Postal and Warehousing
Information Media and Telecommunications
Rental, Hiring and Real Estate Services
Professional, Scientific and Technical Services
Administrative and Support Services
Arts and Recreation Services
Other Services (Reference group)

In line with other research, an innovation variable is included as innovative activities are likely to impact job creation and destruction within firms (Soames, Bruncker and Talgaswatta, 2011). This variable indicates if firms have introduced any new or substantially improved goods or services within a given year. It has been lagged by one period as innovation generally positively impacts business performance with some delay (see, Soames, Bruncker and Talgaswatta, 2011; Gronum, Verreyne and Kastle, 2012). To mitigate any omitted variable bias in the regulation variable of interest, it is necessary to control for other factors that may impact the number of jobs or positions. General business performance is likely to drive a business' demand for labour and as such, reported level of sales has been included, in its logarithmic transformation, as a control.

Australian businesses have identified a range of perceived barriers to business performance, including regulation (Australian Bureau of Statistics, 2013). In order to mitigate any other biases, these other barriers to business performance should be controlled for in the regression. As is the case for the variable of interest, these barriers were identified in the BLD through the same question:

- Did any of the following factors significantly hamper other business activities or performance (Tick all that apply).

³ Normal units do not include businesses that are dying or have died. It also omits those businesses that are out of scope or become out of scope.

These control variables include, a lack of customer demand for goods and services; and lowering of profit margins to remain competitive. These are both binary variables, equal to 1 if a business perceived that barrier as significantly hampering other business activities or performance, and equal to zero otherwise.

There were a number of tests undertaken to ensure the robustness of the results:

- All datasets under analysis are limited to normal units.³ Furthermore, the dataset has been cleaned to eliminate firms for non-response in either the dependent or independent variables.
- The log-likelihood chi square is used to test to see if the model as a whole is statistically significant. All models presented were found to be statistically significant.
- No evidence of multicollinearity is found for our independent variables for all regressions presented.

Results

Odds ratios are reported in table 6 in relation to job creation and job destruction. The main variable of interest does not show any significant effects within either regression. Taken alone, this indicates that regulation does not influence the employment growth of a firm. This is contrary to much of the existing theory and research presented in this paper, which shows that regulation negatively impacts employment. However, there is also the position that some regulation might be more labour intensive than other types of regulation and therefore result in positive employment effects (Morgenstern, 2000). As we have not differentiated between types of regulation, this might be affecting our results.

The secondary variables of interest include the interaction terms between firms' age and the regulation variable. An interesting result is that, when interacted with regulation, firms aged five years or less are significantly more likely to experience job destruction. This odds ratio is showing, all else equal, the increased likelihood of job destruction for those firms who are five years or less in age and who have indicated government regulation is a barrier to business performance, relative to all other firms.

Table 7 includes the two different effects that exist within the age and regulation interaction for job destruction. For those firms that report government regulation as a barrier to business performance, firms aged five years or younger are 3.2 times more likely to report job destruction than firms of all other ages. This effect is significant at the 1 per cent level. For those firms that are aged five years or less, firms that report government regulation as a barrier to business performance are 2.3 times more likely to experience job destruction relative to those firms that do not report government regulation as a barrier. This is significant at the five per cent level. This result is in line with research presented in this paper, whereby younger firms are disproportionately affected by regulation, due to less experience with the required compliance (de Jong and Kloeze, 2013).

The other regulation interactions of interest, those with other ages of firms and sizes of firms, reveal no significant effects. Despite research finding that smaller firms are increasingly burdened by regulation, this effect is not present here, which is most likely due to the dataset being comprised of small and medium sized firms. Additionally, inclusion of the inverse Mill's ratio (λ) is insignificant in both

regressions, meaning that attrition was not related to the likelihood of reporting job creation or job destruction.

A number of control variables significantly predict both job creation and job destruction, which is in line with what was expected. Firstly, the size of a firm significantly predicts if a business will experience job destruction, with bigger effects for larger firms. Secondly, the age of a firm shows that small to medium size firms are associated with increased odds of experiencing job creation. Firm performance, as measured through level of sales, is also a significant predictor of both job creation and job destruction, with the direction of the effects in line with expectations. Further, the lagged innovation variable is the biggest predictor in the probability of reporting job creation, showing positive effects on job creation. Finally, the barrier control variables also show results as expected, with decreased odds associated with job creation and increased odds associated with job destruction.

Not reported in table 6, the industry control variables showed that the retail and agriculture, forestry and fishing industries were significant at the one per cent level, and were associated with a decrease in odds of job creation and job destruction respectively.

Table 6 - Odds Ratios of Binary Logits of Job Creation and Job Destruction by Firm Characteristics

Variable	Job creation		Job destruction	
	Odds Ratio	Robust Standard Error	Odds Ratio	Robust Standard Error
Non-employed businesses (at time of first observation)	1.530	0.418	2.151 ***	0.485
1 to 4 workers (at time of first observation)	1.533	0.514	3.789 ***	1.022
5 to 19 workers (at time of first observation)	1.840	0.705	6.789 ***	2.071
Non-employed businesses x Government regulation	0.917	0.557	0.749	0.338
1 to 4 workers x Government regulation	1.112	0.650	0.889	0.407
5 to 19 workers x Government regulation	0.912	0.556	0.791	0.362
Age 5 years or less	1.752 ***	0.317	1.000	0.167
Age 6 years to 10 years	1.575 ***	0.261	1.249	0.185
Age 11 years to 15 years	1.104	0.237	1.191	0.200
Age 5 years or less x Government regulation	1.261	0.628	2.285 **	0.808
Age 6 years to 10 years x Government regulation	1.759	0.628	1.216	0.399
Age 11 years to 15 years x Government regulation	0.741	0.401	1.143	0.400
Exporter	1.335 *	0.211	1.223	0.170
Foreign ownership	0.837	0.231	1.299	0.302
Log sales	1.588 ***	0.084	0.922 **	0.035
New goods or services (lag)	1.814 ***	0.223	1.217 *	0.143
Government regulation	1.095	0.625	1.414	0.627
Lack of customer demand for goods and services	0.639 ***	0.102	2.044 ***	0.226
Lower profit margins to remain competitive	1.024	0.129	1.596 ***	0.165
Lambda (inverse Mills ratio)	0.849	0.697	1.535	0.987
N		3170		3410
Log likelihood		-1267.0217		-1673.0013

* 10% significance level; ** 5% significance level; *** 1% significance level. Year dummies are included in the concatenated regression. In the concatenated regression errors are clustered around the ABSID. For the full list of regression results please email authors. All results are rounded to the third decimal place. Run in STATA.

Table 7 - Differentiation of Effects within the 'age 5 years or less' and 'Government Regulation' Interaction

	<i>Odds Ratio</i>	<i>Robust Standard Error</i>
Difference between those aged 5 years or less and all other businesses (when 'government regulation' = 1)	3.171***	1.379
Difference between those who reported government regulation as a barrier and those who did not (when 'aged 5 years or less' = 1)	2.256**	0.730

Panel Data Models

A significant advantage of using panel data is the ability to, at least in part, control for unobserved heterogeneity. Research on firm performance using panel data has utilised both random effects and fixed effects methods to control for unobserved factors (Pendell and Boland 2005; Hawawini *et al.* 2001).

In all cases when a hausman test was run for both a fixed effects model and a random effects model, the test found that the unique errors were correlated with the regressors, which suggests the fixed effects model should be examined. However, in all of the fixed effects models there were almost no statistically significant variables. A key reason is that the fixed effects models dropped a significant amount of observations and resulted in small sample sizes (690). Furthermore, as the regression model's dependent variables are specified as a discrete change on the previous year, this reduces the likelihood of finding a significant association through a fixed effects model. The available data was restricted by groupings, and as such, a discrete modelling technique needed to be used.

While caution must be observed when interpreting the previous results that do not control for unobserved factors, if data on employment change would be available as a continuous variable, it would allow for different modelling techniques. Indeed, the exploratory research in this paper suggests that modelling using these panel techniques on a continuous dependent variable is an area of possible future research.

5. Discussion and Conclusion

In regards to the hypothesis made earlier, this paper finds that, for many businesses, government regulation tends to have no observable impact on the job creation and job destruction rates of firms. The paper, however, does find a concentrated effect on job destruction for firms that are aged five years or less. Of those firms that report an issue with government regulation, firms aged five years or less are 3.2 times more likely to experience job destruction than those older firms. Further, of those firms that are aged five years or less, firms that report government regulation as a barrier are 2.3 times more likely to experience job destruction relative to those firms that don't report regulation as a barrier. This result is consistent with other research that shows younger firms are disproportionately burdened by government regulation, relative to older firms (Lewis, Richardson and Corliss, 2015).

The impact of regulation on employment also potentially varies according to the business cycle or sales growth in the industry. Indeed, lack of customer demand

remains central to the probability of firm-level job creation and job destruction. Due to data limitations in this analysis, this level of analysis could not be included.

Simple random effects and fixed effects logistic models were run in an attempt to control for individual heterogeneity. While the panel data analysis preferred the fixed effects model, given the drop in sample size, virtually none of the independent variables were statistically significant. Models that use a different measure of employment, not publicly available in the data set used, are a possible area of future research.

References

- ACCI (2012), 'ACCI national red tape survey', Australian Chamber of Commerce and Industry, Canberra, Australia.
- ATAX (1997), *A Report in to the Taxpayer Costs of Compliance*, Australian Taxation Office, Canberra, Australia.
- Australian Bureau of Statistics (2013) 'Barriers to Innovation and General Business Activity', 8167.0, ABS, <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/8167.0Main+Features12011-12?OpenDocument>.
- Baum, J.A.C., Calabrese, T. and Silverman, B.S. (2000), 'Don't Go It Alone: Alliance Network Composition and Startups' Performance in Canadian Biotechnology', *Strategic Management Journal*, 21, 267-294.
- Berman, E. and Bui, L.T.M. (2001), 'Environmental Regulation and Labor Demand: Evidence from the South Coast Air Basin', *Journal of Public Economics*, 79, 265-95.
- Bommer, W., Johnson, J., Rich, G., Podsakoff, P. and Mackenzie, S. (1995), 'On the Interchangeability of Objective and Subjective Measures of Employee Performance: A Meta-Analysis', *Personnel Psychology*, 48(3), 587-605.
- Canadian Government (2012), 'Red Tape Reduction Action Plan', Treasury Board of Canada Secretariat, Canada.
- Chittenden, F., Kausar, S. and Poutziouris, P. (2002), 'Regulatory Burdens of Small Business: A Literature Review', Sheffield: Small Business Service.
- Chriten, M. and Gatignon, H. (2011), 'Estimating the Performance Effect of Strategic Variables Which Vary Little Over Time', Working Paper.
- Ciccone, A. and Papaioannou, E. (2007), 'Red Tape and Delayed Entry', *Journal of European Economic Association*, 5(2-3), 444-458.
- Coglianesi, C. (2013), 'Regulation and Unemployment', Penn-Whaton Public Policy Initiative Issue Brief (March).
- Coglianesi, C. and Carrigan, C. (2014), 'The Jobs and Regulation Debate', in Coglianesi, C., Finkel, A.M. and Carrigan, C. (ed.), 'Does regulation kill jobs?', University of Pennsylvania Press, Pennsylvania.
- Connolly, E. and Lewis, C. (2010), 'Structural Change in the Australian Economy', Reserve Bank of Australia Bulletin, September, 1-9.
- Davidson, P., Kirchoff, B., Hatemi-J, A. and Gustavsson, H. (2002), 'Empirical Analysis of Growth Factors Using Swedish Data', *Journal of Small Business Management*, 40(4), 332-349.
- Djankov, S., McIesh, C. and Ramalho, R. (2006), 'Regulation and Growth Manuscript', The World Bank, Washington D.C.

- Djankov, S., La Porta, R., Lopez-de-Silanes, F. and Shleifer, A. (2002), 'The Regulation of Entry', *Quarterly Journal of Economics*, 117(1), 1-37.
- de Jong, G. and Kloeze, R. (2013), 'Institutions and the Regulation of Business – An International Firm-Level Study of Regulatory Compliance Costs', *American Journal of Industrial and Business Management*, 3, 1-11.
- Feldmann, H. (2008), 'Business Regulation and Labor Market Performance Around The World', *Journal of Regulatory Economics*, 33(2), 201-235.
- Garicano, L., Lelarge, C. and Van Reenen, J. (2013), 'Firm Size Distortions and the Productivity Distribution: Evidence from France', CEPR Discussion Paper 9495, forthcoming.
- Greenstone, M. (2002), 'The Impacts of Environmental Regulations on Industrial Activity: Evidence from the 1970 and 1977 Clean Air Act Amendments and the Census of Manufacturers', *Journal of Political Economy*, 110, 1175-219.
- Greenstone, M. (2013), 'Eliminating Unnecessary and Costly Red Tape Through Smarter Regulations', Transcript Before the Joint Economic Committee USA.
- Gronum, S., Verreyne, M. and Kastle, T. (2012), 'The Role of Networks in Small and Medium-Sized Enterprise Innovation and Firm Performance', *Journal of Small Business Management*, 50(2), 257-282.
- Hall, K. (2013), 'The Employment Costs of Regulation', Working paper No. 13-06, George Mason University.
- Hawawini, G., Subramanian, V. and Verdin, P. (2003), 'Is Performance Driven by Industry-or Firm -Specific Factors? A New Look at the Evidence', *Strategic Management Journal*, 24, 1-16.
- Haltiwanger, J.C., Jarmin, R.S. and Miranda, J. (2010), 'Who Creates Jobs? Small Vs. Large Vs. Young', NBER Working Paper Series, Working Paper 16300.
- Healy, J., Mavromaras, K. and Sloane, P.J. (2012), 'Skill Shortages: Prevalence, Causes, Remedies and Consequences for Australian Businesses', National Vocational Education and Training Research and Evaluation Program, Monograph Series 09/2012.
- Heckman, J.J. (1979), 'Sample Selection Bias as a Specification Error', *Econometrica*, 47, 153-161.
- Kitching, J. (2006), 'A Burden on Business? Reviewing the Evidence Base on Regulation and Small Business Performance', London: Kingston University Research Repository.
- Lahey, K. (2005) 'Red Tape on a Roll and it Must Stop', The Age, accessed 10/04/14 (<http://www.bca.com.au/newsroom/red-tape-on-a-roll-and-it-must-stop>).
- Lattimore, R., Madge, A., Martin, B. and Mills, J. (1998), *Design Principles for Small Business Programs and Regulations*, Productivity Commission Staff Research Paper, AusInfo, Canberra, August.
- Lewis, P., Richardson, A. and Corliss, M. (2015), 'Compliance Costs of Regulation for Small Business', *Journal of Business Systems, Governance & Ethics* 02/2015, 9(2), DOI: 10.15209/jbsge.v9i2.715.
- Loayza, N.V., Oviedo, A.M. and Servén, L. (2004), 'Regulation and Macroeconomic Performance', World Bank Policy Research Working Paper No. 3469
- Mankiw, N.G. (2012), *Principles of Microeconomics*, Mason, OH: South-Western, Cengage Learning.

- Mazzarol, T. (2012), *What is Red Tape and Why is it a Problem For Small Firms?*, The Conversation, accessed 10/04/14, (<http://theconversation.com/what-is-red-tape-and-why-is-it-a-problem-for-small-firms-6601>).
- Mitchell, J. (2014), *Red Tape Curbing Growth: QBE*, The Adviser, accessed 10/04/14, (<http://www.theadviser.com.au/breaking-news/29995-red-tape-curbing-growth-qbe>).
- Morgernstern, R.D., Pizer, W.A. and Shih, J. (2000), *Jobs versus the Environment: An Industry-level Perspective*, Discussion Paper 99-01-REV, Resources for the future.
- Mundlak, Y. (1978), 'Pooling of Time-series and Cross-section Data', *Econometrica*, 46(1), 69-85.
- North, D. (1990), *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, Cambridge.
- Pendell, D. and Boland, M. (2005), *Persistence of Profitability in Family-Owned Food Businesses*, American Agricultural Economics Association Annual Meeting, Providence, Rhode Island, July 25-27, 2005.
- Productivity Commission (2013), 'Looking Back on Structural Change in Australia: 2002-2012', Supplement to *Annual Report 2011-12*, Canberra.
- Soames, L., Bruncker, D. and Talgaswatta, T. (2011), *Competition, Innovation and Productivity in Australian Businesses*, Australian Bureau of Statistics, Research Paper.
- Walker, W.R. (2011), 'Environmental Regulation and Labor Reallocation: Evidence from the Clean Air Act', *American Economic Review: Papers and Proceedings*, 101, 442-47.
- Wall, T., Michie, J., Patterson, M., Wood, S., Sheehan, M., Clegg, C. and West, M. (2004), 'On the Validity of Subjective Measures of Company Performance', *Personnel Psychology*, 57(1), 95-118.
- Walpole, M., Evans, C., Ritchie, K., and Tran-Nam, B. (1999), 'Taxation Compliance Costs: Some Lessons from 'Down Under'', *British Tax Review*, 4, 244-271.
- Wegrich, K. (2009), *The Administrative Burden Reduction Policy Boom in Europe: Comparing Mechanisms of Policy Diffusion*, CARR Discussion Papers, DP 52, London School of Economics and Political Science, London.