

**The Impact of Wage Subsidies on  
Jobseekers' Outcomes and Firm  
Employment**

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**Abstract**

The study examines the impact of wage subsidies on assisted jobseekers and on the firms that employ them, using propensity matching methods. Overall we find that starting a subsidised job leads to significant employment and earning benefits for assisted jobseekers over several years. Subsidised workers are disproportionately hired into expanding firms, though we cannot determine whether the expansion would have occurred in the absence of the subsidy.

**JEL codes**

J08, J38, J64

**Keywords**

Wage subsidy, active labour market policies, propensity matching

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## **EXECUTIVE SUMMARY**

Wage subsidies are commonly used to assist disadvantaged jobseekers into employment. If effective they can contribute to reducing long-term benefit dependence.

The current study examines the impact of wage subsidies on assisted jobseekers and on the firms that employ them. It focuses mainly on hiring subsidies granted over the period of January 2003 to December 2007 and outcomes up to December 2010.

Overall we find that starting a subsidised job leads to significant employment and earning benefits for assisted jobseekers over several years. Subsidised workers are disproportionately hired into expanding firms, though we cannot determine whether the expansion would have occurred in the absence of the subsidy.

### **Research questions and contribution**

The study addresses two main questions:

- a) What impact do wage subsidies have on subsequent outcomes for assisted jobseekers? We consider a range of outcomes, including subsequent employment, earnings, and benefit dependency.
- b) How do firms adjust their employment levels, and the employment of unsubsidised workers when taking on a subsidised worker?

The novel contributions of the current study are twofold:

- It extends previous evaluations of wage subsidy programmes by examining employment outcomes in addition to the more commonly examined measure of being off-benefit.
- It provides new evidence on whether the gains for assisted jobseekers are achieved by placing them in previously filled jobs or in new jobs.

Impacts are estimated by comparing outcomes for jobseekers and firms with the outcomes of matched comparison groups with the same characteristics. Matching is done using the method of propensity score matching.

### **Main findings: Impacts on jobseekers**

Receiving a wage subsidy improves labour market outcomes for recipients, with impacts still evident after 72 months. Improvements are evident as greater employment and income, and lower benefit dependence. The benefits are evident for a wide range of recipients.

- Subsidised jobs usually last longer than the subsidy. About 60 percent of subsidised jobs continue after the subsidy ends, with 33 percent lasting up to 6 months more and 19 percent lasting 12 months more. Jobs are more likely to continue after a longer subsidy spell. Following a 6-month subsidy, 40 percent of jobs last a further 12 months.
- Those who start a subsidised job are much more likely to be in unsubsidised employment and less likely to be receiving main benefits



over the subsequent 3 years than those who do not start a subsidised job. Differences between participants and the matched comparisons decline over time. Impacts on employment are larger than on subsequent benefit receipt.

- Twelve months after starting a subsidy, participants are 26 percent more likely to be employed and 24 percent less likely to be receiving benefit.<sup>2</sup>
  - Three years after starting a subsidy, participants are 13 percent more likely to be employed and 10 percent less likely to be receiving benefits.
  - During the 3-year period following a subsidy start, participants spend 6 more months employed, 5 fewer months receiving benefit, and earn \$20,200 more than matched comparisons.
  - A subset of jobseekers are observed 7 years after starting a subsidy. At that point, participants are 8 percent more likely to be employed and 5 percent less likely to be receiving benefits. During the 7-year period, they spend 11 more months employed, 9 fewer months receiving benefit, and earn \$34,900 more than matched comparisons.
- The favourable impacts of subsidies are evident for a wide range of sub-groups defined by demographic characteristics (age, gender, and ethnicity), the type of benefit received, and benefit duration.
    - Those who had been on-benefit for 4 years or more experience much greater benefits than those who had been on-benefit for less than 6 months.
    - Jobseekers aged over 45–64 experience greater benefits than those aged under 45.
    - Subsidies were very effective for those receiving Domestic Purposes, Sickness, or Invalid’s benefits, including long-term recipients.

## **Main findings: Impacts on firms**

### ***Patterns of subsidy use by firms***

For most firms, taking on a subsidised worker is an isolated event. Most firms hire only one new subsidised worker at a time, and employ only a few subsidised workers during the 2003-2007 period.

Firms that hire subsidised workers:

- are larger than the average comparison firm

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<sup>2</sup> We use the term ‘employed’ to refer to those who are in unsubsidised employment and not receiving main benefits, and the term ‘on-benefit’ to refer to Work & Income assistance in the form of main benefits or wage subsidies. Main benefits include the Unemployment; Sickness; Invalid’s; Independent Youth; Training; Domestic Purposes; and Widow’s Benefit; they do not include supplementary assistance, like the Accommodation Supplement, or IRD tax credits.

- have higher employment growth, higher turnover, and are slightly younger
- have a higher share of their workforce who are young or male, or have monthly earnings below the lower quartile.

Subsidy use is relatively low in agriculture and in professional and technical services industries, and relatively high in construction services, food and beverage services, and food product manufacturing.

### ***Employment impacts of wage subsidy use by firms***

Firms hiring a subsidised worker generally increase employment at the time of hiring. Subsidised workers do not replace existing workers but we cannot determine whether the subsidised jobs would have existed in the absence of the subsidy.

- Firms hiring subsidised workers increase their total employment relative to matched comparison firms.
- The impact on employment is generally larger than the number of subsidised workers hired. On average, firms with 50 or fewer employees hire 1.1 subsidised workers and increase their total employment by 1.4.
- The exception is that very small firms (5 or fewer employees) expand employment by slightly less than the number of subsidy hires. Overall, there is little evidence that employers are claiming subsidies to fill routine vacancies.
- Subsidised workers are disproportionately hired into expanding firms. We are unable to determine how big the expansion would have been in the absence of subsidies, and therefore cannot isolate whether subsidies stimulate employment growth.
- Subsidised firms continue to have higher employment levels than matched comparison firms for at least 36 months after a subsidy hire, though the size of the difference declines over time. The retention of subsidised workers after the end of their subsidy contributes significantly to the employment effect.

### **Data sources**

The study was made possible by the availability of linked beneficiary, employment, and business data that are part of Statistics New Zealand's prototype Integrated Data Infrastructure. The data were accessed under conditions that meet the stringent protections of the Statistics Act 1975 and the Tax Administration Act 1994. A detailed disclaimer is included on page ii. .



# 1. INTRODUCTION

Wage subsidies are a commonly used form of active labour market policies to assist disadvantaged jobseekers into employment. Between 2003 and 2007, subsidies were paid for about 50,000 jobs at an average cost of \$3,000<sup>3</sup>. In 2007, a subsidy of up to \$16,900 per jobseeker was available, although in most cases subsidies were less than \$5,000. In recent years, the focus of employment assistance has moved more towards providing training assistance, and at targeting youth, though the use of wage subsidies is still significant. The *Flexi-wage* policy that came into force on 1 July 2012 as part of the \$62 million *Job Streams* package offers a subsidy of up to \$21,060 per year to employers who take on beneficiaries at highest risk of staying on-benefit long term.<sup>4</sup> Current policy is increasingly focused on reducing long-term benefit dependence. Given the costs associated with long-term benefit dependence, to beneficiaries as well as to the Government, there is a clear interest in policies such as wage subsidies that have the potential to assist long-term beneficiaries into employment.

The focus of the current paper is on the impacts of job subsidy policies on the employment of subsidised jobseekers and on the firms that employ them. Previous studies in New Zealand have found that wage subsidies are effective in moving jobseekers out of unemployment (Maré 2002) or off benefit (Johri et al. 2004; de Boer 2003). Survey evidence (Department of Labour 1985; New Zealand Employment Service 1994) suggests that wage subsidies improve the subsequent employment prospects of assisted jobseekers. The current study focuses on the impacts of wage subsidies granted between 2003 and 2007. The largest single wage subsidy programme over this period was *Job Plus*, which has also been the focus of previous studies of subsidy effectiveness in New Zealand.

The key original contributions of the current study are twofold. First, it extends previous New Zealand studies of the impact of subsidies on jobseeker outcomes by examining the impacts on subsequent employment and earnings, in addition to the impacts on unemployment and subsequent benefit receipt. Second, it presents evidence on the impacts of wage subsidies on employment in the firms that hire subsidised workers. It thus provides evidence on whether the gains for assisted jobseekers are achieved by placing them in previously filled jobs or in new jobs.

Our study makes use of data from Statistics New Zealand's prototype Integrated Data Infrastructure (IDI), which contains relevant administrative and survey information for a broad set of New Zealand workers and firms. This enables us to estimate the impacts of wage subsidies by comparing outcomes for assisted workers and firms with those of comparison groups with similar characteristics. Comparison groups are defined using the method of propensity score matching.

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<sup>3</sup> Johri et al. (2004) report that 19,051 people were assisted by *Job Plus* in 2003. The corresponding number from the Integrated Data Infrastructure (IDI) is 14,538 people (with 15,264 subsidy starts). For the fiscal year 2002/2003, IDI shows 15,804 starts for 15,555 people. A 2007 Parliamentary Question (PQ 13452) reports that 17,043 jobseekers were assisted in *Job Plus* or *Skills Investment Subsidy*.

<sup>4</sup> Bennett, Hon Paula (2012) 'Press release: Government announces Job Streams' <http://www.national.org.nz/Article.aspx?articleId=38731>

The next section outlines the expected impacts of wage subsidy programmes. This is followed by a discussion of the key features of the wage subsidy programmes that are evaluated. We then summarise the data and methods that we use, before presenting our estimates of the impacts of wage subsidies on assisted jobseekers and on the firms that employ them. We conclude with a discussion of our findings.

## 2. BACKGROUND

Most wage subsidy evaluations focus on the impact of the subsidy on the prospects of the subsidised worker.<sup>5</sup> This focus is appropriate given that the primary aim of wage subsidy policies is generally to help unemployed jobseekers into work.

These gains may, however, come at the cost of other workers or jobseekers. Effective design and delivery of wage subsidy programmes seeks to limit the costs of subsidies, which take the form of direct deadweight costs and indirect costs in the form of substitution or displacement effects. Deadweight costs arise when a subsidy is paid to a jobseeker who would have gained employment anyway, or who would have gained employment with a lesser subsidy. Managing eligibility for subsidies and negotiating the subsidy amount and duration can lower the risk of deadweight costs.

Substitution effects arise when the subsidised jobseeker fills a job that would otherwise have been filled by an unsubsidised worker. Unless subsidies can induce firms to increase employment, a degree of substitution is an unavoidable cost of achieving gains for subsidised jobseekers. To reduce the risks of firms dismissing existing workers in order to access a subsidy, eligibility may be restricted to firms creating new jobs or filling open vacancies.

Displacement effects arise where some of the benefit of a subsidy accrues to employers, enabling them to compete more effectively, to the detriment of other employers. In this case, employment gains made by the subsidised worker come at the expense of employment in firms with which the employer competes.

It is possible that a wage subsidy programme can induce firms to expand their employment, though this effect arises only in particular circumstances. First, it may arise if the subsidy amount more than compensates the employer for the lower productivity of subsidised workers at the time of hiring. In this case, the subsidy serves to lower the effective price of labour input, and will lead to an increase in the amount of labour demanded. Second, firms may expand employment if firms hire more than one low-wage/low-productivity worker to provide the labour input that would otherwise have been provided by one higher-paid/more-productive worker. The degree of substitution will depend on the firm's production technology. In either of these cases, we would expect that once the subsidy expires, the employer would be unwilling to open up a new unsubsidised vacancy if an employee were to leave. They may, however, be willing to retain the formerly subsidised worker because doing so does not entail any hiring costs, and because the worker may have acquired relevant skills while subsidised.

A subsidy may make the employer willing to hire, or to bring forward a possible future hiring,<sup>6</sup> by covering hiring and training costs, or by compensating them

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<sup>5</sup> For a review, see Heckman et al. (1999) or Maré (2005).

<sup>6</sup> Department of Labour (1985) reported that 65% of subsidised placements arose from employers bringing forward future hiring. At the time, this was seen as evidence of strong deadweight costs—with the subsidy paying employers to do what they would have done anyway, which was influential in reducing the use of wage subsidies in the late 1980s.

for taking the risk of hiring when there is uncertainty about future demand or about the productivity of a particular applicant.

## **Previous studies of the impacts of subsidies on firms**

There are relatively few studies that, like ours, examine the impact of subsidies on firm employment using a rich microdata panel. A number of earlier studies relied on surveys of firms to ascertain the extent of substitution or deadweight effects (for example, Department of Labour 1985; see also the summaries in Calmfors *et al.* 2001 and OECD 1993). These survey-based studies generally found substantial deadweight effects (60 percent of subsidised workers would have been employed anyway) and substitution effects (of the remaining 40 percent, 25/40 gain employment at the expense of other workers). The net expansion of employment is thus only about 5 to 10 percent of the number of subsidised workers (Maré 2005).

In contrast, more recent matching estimates using firm microdata find more substantial positive effects of subsidised employment on total employment at the firm. Using a similar matching approach to ours, and administrative data on firm employment in Denmark, Rotger and Arendt (2010) estimate the impact on hiring and separations, and hence on net employment, for each of 7 months after the start of a subsidy. Seven months after the subsidy start, when most subsidies are ended, firms that had hired a subsidised worker have 0.26 more employees than in otherwise comparable firms. The authors infer that the additional jobs 'would not have been created in the absence of a wage subsidy', though their findings may also reflect increased hiring in response to an increase in labour demand at the affected firms. Rotger and Arendt report an absence of deadweight effects when subsidised workers are hired—firms that hire a subsidised worker do not lower their hiring of unsubsidised workers once the subsidy has started (though the authors do not report effects for the month in which the subsidised worker is first hired).

A related Finnish paper by Kangasharju (2007) reports that firms that took on subsidised workers increased their payroll by around 9 percent relative to a matched comparison group. The author interprets this as evidence that subsidies lead to increases in total employment. The results are, however, also consistent with the take-up of subsidies being concentrated in expanding firms.

Kangasharju also tested for displacement effects, whereby the increases in employment within subsidised firms come at the expense of employment declines with firms that compete in the same industry or region. Kangasharju investigated displacement effects by examining whether the estimated impacts are stronger when comparing to non-participants in the same industry or region. In the presence of displacement effects, the estimated impacts would be larger because the gains of participants would be magnified by poorer outcomes for non-participants. Kangasharju found no evidence of displacement.

### 3. WAGE SUBSIDY PROGRAMMES

There were a numbers of different subsidy programmes operating over the January 2003 to December 2007 period that we examine. Appendix Table 1 shows the number of subsidised job starts by programme and year. The main programme over this period was called *Job Plus* which was a hiring subsidy paid to assist disadvantaged jobseekers to secure permanent employment. *Job Plus Training* enabled clients to undertake specific training required for an identified job opportunity. *Job Connection* is a work experience subsidy<sup>7</sup> targeted to those who have been unemployed for more than 4 years. In 2007 *Job Plus*, *Job Plus Training*, and *Job Connection* were consolidated into a single programme called *Skills Investment Subsidy*.

The *Job Plus* wage subsidy programme was administered by the New Zealand Employment Service, and then by Work & Income, between 1993 and 2007. It was a targeted subsidy programme aimed at disadvantaged jobseekers. The main, but not only, criterion for disadvantage was having been registered as unemployed for at least 6 months. The duration and amount of the subsidy was negotiated by the case manager and the employer. In most cases the duration of subsidy was for 26 weeks, although it could be up to 52 weeks.

*Job Plus* subsidies were paid to employers who employed particular jobseekers in permanent, full-time jobs. A *pro rata* subsidy could be paid for work-tested beneficiaries working 15–30 hours per week.

In 1999, the subsidy amount was capped at \$11,000 per participant per year, which equates to \$214 per person per week for up to 52 weeks. Over the 2003 to 2007 the average subsidy was about \$200 to \$250 per week, while the median gross earnings while employed for subsidised workers in the 2 years prior to subsidy receipt was around \$430 per week, in June 2005 dollars.

Jobseekers could secure subsidised jobs in a number of ways. In some cases, employment advisors or case managers would negotiate with an employer prior to a jobseeker being referred to a posted vacancy. Employment advisors could also negotiate with employers who had not posted a vacancy, to encourage them to hire a subsidised jobseeker. Jobseekers could also apply for vacancies and inform prospective employers that employing the jobseeker would attract a subsidy payment. The operational principles guiding the delivery of the programme required that the subsidy only compensate the employer for the extra costs of employment incurred by employing a disadvantaged jobseeker; that subsidised jobseekers should not replace existing employees; and that subsidies should not provide employers with a competitive advantage. Overall, the design and implementation of the programme favoured placing subsidised jobseekers into existing vacancies.

An evaluation of *Job Plus* was undertaken in 1994 (New Zealand Employment Service 1994). A sample of 400 subsidy recipients was interviewed 6 months after their subsidy ended. Information was collected on the length of their subsidy and on their employment experiences during and after the period of the

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<sup>7</sup> Work experience subsidies differ from hiring subsidies (like *Job Plus*) in that the employer is under no obligation to continue to employ the participant at the end of the subsidy period.



subsidy. Almost half (44 percent) of subsidy recipients reported receiving a subsidy for fewer than 6 months. Six months after the subsidy ended, 39 percent of recipients reported that they were still employed at the firm in which they had received subsidised employment.

The current paper provides the first examination of the impact of *Job Plus* on the firms that hired the subsidised workers.

## 4. DATA

We use data from the Statistics New Zealand prototype IDI dataset. This dataset contains information on benefit dynamics and active labour market policies, linked employer–employee data (LEED) on monthly employment and earnings derived from tax data, and information on firms’ industry and location from the Statistics New Zealand Longitudinal Business Frame.

Monthly employment and earnings data are available from April 1999 until December 2010. We focus on subsidy spells that started between January 2003 and December 2007, to ensure that we have 3 years of prior and subsequent job information, covering January 2000 to December 2010. We also report longer-term outcomes for jobseekers who receive early in our study period.

The dataset includes main benefit payments (which are taxable) but not second or third tier benefit payments. (The main second and third tier benefits are the accommodation supplement and hardship grants.) Hence it is not possible to determine the total amount of benefits an individual received in any month.

For each person who receives a wage subsidy, the dataset contains information on the start date and the estimated duration over which the subsidy was paid. Information on the amount of subsidy paid or the identity of the employer is not included. The information on start date is considered to be more reliable than end date, which in many cases is derived based on the amount of subsidy paid. Complete information on all subsidy programmes is available from January 2000 to December 2007. After this time, not all subsidy programmes are included in the dataset. Unsubsidised and subsidised employment in the 3 years following a subsidy start can therefore be distinguished only for subsidies that started prior to January 2005.

We use administrative data on programme participation to identify all those who started a subsidised job between January 2003 and December 2007. This was about 60,000 people, most of whom received one subsidy over the 5-year period.<sup>8</sup>

In some cases the duration of the subsidy is very short, with about 10 percent having a duration of less than 1 month. There are also cases where one subsidy spell is separated from a second by only a few weeks. We treat subsidy spells separated by less than 30 days as a single spell which reduces the number of spells from 66,595 to 59,985. Based on the start and end dates recorded in the administrative data the median subsidy duration is 5 calendar months, with 9 percent lasting 1 calendar month, 35 percent between 2 and 4 months, 19 percent 5 or 6 months, 31 percent 7 months, and 5 percent lasting 8 to 13 months.

We use the linked data to identify those jobseekers who start a new job-spell around the time recorded in the administrative data. We match each subsidy start to the closest job-spell start within a given window. A match is made if the job-spell started in the same calendar month, up to 3 months before, or 1 month

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<sup>8</sup> The number of wage subsidies declined between 2003 and 2007 from about 12,000 to 6,000 reflecting the steady decline in the number of jobseekers over that time.

after the administrative start date. Where there is more than one candidate job-spell start, we select the one that is closest to the administrative start date.

We include cases where the job-spell starts 2 or 3 months before that recorded in the administrative data, as it seems unlikely that a jobseeker would receive a wage subsidy if they already have a job. We don't include matches where the job-spell starts 2 or 3 months after that recorded in the administrative data because of the possibility that the jobseeker starts an unsubsidised job rather than a subsidised one at that time.

In a few hundred cases, more than one wage subsidy spell is matched to the same job start. In these cases we select the wage subsidy spell with the longest duration. In total, 46,469 subsidy spell starts are matched to a job start, with 65 percent matching exactly on calendar month. In 20 percent of cases the job-spell starts in the month after that recorded in the administrative data, in 10 percent of cases the job-spell starts in the month before that recorded, and in 5 percent of cases the job-spell starts 2 or 3 months before that recorded in the administrative data.<sup>9</sup>

Subsidy spells that do not match to a job spell start are more likely to be *Job Plus Training* rather than *Job Plus* subsidies, but are very similar in terms of recorded duration. It seems that a significant minority of jobseekers do not start the subsidised job as arranged.

Appendix Table 2 compares the duration of the wage subsidy (in calendar months) recorded in the administrative data with the duration of the matched job-spell in LEED. In about 21 percent of cases the subsidy duration was longer than the job-spell. In these cases we changed the wage subsidy end month to be consistent with the job-spell end month. This reduced the average duration from 5.0 to 4.4 calendar months and the median duration from 5 to 4 calendar months. Fifteen percent of wage subsidies last one calendar month, 37 percent last 2 to 4 months, 18 percent last 5 to 6 months, 26 percent last 7 months, and 4 percent last 8 to 13 months.

For the firm-based analysis, the unit of analysis is an enterprise, which may operate in more than one location. We apply some repairs to enterprise records, joining continuing enterprises that appear to have ceased, using the algorithm in Fabling (2011). We use financial information about firms from the prototype Longitudinal Business Database, drawing on information from survey and administrative sources. From this financial information, we derive a measure of productivity.

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<sup>9</sup> In 4 percent of cases the jobseeker had previously worked for the same employer, i.e. the matched job-spell was the second or third employment spell with the same employer in LEED. Of those who started a subsidised job in 2006–2007, 3 percent had worked for the same employer within the last 2 years, while 4 percent had worked for the same employer within the last 5 years. For those who started a subsidised job in 2003, 3 percent had worked for the same employer within the last 2 years.

## 5. THE IMPACT OF WAGE SUBSIDIES ON PARTICIPANTS' LABOUR MARKET OUTCOMES

### Method

The impact of starting a subsidised job on subsequent outcomes is estimated using the method of propensity matching. Jobseekers are matched to similar jobseekers who did not start a subsidised job, on the basis of the estimated probability of starting a subsidised job. Differences in subsequent benefit, employment, and earnings of the treated and matched jobseekers indicate the impact of starting a subsidised job on subsequent employment and earnings. The method is implemented in three stages.

First, a pool of potential matches is identified for each calendar month, referred to as the reference month. Adopting terminology from the evaluation literature, we classify all jobseekers who start a subsidised job in the month as part of the 'treatment group'. A 'potential comparison group' contains all other jobseekers. Both treatment and comparison groups are restricted to individuals who have been receiving benefit at some stage during the 3 years prior to the reference month. This restriction ensures a minimal set of information on jobseekers' employment histories, which are an important basis on which they are matched. Note that a jobseeker who starts a subsidised job in one reference month may be selected as a comparison group member in another month.

Second, we estimate a logistic regression model to obtain a predicted probability for each jobseeker of starting a subsidised job. The probability of treatment is modelled as a function of past benefit history, employment patterns, and demographic and other characteristics recorded in the administrative data, including location. The included variables are summarised in Table 1 and Table 2, and discussed below. A separate logistic regression model is estimated for each type of main benefit, pooled across years. For those receiving the Unemployment Benefit, which is the largest group of subsidy recipients, separate regressions are estimated by year. Separate models are estimated by time period to allow for changes over time in rules or practices about who is given a subsidy. Separate models for different types of benefits are estimated to allow for differences in the use of subsidies among different client groups, and for diversity of their employment and benefit histories. The regression models are estimated on a sample comprising all members of the treatment group, and a 1 percent sample of other jobseekers. Predicted probabilities are derived for all members of the treatment and comparison groups, and are referred to as 'propensity scores', following the terminology of Rosenbaum and Rubin (1983).

The third stage of the method is to match each treated jobseeker to a subset of similar comparison jobseekers. Matches are made only between jobseekers observed in the same reference month, and of the same sex, ethnicity, benefit, and age class, to facilitate subsequent subgroup comparisons. Within those constraints, each treated jobseeker is matched to five comparison group

jobseekers with the closest values of the propensity score<sup>10</sup> and compare outcomes for the treated jobseeker with the average outcomes of the five matched jobseekers. Each comparison group jobseeker may be matched to more than one treated jobseeker, and many comparison group members are not matched to any treated jobseeker. Those that are matched at least once are referred to as the 'matched comparison group'.

This three-stage matching method serves to balance the average characteristics of the treatment and matched groups. The validity of this balancing is tested by comparing means of the variables that are entered in the regression model, and confirming that, within the matched treatment and comparison groups, participants cannot be identified on the basis of the matching variables.<sup>11</sup>

### ***Jobseeker analysis sample***

We focus attention on jobseekers who started a subsidised job between January 2003 and December 2007. This choice of study period ensures that we have information on employment status for at least 36 months prior to the subsidy start, and for at least 36 months following the subsidy start.

Some further restrictions are imposed on the study population. We exclude about 6 percent of cases where a subsidy was received during the 6 months before the reference subsidy spell start. We also exclude about 9 percent of cases where the jobseeker did not receive a benefit during the 12 months before they started the subsidised job.<sup>12</sup> These restrictions reduce the number of subsidised jobs starts from 46,469 to 39,885. (About 4 percent of jobseekers were not receiving benefit in the month before starting the subsidised job or in the month they started the subsidised job.)

Table 1 compares the demographic characteristics, and employment and benefit history of the 39,885 participants in our study population with a random sample of non-participants. We select a 1 percent random sample of non-participants in each calendar month excluding those who received a wage subsidy during the 6 months before or after the reference month.

Participants are relatively diverse with respect to age, sex, benefit duration, and recent employment history. About two-thirds were receiving the Unemployment Benefit before they started the subsidised job, with one-third receiving other benefits. About 20 percent had been receiving benefit for less than 3 months when they started the subsidised job, 45 percent had been receiving benefit for 12 months or more, and 33 percent had been receiving benefit for 6 or more of the previous 10 years. Participants are more likely than non-participants to be on the unemployment benefit, male, young, Māori, and to have no school qualifications. They also have lower average duration on-benefit than the non-participants.

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<sup>10</sup> Fewer than five matches may be selected if the difference in propensity scores is greater than 1.0 percent. We drop treatment group members with propensity scores above the maximum or below the minimum of the scores for the comparison group (i.e. outside the region of 'common support').

<sup>11</sup> This test was implemented by estimating a logistic regression of treatment on matching covariates, and confirming that the covariates were jointly insignificant.

<sup>12</sup> Most had not received benefit during the previous 36 months.

### **Matching variables**

We model the probability of starting a subsidised job based on demographic and other information available in IDI. This includes information on age, sex, ethnicity, migrant status, educational attainment, partnership status, number of dependent children, age of youngest child, current benefit duration, benefit history over the last 10 years, employment status and earnings over the previous 3 years, and participation in wage subsidy and training programmes over the last 3 years. For those who received Sickness or Invalid's benefits, time information on incapacities recorded over the last 3 years was included.

A separate propensity model is estimated for each benefit type, with the exception of those receiving the unemployment benefit, where a separate model is estimated for each year. The models are estimated on a sample that includes all participants and a 1 percent random sample of non-participants in each calendar month. For the Unemployment Benefit (UB) population, participants make up about 50 percent of the sample, while for Domestic Purposes Benefit (DPB), Sickness Benefit (SB), and Invalid's Benefit (IB) they comprise between 10 to 15 percent of the sample.

Matches are made only between jobseekers observed in the same reference month, and of the same sex, ethnicity, benefit, and age class, to facilitate subsequent subgroup comparisons.<sup>13</sup> Within those constraints, each treated jobseeker is matched to five comparison group jobseekers with the closest values of the propensity score.

We drop individuals who have no comparators or those with propensity scores outside the region of common support. These restrictions reduce the number of subsidy starts from 39,885 to 38,808, a match rate of 97.3 percent. The total number of jobseekers in the matched comparison group is 182,223.

This matching method serves to balance the average characteristics of the treatment and matched groups. The validity of this balancing is tested by comparing means of the variables that are entered in the regression model, and confirming that, within the matched treatment and comparison groups, participants cannot be identified on the basis of the matching variables. (A logistic regression of treatment on all covariates, using the matched treatment and comparison groups, resulted in a  $\chi^2$  from a likelihood ratio test of joint insignificance of all matching variables in the regression, having an associated  $p$ -value of 1.000 in each case. In five out of eight cases there were no individual covariates for which there was a significant difference in means between the treatment and matched comparison groups ( $p < 0.05$ ). In the other three cases only one or two of the 350 or so individual covariates was significantly different.)

Table 2 shows the characteristics of participants who were matched to at least one non-participant, by the type of benefit they received on or prior to the reference month. This table illustrates the diversity among the jobseeker

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<sup>13</sup> DPB recipients were also matched exactly on age of youngest child. Estimates by benefit duration and detailed age group were obtained from two additional matches. Matching on current benefit duration category resulted in 37,611 records being matched to at least one comparator (a match rate of 95%) and matching on detailed age category resulted in 38,367 records being matched (a match rate of 96%).

population, with large difference in benefit and employment history evident by benefit type.

### ***Outcome measures***

We focus on eight key outcomes measures:

1. On-benefit: the proportion receiving benefit or wage subsidy 36 months later
2. Months on-benefit: the average number of months receiving a benefit or wage subsidy over the subsequent 36 months
3. Employed: the proportion in unsubsidised employment 36 months later
4. Months employed: the average number of months in unsubsidised employment over the subsequent 36 months
5. Employed and off-benefit: the proportion in unsubsidised employment and not receiving benefit 36 months later
6. Months employed and off-benefit: the average number of months in unsubsidised employment and not receiving benefit over the subsequent 36 months
7. Monthly earnings: average monthly earnings from wages and salary (if employed and off-benefit) 36 months later
8. Total earnings: average total earnings from wages and salary (including subsidised employment and earnings while receiving benefit) over the subsequent 36 months

## **Results**

### ***Patterns of employment and benefit receipt***

Overall, wage subsidies are estimated to have a positive impact on jobseekers' outcomes. Furthermore, the positive impacts are evident even several years after the subsidy is received.

Figure 1 shows various measures for participants and matched comparisons in the 36 months before and 36 months after the reference month (that is, the month participants started a subsidised job).

In addition to the measures described above we also include the proportions employed, including both subsidised and unsubsidised employment (panel d), the proportion neither employed nor in receipt of benefits (panel f), and the proportion receiving wage subsidy (panel i).

The wage subsidy generally lasts between 1 and 7 calendar months, with 31 percent receiving the subsidy in the seventh month (that is, 6 months after the reference month) and only 5 percent receiving a subsidy after that. Differences in outcomes between participants and comparisons were greatest around 7 months, with participants much less likely to be receiving benefits or a wage subsidy, and more likely to be employed, off-benefit and employed, and in unsubsidised employment.

Seven months after starting a subsidised job, 34 percent of participants are receiving benefits or a wage subsidy, compared to 64 percent of matched comparisons (panel a). Fifty-five percent of participants are off-benefit and in

unsubsidised employment, compared to 22 percent of matched comparisons (panel b).

Twelve months after starting a subsidised job, 34 percent of participants are receiving benefits or wage subsidy, compared to 58 percent of matched comparisons (panel a). Fifty-two percent of participants are off-benefit and in unsubsidised employment, compared to 26 percent of matched comparisons.

Although differences between participants and comparisons decline gradually from around 7 months, large differences remain 36 months after starting a subsidised job. Thirty-six percent of participants receive benefits or a wage subsidy, compared to 45 percent of matched comparisons. Forty-five percent of participants are off-benefit and in unsubsidised employment, compared to 32 percent of matched comparisons.

While 65 percent of participants are off-benefit 36 months after starting a subsidised job, only 46 percent are employed, leaving 19 percent neither employed nor in receipt of benefits. In comparison, 56 percent of comparisons are off-benefit, 32 percent are employed, and 23 percent are neither employed nor in receipt of benefits.

Overall impacts on employment are slightly greater than the impacts on benefit receipt, reflecting that those who start subsidised jobs and remain off-benefit are more likely to be employed, and less likely to be neither employed nor in receipt of benefits over the subsequent 36 months. These results show that using benefit receipt as a proxy for employment outcomes measure leads to an underestimate of the impact of subsidies on employment. Figure 2 shows how the key outcome measures vary by benefit type. Overall, the impacts are very positive for all benefit types, but slightly more positive for those on the DPB and slightly less positive for those on the Independent Youth Benefit (IYB). Large positive impacts are still evident 3 years later.

While participants who had received IB, DPB, and SB are less likely to be employed than those who had received UB, so are matched comparisons in each case (Figure 2). While the impact on employment is smallest for IB recipients, the relative difference between participants and comparisons is large, with 22 percent of IB participants employed 12 months afterwards compared to 5 percent of matched comparisons, and 55 percent of UB participants compared to 30 percent of matched comparisons.

Participants who had received IB (and to a lesser extent DPB) are much less likely to leave benefit after starting a subsidised job than those who had received UB. This reflects that a subsidy may be used to support some groups into part-time rather than full-time employment. Figure 3 shows the proportion in unsubsidised employment including those who are also receiving benefits. Those who had received IB were much more likely to be employed in the 3 years after starting a subsidised job than matched comparisons, with 50 percent of IB participants employed 36 months later compared to 27 percent of matched comparisons. About 60 percent of those employed are receiving main benefits, and hence are likely to be working part-time rather than full-time.

Appendix Figure 1 shows estimated impacts on subsequent benefit receipt, employment, and monthly earnings and the 95 percent confidence intervals associated with these estimates.



Table 3 summarises the main results by benefit type and year. Impacts that are not statistically significant at the 95 percent confidence level are flagged.

Participants are 26.2 percent more likely to be employed and 23.3 percent less likely to be receiving benefit 12 months after starting a subsidised job.

Participants spend 2.0 more months employed over the subsequent 12 months on average, and 1.6 fewer months receiving benefit. Average total earnings from employment are \$9,960 higher than for matched comparisons in the 36 months after starting a subsidised job.

Participants are 13.0 percent more likely to be employed 36 months after starting a subsidised job, and 10.2 percent less likely to be receiving benefit. Participants spend 6.1 more months employed over the subsequent 36 months, and 5.0 fewer months receiving benefit. Average total earnings from employment over 3 years are \$20,150 higher than for matched comparisons.

### ***Job duration***

In a majority of cases the job continues after the subsidy comes to an end. Table 4 shows the number of months that the job lasts after the subsidy ends. In 42 percent of cases the job ends in the same month as the subsidy ends. About 22 percent last 1 to 3 more months, 9 percent last 4 to 6 more months, 9 percent last 7 to 12 more months, and 19 percent last more than 12 months after the subsidy ends. A relatively large proportion of subsidies last only 1 to 3 months, and in two-thirds of these cases the job ends in the same month as the subsidy ends. For subsidies lasting 6 months or more (that is, 7 or more calendar months), only 10 percent of jobs end when the subsidy ends. About 20 percent last 1 to 3 more months, 14 percent last 4 to 6 months, 17 percent last 7 to 12 months and 39 percent last more than 12 months after the subsidy ends.

Overall about 31 percent of jobs last 1 to 3 calendar months, 20 percent last 4 to 6 months, 21 percent last 7 to 12 months, 14 percent last 13 to 24 months, and 14 percent last 25 or more calendar months. It seems that most of the subsidised jobs do not last very long. Research on benefit-to-work transition (Dixon & Crichton 2006) found that many jobs gained by beneficiaries only lasted a few months. To examine this further we examine the duration of jobs obtained by those in the matched comparison group. About one-fifth of the matched comparison group start a new job and leave benefit within 12 months of the reference month (that is, the month the participant they were matched to started a subsidised job). About 37 percent of these jobs last 1 to 3 calendar months, 21 percent last 4 to 6 months, 17 percent last 7 to 12 months, 12 percent last 13 to 24 months, and 12 percent last 25 calendar months or more.

On average, job duration is slightly longer for participants than (weighted) matched comparisons with 31 percent of subsidised jobs lasting 3 calendar months or less, compared to 37 percent of new jobs started by those in the matched comparison group.

### ***Employment and benefit status after the subsidised job ends***

About 30 percent of jobseekers are employed and off-benefit in the month after the job ended, 40 percent are on-benefit, and 30 percent are neither employed

nor receiving benefit. Benefit receipt was unchanged, but employment increased over the subsequent months with 43 percent employed 12 months later.

There were differences by benefit type, with 9 percent of IB, 23 percent of DPB, and 24 percent of SB recipients employed and off-benefit in the month after the job ended, compared to 34 percent of UB recipients. About 82 percent of IB, 61 percent of DPB, and 50 percent of SB recipients were receiving benefit, compared to 33 percent of UB recipients. The remaining 9 percent of IB, 16 percent of DPB, and 26 percent of SB recipients were neither employed nor receiving benefit, compared to 35 percent of UB recipients.

Jobseekers were slightly more likely to be employed (35 percent) and less likely to be on-benefit in the month after the job ended (30 percent) if the job lasted at least 3 months longer than the subsidy. Where the job didn't last 3 more months, 27 percent were employed and 42 percent were on-benefit in the month after the job ended.

### ***Impacts by benefit type***

While two-thirds of participants were receiving Unemployment Benefit (UB) significant minorities were receiving other types of benefit: 11 percent received Domestic Purposes Benefit (DPB); 7 percent Training Benefit (TB); 7 percent Sickness Benefit (SB); 5 percent Invalid's Benefit (IB); and 2 percent Independent Youth Benefit (IYB).

Overall, the impacts are positive for all benefit types, but slightly more positive for those on the DPB and less positive for those on the IYB. Positive impacts are evident several years after the subsidy is received.

Impacts for DPB recipients are the most positive over the subsequent 3 years with a 16.8 percent higher probability of being off-benefit and in unsubsidised employment, and a 16.5 percent lower probability of receiving benefit or wage subsidy 36 months later. On average, DPB participants spend 7.8 more months employed over the subsequent 36 months, and 7.7 fewer months receiving benefit. Total earnings from employment over 3 years are \$24,800 higher than for matched comparisons.

Impacts for UB and SB recipients are very similar, with these groups being 11.8 and 12.8 percent more likely to be employed, and 8.8 and 9.9 percent less likely to be receiving benefit 36 months later. On average, UB and SB participants spend 5.8 and 6.0 more months employed over the subsequent 36 months, and 4.5 and 4.9 fewer months receiving benefit. Total earnings from employment over 3 years are \$19,000 and \$21,650 higher than for matched comparisons on average.

Some impacts for IB recipients are lower than for other benefit types 12 months afterwards, but very similar 36 months afterwards. While the impact on the proportion employed and off-benefit is smaller for IB recipients at 12 months, the relative difference between participants and comparisons is large. About 22 percent of IB participants were employed 12 months afterwards compared to 5 percent of comparisons (a difference of 17 percent), and 55 percent of UB participants compared to 30 percent of comparisons (a difference of 25 percent). However, 36 months afterwards, IB recipients are 13.9 percent more likely to be employed, slightly higher than UB recipients at 12.4 percent. Those who had

received IB were much more likely to be both employed and receiving benefits with 50 percent of participants employed 36 months later compared to 27 percent of matched comparisons. On average, IB participants spend 7.7 more months employed over the subsequent 36 months, 4.7 more months employed and off-benefit, and 4.2 fewer months receiving benefit. Total earnings from employment over 3 years are \$20,200 higher than those of matched comparisons on average.

Impacts for those receiving TB are very similar to the impacts for those receiving DPB and slightly lower than for those receiving UB. On average, participants spend 7.3 more months in unsubsidised employment over the subsequent 36 months, and 6.3 fewer months receiving benefit or wage subsidy. Total earnings from employment over 3 years are \$24,000 higher than for matched comparisons on average.

Impacts for those receiving IYB are very similar to those receiving UB and SB during the first 12 months after starting a subsidised job, but decline more markedly over the subsequent 24 months. IYB recipients are 5.2 percent more likely to be employed and off-benefit and 5.7 percent less likely to be receiving benefit 36 months later. On average, participants spend 4.5 more months employed over the subsequent 36 months, and 4.4 fewer months receiving benefit. Total earnings from employment over 3 years are \$13,500 higher than for matched comparisons on average.

### ***Impacts by year***

Appendix Table 3 and Appendix Table 4 contain additional results by year and by benefit type. The main finding is that impacts 3 years afterwards appear to be slightly lower for subsidised jobs that started in 2006–2007 than for those that started in 2003–2005. This seems likely to reflect the deteriorating labour market conditions experienced from late 2008 onwards.

### ***Impacts by age, sex, ethnicity, and benefit duration***

Table 5 contains additional results by age, sex, ethnicity, and benefit duration, for all benefit types together. Overall impacts over 3 years are greater for those aged 35 and over, for Asian and other ethnic groups, and those who had been in receipt of benefit for 2 or more years before starting the subsidised job.

On average those aged 18–24 years spend 5.1 more months employed and off-benefit while those aged 45–54 years spend 8.0 more months, and those aged 55 and over spend 10.1 more months employed and off-benefit than those in the matched comparison group. Māori, Pacific, and Europeans spend 5.7, 5.8, and 6.2 more months employed and off-benefit during the 3 years after starting a subsidised job, while Asian and other ethnic groups spend 7.9 and 7.8 more months employed and off-benefit.

Those who had been on-benefit for less than 6 months spend 3.9 more months employed and off-benefit while those who had been in receipt of benefit for more than 2 years, but less than 4 years, spend 8.0 more months, and those had been in receipt of benefit for more than 4 years spend 8.3 more months employed and off-benefit than those in the matched comparison group.

Appendix Table 5 contains results by age, sex, and ethnicity separately by each benefit type. In each case, variations are similar to those observed for all benefit types together, with impacts greater for those aged 45 and over and for Asian or other ethnic groups and smaller for Pacific and Māori. The only noteworthy difference is that for those who received DPB or IB, impacts are slightly smaller for women than men.

Appendix Table 5 also contains results by duration on-benefit before starting the subsidised job. For those who received UB, TB, or SB the impacts over 3 years are greatest for those who had been in receipt of benefit for 2 or more years before starting the subsidised job, while for those who received DPB or IB the impacts were similar for those who had been on-benefit for 6 to 23 months, as for those who had been on-benefit for 2 years or longer.

### ***Impacts 5 and 7 years after starting a subsidised job***

For those who started subsidised jobs in 2005 or earlier, impacts up to 5 years later are observed, and for those who started a subsidised job in 2003, impacts up to 7 years later are observed.

Within these subsets, participants are 9.7 percent more likely to be off-benefit and employed and 7.2 percent less likely to be receiving benefit 5 years after starting a subsidised job. On average, participants spend 9.0 more months employed and 7.3 fewer months receiving benefits over the following 5 years.

Participants are 7.5 percent more likely to be off-benefit and employed and 5.3 percent less likely to be receiving benefit 7 years after starting a subsidised job. On average, participants spend 11.1 more months employed and 8.7 fewer months receiving benefits over the following 7 years (Table 6).

### ***Variation in impacts by likelihood of starting a subsidised job***

Appendix Figure 2 shows how the estimated impact on the numbers of months in unsubsidised employment over the following 3 years varies by propensity score. This suggests that those who are less likely to participate benefitted slightly more than those who are more likely to participate on average. This overall result generally holds by benefit type, with the exception of those on SB where there is no relationship between estimated impact and propensity score. The overall result, for all benefit types together, partly reflects the higher positive impacts observed for DPB and SB, who are less likely to participate than those on UB, and hence are concentrated in lower propensity scores.

## 6. THE IMPACT OF WAGE SUBSIDIES ON EMPLOYMENT AT THE FIRM

### Method

As for the analysis of jobseeker outcomes, the impact on a firm of hiring a subsidised worker is estimated using the method of propensity matching. Firms employing a subsidised worker are matched to a subset of similar firms, where similarity is defined on the basis of the estimated likelihood of taking on a subsidised worker. Differences in subsequent employment growth of the treated and matched firms indicate the impact of hiring a subsidised worker. The method is implemented in three stages.

First, a pool of potential matches is identified for each calendar month, referred to as the reference month. Adopting terminology from the evaluation literature, we classify all firms hiring one or more subsidised workers in the month as part of the 'treatment group'. A 'potential comparison group' contains all other firms. Both treatment and comparison groups are restricted to firms that have been continuously employing for at least 3 months prior to the reference month. This restriction ensures a minimal set of information on firms' employment histories, which are an important basis on which firms are matched. Note that a firm that hires a subsidised worker in one reference month may be selected as a comparison group member in another month.

Second, we estimate a logistic regression model to obtain a predicted probability for each firm of hiring a subsidised worker. The probability of treatment is modelled as a function of past employment patterns, recent workforce composition, industry, and region. A fuller discussion of the included variables is contained below. A separate logistic regression model is estimated for each calendar year, and within year, by firm size, where firms are classified into eight size classes. Separate models are estimated by time period to allow for changes over time in rules or practices about who is granted a subsidy. Separate models for different sized firms are estimated to allow for the differences in the use of subsidised workers, and for the diversity of employment growth profiles. The regression models are estimated on a sample comprising all members of the treatment group, and a 40 percent sample of other firms. Predicted probabilities are derived for all members of the treatment and comparison groups, and are referred to as 'propensity scores', following the terminology of Rosenbaum and Rubin (1983).

The third stage of the method is to match each treated firm to a subset of similar comparison firms. Matches are made only between firms observed in the same reference month and of the same size class. Within those constraints, each treated firm is matched to five comparison group firms with the closest values of the propensity score<sup>14</sup> and we compare outcomes for the treated firm with the

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<sup>14</sup> More than five matches may be selected when more than 5 comparison group members have the same propensity score value. Fewer than five matches may be selected if the difference in propensity scores is greater than 0.5 percent. We also drop treatment group members with propensity scores above the maximum or below the minimum of the scores for the comparison group (i.e. outside the region of 'common support').

average outcomes of the five matched firms. Each comparison group firm may be matched to more than one treated firm, and many comparison group members are not matched to any treated firm. Those that are matched at least once are referred to as the 'matched comparison group'.

This three-stage matching method serves to balance the average characteristics of the treatment and matched comparison groups. The validity of this balancing is tested by comparing means of the variables that are entered in the regression model.

### ***Main analysis sample***

We focus attention on firms that hire one or more subsidised workers between January 2003 and December 2007. This choice of study period ensures that we have information on firm employment patterns for at least 36 months prior to the subsidy start, and for at least 36 months following the subsidy start. Specifically, we restrict attention to subsidy starts in firms that have been employing continually for 3 months prior to taking on a subsidised worker.<sup>15</sup> This excludes around 15 percent of subsidy starts during the period. We also exclude a small number of firms for which industry or location information is missing. We apply the same restrictions to comparison group enterprises that do not take on a subsidised worker in a particular month.

Table 7 summarises the sample sizes used in the analyses that follow. We observe 34,620<sup>16</sup> monthly observations on enterprises ('enterprise-months') for months in which one or more subsidised workers start an employment spell. Overall, 40,068 employees within these firms started a subsidised job during the 2003 to 2007 sample period. As described above, we identify a group of potential comparison firms in each month. There are 8,222,463 potential comparison observations.

We show separate counts for firms of different sizes. Size classes are based on the firm's average number of employees in the previous 12 months (excluding months with no employees). Our main results restrict attention to firms with average employment of 50 or less, due to difficulties in credibly matching treatment and comparison firms within larger size classes. This restriction excludes 24 percent of subsidy starts, but only 3 percent of potential comparison group observations.

In the third, 'matching' stage of the propensity matching method, we drop firms for which we have no comparators, or firms with propensity scores outside the region of common support. These restrictions reduce the number of treated firms to 33,372, and the number of subsidy starts to 37,971.

### ***Production sub-sample***

We present a supplementary analysis of the impacts of subsidies on firms, in which we control for firms' production histories. Information on production is

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<sup>15</sup> In contrast with the sample of subsidy starts used in the evaluation of the impact on subsidised workers, our analysis of the impact on firms includes subsidy starts associated with workers without benefit histories in the previous year.

<sup>16</sup> All counts have been randomly rounded in accordance with Statistics New Zealand requirements.

available annually and is aligned to each firm's balance date. The measures that we use are indicators of the capital and intermediate inputs into production, the firm's output, and the growth in each of these between the two most recently completed financial years. When modelling the probability that a firm hires a subsidised worker in a particular month, we use production measures from the most recently completed financial year. Production data may thus relate to a year ending up to 12 months prior to the reference month. By controlling for changes in production-related variables, we further restrict our analysis to firms that have existed for at least 2 to 3 years. Furthermore, we can include only the subset of firms with valid survey or administrative data. Overall, the sample used in the production analysis is around half the size of the main analysis sample. Observation counts by size class are shown in the lower panel of Table 7.

### ***Outcome variables***

We focus on employment outcomes for the firm. The main measure that we use is a count of total employment within a firm in each of the 36 months following the start of a subsidy spell. We also track the number of subsidised jobs in the firm, and the retention of previously subsidised workers.

### ***Matching variables***

We estimate the probability that a firm hires a subsidised worker as a function of past employment patterns, recent workforce composition, industry, and region. Employment history is captured by the number of employees in the firm in each of the previous 36 months. These employment counts are interacted with calendar month indicators for the previous 12 months, to allow for seasonal variation in employment patterns. The strength of seasonality in the firm is further controlled for by including a measure of employment volatility—the ratio of maximum to minimum employment over the previous year in months with positive employment. Recent employment growth is controlled for by including the percentage growth in employment since the same month in the previous year, with a separate indicator variable included for new firms.

Firms are categorised according to their average employment level over the previous 12 months, averaged over months in which the firm employed at least one employee, and separate regressions are run for firms in the following size categories: (0,2], (2,5], (5,10], (10,20], (20,50], (50,100], (100,250], more than 250.<sup>17</sup> Average employment in each of the 3 years prior to the reference month is also included as covariates in the regressions. Not all firms employ in all months. We allow for firm entry by including firm age as a separate regressor. Firm age is top-coded at 36 months, and a separate indicator is included to capture censored firms.<sup>18</sup>

Workforce composition measures are included to capture the characteristics of firms that are likely to hire subsidised workers. We control for the proportion of

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<sup>17</sup> Square brackets indicate that the value is included in the range. Parentheses indicate that the value is excluded.

<sup>18</sup> Very similar results are obtained when firm age variables are replaced with separate monthly indicators for positive employment.

workers in the previous year who were young (less than 25 years old), male, or with low monthly earnings (below the lower quartile of monthly earnings, as measured over the current March year). We include an indicator for whether firms employed any subsidised workers 6 to 12 months prior to the reference month. The timing is chosen to reflect seasonal patterns in the hiring of subsidised workers. Finally, worker turnover rates are controlled for using the ratio of new hires over the previous year to the total number of employees working at the firm in the previous year.

Geographic variation is captured by a set of variables measuring the proportion of the firm's employment in each of 16 regional council areas. To capture industry differences in the likelihood of hiring a subsidised worker, we assign each firm to a unique industry based on shares of employment across all employing months, and include a set of industry indicators in the regression. Separate two-digit industry indicators are included for each of the 31 two-digit industries with at least 50 subsidy starts in each year. Other two-digit industries are grouped by industry division, and further grouped into a residual category if the total number of subsidy starts in the division is less than 500 between 2003 and 2007. The resulting industry classification has 38 distinct groups. Finally, calendar month indicators are included to capture monthly variation in subsidy hiring rates.

When controlling for differences in production variables, using the production sub-sample, we include the annual growth rates of gross output, capital inputs, and intermediate inputs (calculated as log differences). This ensures that treated firms are compared with firms that have similar recent growth patterns. It also restricts attention to only those firms that have at least 2 years of production data prior to the current financial year, meaning that they must have been in operation for a minimum of 14 to 24 months.<sup>19</sup> The size of the firm is also controlled for using lagged values of the log of capital inputs, the log of intermediate inputs, and estimated multi-factor productivity from the most recently completed financial year. Finally, firm productivity is included as a regressor, to control for possible differences between the treatment and comparison groups. Productivity is measured as multi-factor productivity, based on industry-specific Cobb-Douglas production function estimates including firm fixed effects.

## Results

### *Patterns of wage subsidy use*

In our analysis sample of treated and potential comparison group firms, an average of 670 new subsidies were started in each month between 2003 and 2007. Figure 6 shows the variation over time—with a gradual decline in the number of subsidy starts over time. The total number of active subsidies in any month declined from around 4,000 in 2003/04 to around 2,500 in 2007. The decline in active subsidies was more pronounced than the decline in subsidy

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<sup>19</sup> They must have been operating for at least 1 month since their most recent balance date, and at least 1 month in the financial year prior to the year to which their most recent balance date relates. Firms that had been operating for up to 24 months could nevertheless be excluded, if the 24th month is the end of a financial year.



starts due to an accompanying reduction in the average duration of subsidies. Median subsidy duration remained at 6 or 7 months throughout the period but average durations declined due to a reduction in the length of long-duration subsidy spells. Figure 6 also shows that around one-third of active subsidies were in firms that were hiring a new subsidised worker in the month.

Table 8 summarises the variation across firms in the use of subsidised workers. The tallies are based on the 40,068 subsidy starts for treatment group firms, as reported in Table 7. The number of subsidised workers employed by a firm in any month is imputed based on the start date of the job to which the subsidy start is matched, and the duration of the subsidy, as recorded in the benefit administration data.<sup>20</sup> The number of subsidised workers between 2003 and 2007 is derived using information on subsidies that started prior to the 2003.

Most firms hire only one new subsidised worker at a time, and employ only a few subsidised workers during the 2003–2007 period—often for overlapping time periods. In a month where a subsidy starts, firms on average take on 1.2 subsidised workers. However, 90 percent of firms take on only one subsidised worker at a time. The average is higher due to a relatively small number of (mainly larger) firms taking on multiple subsidised workers. The third column of Table 8 shows that 65 percent of the 22,278 firms who hire a new subsidised worker between 2003 and 2007 only ever take on one subsidised worker, with a further 17 percent only ever taking on two workers, which is close to the average of 2.1 workers. In the month in which a subsidy starts, the average number of subsidised workers is 1.6, indicating that where firms do take on more than one subsidised worker, the subsidy spells often overlap. Over the entire study period, in months when a firm is employing a subsidised worker, the average number of subsidised workers employed is 1.3, though in only 15 percent of those months is the number of subsidised workers greater than one.

The pattern of subsidy use in the months around the reference month is shown in Figure 7, for firms with average employment of 50 or less. The darker lines show the patterns for treated firms. There is a pronounced spike in subsidy starts in the reference month, reflecting the fact that for most firms, taking on a subsidised worker is an isolated event. The figure also shows that average employment of subsidised workers is moderately high prior to taking on a subsidised worker, accounting for 0.3 workers in the month prior to the subsidy start. Following the spike in the number of subsidised workers at the firm, there is a steep decline in the following 6 months, as subsidy spells come to an end. For the matched comparison group, there are, by construction, no subsidy starts in the reference month. However, there are relatively few subsidy starts in other months either. The number of subsidised workers employed in comparison group firms is close to zero across the entire potential comparison group, but in the matched comparison group shown in the figure, there is a somewhat higher prevalence of subsidy use in the 6–12 months prior to the reference month. This is due to the fact that prior employment of subsidised workers is one of the matching variables.

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<sup>20</sup> Where the job ends prior to the recorded duration, we truncate the subsidy duration.

### ***Characteristics of treatment and comparison samples***

The firms that take on subsidised workers have different characteristics from those that do not. Some key differences are summarised in Table 9 and Table 10, based on selected characteristics that are included in the propensity regressions. The summary statistics are for firms with average employment of 50 or less in the year prior to the reference month. This is the sample on which our main impact estimates are based.

The first column shows the mean values of each variable for all potential comparison firms. The third column shows the means for the treatment group—firms that hire a subsidised worker in the reference month. The final column summarises the raw difference between the treatment group and the potential comparison group. In the second column, we report the weighted<sup>21</sup> mean characteristics of the subset of the potential comparison group that is matched to treatment observations, which, by construction, are very similar to those of the treatment group. The differences that remain between the matched treatment and comparison groups are not statistically significant, except for firms with high levels of annual employment. For these firms, there is a high degree of variation in past employment patterns, and the number of firms is relatively small, making it difficult to construct a credible comparison group. The propensity score matching method is ineffective in balancing covariates across larger firms. Appendix Table 6 summarises the extent to which covariates are balanced across the matched treatment and comparison groups, using a statistical measure of covariate imbalancing.<sup>22</sup>

Within the subset of firms that have 50 or fewer employees, treated firms are larger than the average comparison firm. They have average employment of 11.3 workers, compared with 6.1 for the potential comparison group. They also have higher employment growth, higher turnover, and are slightly younger. A higher share of their workforce is young or male, or has monthly earnings below the lower quartile. There are also differences in the geographic location of treated firms. They are less likely to be employing in Auckland or in the South Island, and are more likely to be employing in the Bay of Plenty, Taranaki, Manawatū-Wanganui, or Northland. The treatment group of firms also has an unrepresentative industry composition, as shown in Table 10. Subsidies are disproportionately high in construction services, food and beverage services, and food product manufacturing. The incidence of subsidies is relatively low in agriculture and in the professional, scientific, and technical services industries. The agriculture industry contains a relatively high share of small firms, which are under-represented among firms hiring subsidised workers.

Table 11 summarises key characteristics of the production sample, for which production data are available. The treatment group in this sub-sample has characteristics that are very similar to those of the treatment group from our

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<sup>21</sup> The weights reflect the contribution of the comparison observations to the matched sample. If five comparison observations are matched to a single treated firm, they will each have a weight of 1/5.

<sup>22</sup> The overall measure is the  $p$ -value from a likelihood ratio test of joint insignificance of all matching variables. It is calculated from a probit regression of treatment on all covariates, using the matched treatment and comparison groups. The test is implemented using the `pstest` Stata® program written by Leuven & Sianesi.

main analysis sample. The average age of treated firms in the production sub-sample is slightly higher than in the main analysis sample, reflecting the requirement that the production sub-sample firms have at least 2–3 years of production data. The additional insights obtained from the production sub-sample are that treated firms not only have higher employment, but also have larger capital and intermediate inputs, compared with potential comparison firms. The treated firms are, however, less productive than comparison firms, with multi-factor productivity that is 6 percent lower. The production data confirm that the treatment group have atypically high growth rates, not only of employment, but also of capital and intermediate inputs and of output. Taking these differences into account when matching treatment and comparison firms improves the credibility of our impact estimates. In practice, estimates of the impact of hiring a subsidised worker that are based on controlling for differences in production characteristics may be very similar to our main estimates if production differences are sufficiently correlated with other matching covariates.

### ***Employment impacts of wage subsidy use***

The impact on a firm's employment of hiring a subsidised worker is estimated by comparing the subsequent employment levels of matched treatment and comparison groups. Figure 8 provides a graphical summary of how the impacts are identified and estimated. The upper panel of Figure 8 graphs mean employment for the treatment and comparison groups. The comparison group (dashed line) has slower growth than the treatment group in the 36 months prior to the reference month, and lower mean employment in the reference month. The 'peaked' shape of the employment profile over time reflects a combination of employment changes for continuing firms and patterns of firm births and deaths. It summarises the experience of a cohort of firms selected in the reference period rather than the employment track of a continuing firm. Identification relies on matching treatment and comparison firms that on average have similar employment growth and firm birth and death patterns. The figure shows clearly that the prior employment growth for the matched comparison group closely matches that of the treatment group. The two lines are indistinguishable on the graph. After the reference month, however, the mean employment levels of the two groups diverge markedly. The difference in employment levels between the treatment group and the matched comparison group is the estimate of the impact of subsidised hiring (effect of treatment on the treated).

The middle panel of Figure 8 plots the vertical distance between the bold 'treatment group' line in the upper panel and the corresponding 'matched comparison group' line. This is the 'average effect of treatment on the treated' (ATT), and is shown in the figure as a solid bold line. Prior to the reference month, the effect is close to zero. In the reference month, the effect rises sharply to 1.39 additional employees. The dotted lines in the middle panel show 95 percent confidence intervals for the average effect of treatment on the treated.<sup>23</sup> The difference is significantly different from zero throughout the follow-up period of 36 months.

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<sup>23</sup> Standard errors are calculated from 100 bootstrap replications over the population of firms, with block selection of each firm's entire history. Within each replication, an independent random sample is chosen for estimation of the propensity score.

The lower panel of Figure 8 plots the same ATT line for total employment, together with lines showing the difference between the treatment and matched comparison firms in the number of subsidised workers and formerly subsidised workers employed in the firm each month. The immediate employment impact (month 0) is larger than the average number of subsidy starts in that month, which is 1.09 for firms with mean employment of 50 or less. The faster growth in employment among treated firms relative to the matched comparison group is not due entirely to the hiring of subsidised workers. The first row of Table 12 summarises the key patterns in Figure 8. Mean employment for the treatment group in the month prior to hiring a subsidised worker is 11.7. By construction, the treatment and comparison groups have the same prior employment level. The treatment group, however, uses subsidised workers more intensively even prior to the subsidy start that defines the reference month. On average, they employ 0.2 more subsidised employees than the firms in the matched comparison group. This necessarily implies that the treatment group has a lower level of unsubsidised employment prior to treatment.

In the reference month, the treatment group firms hire, on average, 1.09 subsidised workers, and have total employment that is 1.39 employees higher than in comparison firms. The fourth column of Table 12 shows that the additional expansion is largely due to the hiring of 0.48 other (non-subsidised) workers. The fact that the treated firms hire 1.57 more employees than the comparison group, but have employment that is only 1.39 higher, implies that the treatment group have a slightly higher rate of job separations. The substantial net increase in employment indicates, however, that firms taking on subsidised workers are not simply substituting subsidised workers for unsubsidised workers. There is a difference in employment between the matched treatment and comparison groups even 36 months after the reference month, which is evident in Figure 8, and in the final columns of Table 12. The effect of treatment on the treatment group is 0.82 additional employees 12 months after the subsidised hiring, and remains substantial even after 36 months, at 0.52.

As shown in Figure 7, treatment group firms are more intensive users of subsidised employment than those in the matched comparison group, even prior to the reference month. The lighter solid line in the lower panel of Figure 8 plots the difference. The dashed line shows the treatment-comparison difference in the employment of workers who were previously employed with a subsidy. The implications of the fact that jobs last longer than the associated subsidy (Table 4) are clearly evident. In the months after the reference month, the number of subsidised workers declines, as subsidies come to an end. There is, however, an accompanying increase in the employment of workers remaining after the end of their subsidy. The employment of formerly subsidised workers accounts for about 70 percent of the treatment effect after 12 months, and about half of the treatment effect 36 months after the subsidy starts.

Figure 9 summarises the estimated impact on (the log of) mean monthly earnings per worker. There is a relatively small difference in earnings rates between the treatment and matched comparison firms. The main exception is that, in the month when the subsidised worker is taken on, mean monthly earnings is around 8 percent lower in treatment firms. This is because subsidised workers are not generally employed for the entire month. The downward spike in monthly earnings thus reflects turnover. Figure 15 shows that this turnover

effect is more pronounced in smaller firms, where the turnover accounts for a larger proportion of monthly earnings. Three years after the subsidy start date, the earnings rate in treatment firms is slightly lower than in the comparison group, though the difference is barely significant.

Estimated employment impacts based on the production sub-sample are presented in the lower half of Table 12 and in Figure 10. The results are substantially similar. The main difference is that the estimated treatment effect is somewhat lower in the reference month, and 12 months after the subsidy start. Treated firms are matched with comparison firms with similar prior growth of output and of capital and intermediate inputs. The resulting comparison group has slightly higher employment growth than the comparison group constructed without production data. Consequently, the difference between the treatment and comparison group outcomes is reduced, particularly in the first year or two after the subsidy start. As shown in Table 12, the immediate impact estimated for the production sample is an increase in employment of 1.28, compared with 1.39 for the main analysis sample. After 36 months, the estimated average treatment effect on the treated is slightly higher in the production sample (0.63) than in the main sample (0.52). Overall, we choose to use the results from the main analysis sample as our preferred estimates, as they use information on more than twice as many subsidy starts, and do not appear to be greatly biased by the omission of production information from the matching.

### ***Estimated impacts by size class***

The pattern of estimated impacts is fairly consistent across different firm size classes, at least for firms with average annual employment of 50 or less. For larger firms, it is more difficult to separate the relatively small influence of hiring a subsidised worker from general employment variation across time and across firms. The matching of treatment and comparison firms is also less credible for larger firms. Summaries of results by different firm size classes are presented in Figure 11 and Figure 12, and in Table 12.

The results in Table 12 show that larger firms on average hire more subsidised workers, but they hire more other workers in the reference month as well. Most firms hire only one subsidised worker at a time. Even among firms with an average size of 20 to 50 employees, 87 percent hire only a single subsidised worker in the reference month, and a further 10 percent hire only two. The mean number of subsidy starts rises only slightly with firm size, from 1.04 for firms with 2 employees or less, to 1.57 for firms with more than 250 employees. In contrast, the difference in the number of unsubsidised hires in the reference month for treatment firms, compared with the matched comparison firms, rises much more sharply with firm size, from 0.15 for the smallest size class, to 59 for the largest size class. The estimated ATT for total employment is thus much larger than the change due to subsidy starts alone for larger firms.

For small firms (average employment of 5 or less), the impact on total employment is smaller than the number of subsidised workers who are hired, despite the positive contribution of other hires. This implies that there is some substitution of subsidised workers for unsubsidised workers, possibly due to difficulties in making fine adjustments to employment when the number of employees is small. Substitution is not evident for firms with average

employment of more than 5. For firms in the 5–10 employee size category, total employment is 1.28 higher in treatment firms than in matched comparison firms, despite the fact that the number of subsidised workers hired is, on average, only 1.08.

Especially for the larger firms, taking on a subsidised worker is not the only hiring event that distinguishes the matched treatment and comparison firms. Subsidy starts occur in firms that are expanding their employment in the reference month. It seems implausible to identify the increase in employment as a consequence only of the subsidised hire. This would imply, for instance, that for firms in the 100–250 size category, taking on 1.28 subsidised workers induces an employment increase of 7.3 workers. Our interpretation is instead that employers choose to hire a subsidised worker in months when they are trying to increase employment. The fact that a reasonably high proportion of subsidised workers are retained after the end of the subsidy is consistent with subsidised workers in many cases being hired into permanent new jobs.

The similarities in estimated impacts for the five smallest size classes are clearly evident in Figure 11. In all cases, the ATT estimate for total employment peaks in the reference month and abates over the following 36 months. For firms with mean employment of 5 to 10, the impact is close to zero after 36 months, whereas for firms with between 20 and 50 employees, the 36-month impact is around 60 percent of the initial impact. Furthermore, the month-to-month volatility of average employment impacts in the two largest size classes is large relative to the reference month impact or the contribution of subsidy starts. Figure 12 shows that, for firms in the largest three size classes, the employment impact in the reference month is clearly larger than the subsidy contribution.

The lower half of Table 12 contains comparable information by size class for the production sub-sample. The patterns are very similar to those from the main analysis sample. There is no evidence of significant impacts on mean monthly earnings within any size class (see Figure 15).

### ***Estimated impacts by year, for firms with average employment of 50 or less***

The estimated employment impact of hiring a subsidised worker appears to be fairly similar across years, with the exception of 2007, when the impact was smaller. The annual results are graphed in Figure 13 for the main analysis sample, and are summarised in Table 12, for both the main analysis sample and the production sub-sample. Compared with the overall estimated impact of 1.39 additional employees in the reference month, the estimate for 2007 is for only 1.22 additional employees.

The smaller estimated employment impact of subsidies started in 2007 may be due to the influence of the 2008–2009 recession. Output peaked in the fourth quarter of 2007, with employment peaking a year later, at the end of 2008 (Fabling & Maré 2012). Clearly, cyclical variation affects both the treatment and matched comparison groups, given that firms hiring subsidised workers are matched to comparison firms in the same month. It is possible that the cyclical slow-down disproportionately affected firms in the treatment group, which had embarked on an expansion of employment. Faced with a poor business outlook,

they may have curtailed their expansion, reducing the long-term impacts of the subsidy hires.

The impacts on the employment of subsidised and formerly subsidised workers that are shown in Figure 13 reflect in part the availability of data on subsidy starts after 2007. We do not have information on subsidy starts after December 2007, which leads to apparent declines in subsidised employment from 24 months after the reference month for the 2005 sample, from 12 months for the 2006 sample, and for the entire outcome period for the 2007 sample.

Mean monthly earnings impacts are consistently small and insignificant across years. The patterns are summarised in Figure 16.

## **7. SUMMARY OF MAIN FINDINGS**

### **Impacts on jobseekers**

We examine the impact of wage subsidies on the employment and earnings outcomes of jobseekers who started a subsidised job between January 2003 and December 2007.

The impact of subsidies on subsequent outcomes is estimated using the method of propensity matching, whereby jobseekers are matched to similar jobseekers who did not start a subsidised job on the basis of the estimated probability of starting a subsidised job. Differences in subsequent benefit, employment, and earnings of the two groups indicate the impact of starting a subsidised job on subsequent employment and earnings. We focus on the amount of time spent employed (that is, off-benefit and in unsubsidised employment) over the following 3 years and total earnings from employment over the same period.

We used the linked data to identify those jobseekers who start a new job-spell around the time recorded in the administrative data. We match each subsidy start to the closest job-spell start, up to 3 months before, or 1 month after the administrative start date. A valid job-spell match is identified for about 80 percent of cases.

The duration of the wage subsidies varies considerably, with 40 percent lasting 1 to 3 calendar months, and a median duration of 4 months. About 58 percent of subsidised jobs continue after the subsidy ends with 33 percent lasting up to 6 more months and 19 percent lasting more than 12 months after the subsidy ends. Where the subsidy is for 6 months, 40 percent of jobs last more than 12 months after the subsidy ends.

Those who start a subsidised job are much more likely to be employed and less likely to be receiving benefit 12 months later than those that did not start a subsidised job. About half of participants are employed and one-third are receiving benefits 12 months after starting a subsidised job. Participants are 26 percent more likely to be employed and 24 percent less likely to be on-benefit than matched comparisons.

Differences between participants and comparisons decline over time. Participants are 13 percent more likely to be employed and 10 percent less likely to be on-benefit 3 years later. On average, participants spend 6.1 more months employed, 5.0 fewer months on-benefit, and earn \$20,100 more than comparisons over the following 3 years.

The positive impacts on participants are evident for participant subgroups defined by previous benefit receipt or by demographic characteristics such as age, gender, ethnicity, and benefit duration.

While two-thirds of participants had received UB, significant minorities had received other types of benefits. Impacts are largest for DPB and TB recipients, who on average spend 7.8 and 7.3 more months employed and off-benefit over the subsequent 36 months. SB, UB, IB, and IYB participants spend 6.0, 5.8, 4.7, and 4.5 more months employed and off-benefit, respectively.



Participants who had received IB are more likely to be employed part-time and receiving benefits, and overall participants spend 7.7 more months employed over the subsequent 36 months than matched comparisons.

There is some variation in estimated impacts by age and ethnicity. In particular, the impacts are larger for those aged 35 and over and for Asian or other ethnic groups, and smaller for Māori and Pacific. Very similar variations are observed within benefit type, although among DPB and IB recipients, impacts are slightly smaller for women. Impacts are greater for those who had been in receipt of benefit for 2 or more years before starting the subsidised job.

For those who started a subsidised job in 2003, impacts up to 7 years later are observed. These participants are 7.5 percent more likely to be employed and 5.3 percent less likely to be receiving benefit 7 years later. On average, participants spend 11.1 more months in unsubsidised employment, 8.7 fewer months receiving benefit, and earn \$34,900 more than matched comparisons over the following 7 years.

Overall we find that starting a subsidised job leads to significant employment and earning benefits over several years.

### **Impacts on firms**

We estimate the impact on firms of hiring a subsidised worker. In particular, we examine how firms adjust their employment levels, and the employment of unsubsidised workers, when they take on a subsidised worker.

Consistent with the recent studies by Rotger and Arendt (2010) and Kangasharju (2007), we find that firms hiring subsidised workers increase their total employment relative to a sample of otherwise similar firms when they take on subsidised workers. Subsidised workers are not merely claiming subsidies to fill jobs that were previously filled by unsubsidised workers.

We estimate that the employment of unsubsidised workers actually increases when subsidised workers are hired. Most small to medium firms (50 or fewer employees) hiring subsidised workers take on only one subsidised worker at a time. On average, the number of subsidised workers hired in a month in these 'treated' firms is 1.09. Compared with employment changes among a group of matched comparison firms, employment in treated firms increases by 1.39 in the subsidy-start month, and is accompanied by a comparatively large hiring of unsubsidised workers (0.48 higher).

There is some evidence of weak substitution for very small firms (5 or fewer employees). For firms with average employment of 2 or fewer in the previous year, subsidised hires in the month of hiring average 1.04, yet total employment increases by only 0.96 employees, despite hiring more unsubsidised workers than comparable firms. At least some of these very small firms decrease their employment of unsubsidised workers when they hire a subsidised worker.

Our matching method controls effectively for differences between the treated firms and comparison firms in the 36 months up until the month immediately prior to the subsidy start date. The estimated treatment effect on total employment thus captures the change in employment that could not have been predicted from past information. If the hiring of a subsidised worker were the

only relevant difference between the treatment and matched comparison groups, we would attribute all of the subsequent employment change to the presence of the subsidy. However, we consider it implausible that the employment increases, relative to the comparison group, in the month of hiring can be attributed solely to the subsidised hiring.

If this were the case, we would infer, for firms of size 100 to 250, that hiring 1.28 subsidised workers induces firms to raise employment by more than 7 employees. Our preferred alternative explanation is that the month in which we observe a subsidised hire is a month in which the hiring firm has decided to expand employment anyway in response to an idiosyncratic labour demand shock. In this case, it is possible that subsidised workers are filling at least some of the vacancies that would have been filled anyway. We are unable to distinguish this from the possibility that subsidies are effective in inducing firms to expand employment beyond what they would have chosen otherwise, or to bring forward future employment growth by hiring a subsidised worker at the same time as they are actively hiring unsubsidised workers.

Treated firms continue to have higher employment levels than matched comparison firms for at least 36 months after a subsidy hire, although the size of the difference declines over time. The retention of subsidised workers after the end of their subsidy contributes significantly to the employment effect. The expansion of employment does not appear to be due to firms paying lower wages. The differences in average monthly earnings between the treatment and comparison groups are small and generally insignificant.

Overall, we find only weak evidence that firms are reducing unsubsidised employment when they take on a subsidised worker, and such substitution is evident only for the smallest firms. Subsidised workers are disproportionately hired into expanding firms and we are unable to determine the independent contribution of the subsidy to the firm's expansion.

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## TABLES & FIGURES

**Table 1: Characteristics of participants and non-participants**

	Non-participants	Non-participants on-benefit in the reference month	Participants
Number of observations	285,339	201,636	39,885
<b>Demographic characteristics</b>			
Average age	38.3	40.0	31.0
Male	40.9	37.9	65.5
No school qualifications (less than 3 SC subjects, less than 80 credits at NQF level 1)	14.8	14.9	20.8
Tertiary qualifications (National Certificate, Trade Certificate, Diploma or Degree)	4.1	3.5	4.4
Highest qualification not specified	12.3	13.1	0.2
Māori	23.9	25.0	31.4
Pacific	8.9	8.7	9.1
Partnered	18.8	18.7	13.8
Have dependent children	37.2	22.1	22.1
Arrived as a migrant since 1997	5.3	3.7	3.7
<b>Benefit type</b>			
Domestic Purposes	26.2	31.0	11.0
Independent Youth	0.7	0.6	1.8
Invalid's	18.7	24.7	5.3
Sickness	15.5	15.9	7.4
Unemployment	33.4	22.9	66.8
Training	1.7	1.6	7.1
<b>Programme participation in the last 3 years</b>			
Training Incentive Allowance (TIA)	8.9	10.7	6.1
Training Opportunities (TOPs)	6.5	6.6	20.7
Wage subsidy	3.5	3.1	13.0
Work experience	1.5	1.6	3.6
<b>Current benefit duration</b>			
Not on-benefit in month started subsidised work	30.3	2.1	4.6
Less than 3 months	6.1	8.5	16.6
Ten years or more	15.0	21.2	5.3
Median current benefit duration (months)	14.0	38.9	10.2
Average number of months on-benefit in the previous 12 months	8.8	10.5	9.0
<b>Benefit history over the last 10 years</b>			
Median cumulative benefit duration (years)	5.1	6.7	3.8
Cumulative duration less than 12 months	4.6	2.0	4.6
Cumulative duration of 6- < 10 years	29.0	33.0	28.5
On-benefit for the last 10 years	15.0	21.2	4.8
<b>Employment and earnings history</b>			
Number of months employed and off-benefit in the previous 12 months	1.7	0.7	1.6
Median monthly earnings (while employed and off-benefit) in the previous 24 months	1,862	1,712	1,683

Note: All counts have been randomly rounded to base 3. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

**Table 2: Characteristics of the study population by benefit type**

	Benefit type						Total
	Domestic Purposes	Invalid's	Youth	Sickness	Training	Unemployment	
Number of observations	4,251	2,028	597	2,883	2,628	26,334	38,808
<b>Demographic characteristics</b>							
Average age (years)	34.3	36.4	16.8	35.1	26.4	30.6	31.2
Male	15.7	70.3	60.7	72.1	70.5	72.9	65.8
No school qualifications (less than 3 SC subjects, less than 80 credits at NQF level 1)	71.2	78.9	77.5	71.2	75.2	68.7	70.3
Tertiary qualifications (National Certificate, Trade Certificate, Diploma or Degree)	5.5	4.9	-	7.9	4.5	9.1	7.9
Māori	46.8	22.2	49.2	28.6	42.1	39.9	39.2
Pacific	7.8	3.6	1.6	5.2	10.2	10.1	9.0
Partnered	-	19.8	-	21.3	11.9	15.5	14.0
Have dependent children	93.1	14.2	-	16.2	10.7	13.8	22.4
Migrant (after 1997)	1.1	-	-	3.3	4.8	4.2	3.6
<b>Programme participation in the last 3 years</b>							
Training Incentive Allowance (TIA)	37.5	18.3	-	1.6	0.6	1.0	6.0
Training Opportunities (TOPs)	15.6	12.7	-	13.9	78.8	16.9	20.3
Wage subsidy	7.1	8.2	-	12.8	11.3	14.6	12.9
Work experience	3.4	3.9	-	3.0	2.9	3.9	3.7
<b>Current benefit duration</b>							
Not on-benefit in the month prior	1.7	0.9	12.6	5.9	3.6	4.6	4.2
Less than 3 months	4.1	1.3	24.6	12.0	10.9	20.6	16.5
Ten years or more	15.6	28.0	-	4.0	1.7	2.4	5.3
Median current benefit duration (months)	38.0	68.0	4.6	11.2	10.1	8.0	10.4
Average number of months on-benefit in the previous 12 months	11.0	11.6	2.0	9.1	9.1	8.5	9.0

**Table 2 cont. Characteristics of the study population by benefit type**

	Benefit type						Total
	Domestic Purposes	Invalid's	Youth	Sickness	Training	Unemployment	
<b>Benefit history over the last 10 years</b>							
Median cumulative benefit duration (years)	7.2	8.3	0.6	4.2	2.2	3.3	4.4
Cumulative duration less than 12 months	3.0	1.3	77.0	13.0	26.4	20.6	18.3
Cumulative duration of 6-< 10 years	45.4	40.8	-	30.4	17.5	26.7	28.8
On-benefit for the last 10 years	15.5	27.9	-	4.0	-	1.9	4.9
<b>Employment and earnings history</b>							
Number of months employed and off-benefit in the previous 12 months	0.6	0.2	2.0	1.9	1.4	1.9	1.6
Median monthly earnings (while employed and off-benefit) in the previous 24 months	1899	1927	626	2019	1439	1697	1700
<b>Recorded incapacities during the last 2 years</b>							
Stress	-	7.2	-	15.4	-	0.5	1.9
Depression	-	11.5	-	22.5	-	0.6	2.7
Other mental health condition	-	36.0	-	27.1	-	0.6	4.3
Accident or injury	-	4.3	-	4.8	-	0.2	0.7
Substance abuse	-	4.9	-	12.1	-	0.3	1.4
Metabolic	-	4.0	-	4.2	-	0.1	0.6
Musculoskeletal	-	10.5	-	14.1	-	0.5	1.9
Fractures or back	-	5.1	-	9.6	-	0.4	1.3
Congenital	-	8.4	-	1.1	-	-	0.5
Nervous system	-	11.8	-	4.9	-	0.1	1.1
Sensory	-	6.9	-	1.6	-	-	0.5
Intellectual disability	-	21.3	-	-	-	-	1.2
Other	-	14.1	-	16.2	-	0.5	2.3

Note: All counts have been randomly rounded to base 3. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

**Table 3: Estimated impacts 1 and 3 years after starting a subsidised job**

	N	1 year							
		Percentage receiving benefit 12 months later	Percentage employed 12 months later	Percentage employed and off-benefit 12 months later	Number of months receiving benefit over the following 12 months	Number of months employed over the following 12 months	Number of months employed and off-benefit over the following 12 months	Average monthly earnings 12 months later	Average total earnings over the following 12 months
<b>Total</b>	38,808	-23.3	23.5	26.2	-1.6	0.9	2.0	38	9,960
<b>Benefit type</b>									
Domestic Purposes	4,251	-31.0	27.4	31.4	-2.4	1.2	2.4	#-9	11,660
Invalid's	2,028	-16.2	31.9	17.1	-1.1	1.6	1.2	#-76	9,020
Independent Youth	597	-22.4	20.1	22.5	-2.0	1.1	2.0	#59	7,640
Sickness	2,883	-21.4	26.3	25.0	-1.4	1.4	1.9	#-7	10,740
Training	2,628	-29.1	28.0	32.8	-2.1	1.2	2.5	115	12,010
Unemployment	26,334	-22.1	21.5	25.5	-1.5	0.7	1.9	#34	9,510
<b>Year</b>									
2003	10,608	-23.6	24.1	26.6	-1.9	1.1	2.2	#30	10,070
2004	9,546	-23.7	23.7	26.8	-1.7	0.9	2.0	#44	10,030
2005	7,149	-23.9	23.9	26.3	-1.6	0.9	1.9	77	9,940
2006	6,609	-22.7	23.5	25.7	-1.4	0.8	1.8	#27	9,970
2007	4,899	-21.5	21.1	24.3	-1.4	0.9	1.9	#16	9,640



**Table 3 cont. Estimated impacts 1 and 3 years after starting a subsidised job**

	N	3 years							
		Percentage receiving benefit 36 months later	Percentage employed 36 months later	Percentage employed and off-benefit 36 months later	Number of months receiving benefit over the following 36 months	Number of months employed over the following 36 months	Number of months employed and off-benefit over the following 36 months	Average monthly earnings 36 months later	Average total earnings over the following 36 months
<b>Total</b>	38,808	-10.2	12.8	13.0	-5.0	4.8	6.1	67	20,150
<b>Benefit type</b>									
Domestic Purposes	4,251	-16.5	15.0	16.8	-7.7	5.7	7.8	#19	24,780
Invalid's	2,028	-12.2	22.9	13.9	-4.2	7.7	4.7	103	20,240
Independent Youth	597	#-5.7	#5.4	#5.2	-4.4	3.3	4.5	200	13,470
Sickness	2,883	-9.9	12.8	11.9	-4.9	5.6	6.0	#13	21,650
Training	2,628	-13.0	12.8	14.3	-6.3	5.4	7.3	170	24,030
Unemployment	26,334	-8.8	11.8	12.4	-4.5	4.3	5.8	63	18,950
<b>Year</b>									
2003	10,608	-10.4	13.3	13.8	-5.3	5.0	6.4	68	20,540
2004	9,546	-10.5	12.1	13.0	-5.1	4.6	6.1	99	20,280
2005	7,149	-11.1	14.6	14.5	-5.3	5.2	6.4	83	21,050
2006	6,609	-8.9	12.3	11.4	-4.5	4.6	5.6	#7	19,600
2007	4,899	-9.4	11.1	11.3	-4.5	4.3	5.5	#39	18,450

Note: All counts have been randomly rounded to base 3. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. Dollar figures are expressed in March 2009 dollars. The term 'employed' refers to unsubsidised employment. Average monthly earnings is conditional on having non-zero earnings in the month. Average total earnings includes months with no earnings and includes earnings from subsidised employment. All estimates are significant at the 5% level, unless indicated by a hash (#). Statistical significance is calculated based on bootstrap standard errors (100 replications, sampled at the individual level prior to propensity estimation).

**Table 4: Jobs lasting longer than the subsidy by duration of subsidy**

<b>Months in job after subsidy ends</b>	<b>Subsidy duration (months)</b>					<b>Total</b>
	<b>1 month</b>	<b>2–3 months</b>	<b>4–6 months</b>	<b>7 months</b>	<b>8+ months</b>	
no months	71.4	65.1	39.2	10.3	23.3	42.3
1 month	11.2	14.3	12.6	7.7	9.6	11.4
2–3 months	7.4	8.3	11.4	12.1	10.8	10.2
4–6 months	3.6	4.3	9.2	13.9	11.6	8.5
7–12 months	2.9	3.1	9.3	17.1	13.3	9.0
13–24 months	1.8	2.2	8.9	17.8	14.5	8.7
25+ months	1.7	2.6	9.4	21.0	17.1	9.9
	100.0	100.0	100.0	100.0	100.0	100.0
Number	5,877	9,369	11,892	9,975	1,470	38,580
Percentage	15.2	24.3	30.8	25.9	3.8	100.0

Note: All counts have been randomly rounded to base 3. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

**Table 5: Estimated impacts 3 years after starting a subsidised job by age, sex, ethnicity, and current benefit duration**

	All types of main benefit							
	N	Percentage receiving benefit 36 months later	Percentage employed 36 months later	Percentage employed and off-benefit 36 months later	Number of months receiving benefit over the following 36 months	Number of months employed over the following 36 months	Number of months employed and off-benefit over the following 36 months	Average total earnings over the following 36 months
<b>Total</b>	38,808	-10.2	12.8	13.0	-5.0	4.8	6.1	20,150
<b>Age</b>								
16–17 years	567	#-6.8	#5.4	#6.6	-4.4	3.4	4.6	14,496
18–19 years	5,061	-9.3	10.1	10.8	-4.0	3.7	5.0	15,783
20–24 years	9,381	-8.4	10.2	10.6	-4.0	3.7	5.1	16,187
25–34 years	9,951	-7.5	11.4	10.9	-4.3	4.4	5.6	19,166
35–44 years	7,722	-12.0	13.9	14.5	-5.9	5.5	6.9	23,327
45–54 years	4,329	-14.5	17.3	18.1	-7.0	6.3	8.0	26,726
55–64 years	1,356	-15.5	23.7	24.0	-8.0	8.7	10.1	32,987
<b>Sex</b>								
Male	25,530	-9.3	13.0	12.9	-4.6	4.9	6.0	20,637
Female	13,278	-11.9	12.4	13.1	-5.7	4.6	6.3	19,204
<b>Ethnicity</b>								
Asian	1,263	-14.1	17.3	18.1	-6.3	6.6	7.9	25,788
European	17,754	-9.9	13.8	13.8	-4.8	4.9	6.2	20,651
Māori	15,297	-10.2	11.2	11.7	-5.1	4.4	5.7	18,965
Pacific	3,465	-8.6	11.2	11.3	-4.6	4.4	5.8	18,949
Other	831	-14.2	18.2	17.6	-6.6	6.9	7.8	26,482
<b>Current duration</b>								
< 6 months	13,092	-4.6	9.0	9.1	-2.0	2.6	3.9	13,469
6–< 24 months	13,497	-10.5	11.5	12.6	-5.6	4.8	6.6	21,502
2–< 4 years	4,554	-13.7	14.7	15.7	-7.3	6.7	8.0	26,011
4 years +	6,465	-19.0	21.0	19.9	-8.1	7.6	8.3	26,994

Note: All counts have been randomly rounded to base 3. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. Dollar figures are expressed in March 2009 dollars. The term 'employed' refers to unsubsidised employment. Average total earnings includes months with no earnings and includes earnings from subsidised employment. All estimates are significant at the 5% level, unless indicated by a hash (#). Statistical significance is calculated based on bootstrap standard errors (100 replications, sampled at the individual level prior to propensity estimation).

**Table 6: Estimated impacts 5 and 7 years after starting a subsidised job by benefit type**

	<b>N</b>	<b>Percentage receiving benefit 5 years later</b>	<b>Percentage employed 5 years later</b>	<b>Percentage employed and off-benefit 5 years later</b>	<b>Number of months receiving benefit over the following 5 years</b>	<b>Number of months employed over the following 5 years</b>	<b>Number of months employed and off-benefit over the following 5 years</b>	<b>Average total earnings over the following 5 years</b>
<b>Total</b>	27,303	-7.2	9.5	9.7	-7.3	7.6	9.0	28,410
<b>Benefit type</b>								
Domestic Purposes	2,739	-11.1	10.5	10.7	-10.2	8.3	10.3	32,851
Invalid's	1,245	-9.7	14.5	9.9	-6.9	12.4	7.4	29,037
Independent Youth	456	#-2.5	#1.4	#0.4	-5.8	5.2	6.1	17,317
Sickness	1,557	-4.2	9.9	7.9	-6.7	8.6	8.6	28,752
Training	1,602	-9.5	9.6	11.0	-9.6	8.3	10.8	34,038
Unemployment	19,641	-6.6	9.2	9.8	-6.7	7.2	8.9	27,473
	<b>N</b>	<b>Percentage receiving benefit 7 years later</b>	<b>Percentage employed 7 years later</b>	<b>Percentage employed and off-benefit 7 years later</b>	<b>Number of months receiving benefit over the following 7 years</b>	<b>Number of months employed over the following 7 years</b>	<b>Number of months employed and off-benefit over the following 7 years</b>	<b>Average total earnings over the following 7 years</b>
<b>Total</b>	10,587	-5.3	7.5	7.5	-8.7	9.8	11.1	34,860
<b>Benefit type</b>								
Domestic Purposes	966	-7.9	8.3	7.9	-12.3	10.4	12.0	38,010
Invalid's	315	-8.0	12.9	9.6	-9.9	18.0	10.9	41,370
Independent Youth	189	#-2.1	#8.3	#9.5	-6.9	6.6	7.8	19,820
Sickness	441	#-2.2	#5.8	#5.1	-9.0	11.4	11.6	36,630
Training	624	-6.5	5.8	7.8	-11.3	10.1	12.6	42,550
Unemployment	8,028	-4.9	7.4	7.5	-8.0	9.3	11.0	33,800

Note: All counts have been randomly rounded to base 3. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. Dollar figures are expressed in March 2009 dollars. The term 'employed' refers to unsubsidised employment. Average monthly earnings is conditional on having non-zero earnings in the month. Average total earnings includes months with no earnings and includes earnings from subsidised employment. All estimates are significant at the 5% level, unless indicated by a hash (#). Statistical significance is calculated based on bootstrap standard errors (100 replications, sampled at the individual level prior to propensity estimation).

**Table 7: Firm analysis: Size of treatment and comparison groups**

<b>Employment size class</b>	<b>Potential comparison</b>	<b>All treatment</b>	<b># subsidy starts</b>	<b>Matched treatment</b>	<b># subsidy starts</b>
<b>(a) Main analysis sample</b>					
(0,2]	2,763,396	3,576	3,702	3,555	3,681
(2,5]	2,430,888	6,828	7,164	6,810	7,140
(5,10]	1,454,439	6,621	7,164	6,594	7,137
(10,20]	843,141	5,691	6,384	5,649	6,309
(20,50]	482,763	5,064	5,949	4,989	5,856
50 or less	7,974,627	27,780	30,363	27,597	30,123
(50,100]	136,881	2,256	2,763	2,130	2,586
(100,250]	70,623	1,815	2,352	1,557	1,992
Above 250	40,332	2,766	4,590	2,085	3,273
50 or more	247,836	6,837	9,705	5,772	7,851
Total	8,222,463	34,620	40,068	33,372	37,971
<b>(b) Production sub-sample</b>					
(0,2]	1,002,744	1,191	1,215	1,158	1,182
(2,5]	969,582	2,514	2,604	2,499	2,586
(5,10]	587,499	2,727	2,907	2,679	2,853
(10,20]	333,072	2,427	2,709	2,358	2,607
(20,50]	181,749	2,148	2,544	2,049	2,424
50 or less	3,074,646	11,007	11,979	10,743	11,652
(50,100]	57,429	1,062	1,323	825	1,005
(100,250]	36,675	1,023	1,350	714	897
Above 250	23,409	1,866	3,177	1,119	1,797
50 or more	117,513	3,951	2,673	2,658	3,699
Total	3,192,162	14,961	17,826	13,401	15,354

Note: All counts have been randomly rounded to base 3. Counts are for enterprise-month observations, except for subsidy starts, which record the total number of subsidy spells. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. Square brackets indicate that the value is included in the range; parentheses indicate that the value is excluded.

**Table 8: Firm analysis: Subsidy starts and the number of subsidised workers (2003–2007)**

	In month when a subsidy starts		In a month where a subsidy is being received	For enterprises that ever started a subsidy
	Number of subsidy starts	Number of subsidised workers	Number of subsidised workers	Total number of subsidy starts
Mean	1.2	1.6	1.3	2.1
1	90.3%	73.5%	85.2%	65.3%
2	7.0%	15.1%	9.9%	17.2%
3	1.6%	5.2%	2.5%	7.0%
4	0.5%	2.3%	1.0%	3.6%
5	0.2%	1.2%	0.5%	2.0%
6 or more	0.4%	2.7%	0.9%	4.9%
Observation count	34,620 enterprise-months	34,620 enterprise-months	155,553 enterprise-months	22,278 enterprises

Note: Counts have been randomly rounded to base 3. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

**Table 9: Firm analysis: Characteristics of treatment and comparison groups (Size ≤ 50)**

	Potential comparison	Matched comparison	Matched treatment	Raw difference
Mean annual employment	6.1	11.3	11.3	5.2
Mean monthly earnings	\$2,357	\$2,122	\$2,012	-\$345
Annual employment growth	8%	14%	13%	5%
Hiring rate	13%	16%	16%	3%
Firm age if less than 36 months (months)	20.3	19.3	19.3	-1.0
Firm age ≥ 36 years	62%	65%	65%	3%
% male	54%	61%	61%	7%
% young	22%	29%	29%	7%
% low earners	48%	51%	51%	4%
Previous subsidy	5%	43%	44%	38%
Northland Region	4%	6%	5%	2%
Auckland Region	29%	26%	27%	-3%
Waikato Region	11%	11%	10%	0%
Bay of Plenty Region	7%	11%	11%	4%
Gisborne Region	1%	2%	1%	0%
Hawke's Bay Region	4%	5%	5%	1%
Taranaki Region	3%	5%	5%	2%
Manawatū-Wanganui Region	6%	9%	8%	2%
Wellington Region	10%	10%	10%	0%
West Coast Region	1%	2%	2%	1%
Canterbury Region	13%	9%	9%	-4%
Otago Region	5%	3%	4%	-2%
Southland Region	3%	2%	2%	-1%
Tasman Region	1%	1%	1%	-1%
Nelson Region	1%	1%	1%	0%
Marlborough Region	1%	1%	1%	-1%
Number of enterprise-months	7,974,626	129,420	27,597	

Note: All counts have been randomly rounded to base 3. The means for the matched comparison group are weighted means, based on the contribution of each observation to the matched sample. The reported observation count is the sum of weights. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

**Table 10: Firm analysis: Industry composition of treatment and comparison groups (size ≤ 50)**

<b>Industry group</b>	<b>Potential comparison</b>	<b>Matched comparison</b>	<b>Matched treatment</b>	<b>Raw difference</b>
E32-Construction Svce	7.7%	11.1%	11.1%	3.3%
H45-Food and Beverage Svce	5.7%	8.6%	8.6%	2.9%
A01-Agriculture	12.1%	5.7%	5.4%	-6.7%
G42-Other Store-Based Retailing	6.5%	5.0%	5.0%	-1.5%
G41-Food Retailing	1.9%	2.2%	2.3%	0.4%
S95-Personal and Other Svce	4.9%	3.8%	3.8%	-1.1%
C11-Food Product Mfrg	1.0%	3.1%	3.1%	2.0%
S94-Repair and Maintenance	3.8%	4.7%	4.6%	0.8%
N72-Administrative Svce	1.8%	1.3%	1.3%	-0.5%
N73-Building Cleaning, Pest Control, etc.	1.3%	2.5%	2.4%	1.1%
I46-Road Transport	2.1%	2.6%	2.6%	0.4%
E30-Building Construction	3.6%	2.6%	2.5%	-1.0%
C22-Fabricated Metal Product Mfrg	1.3%	3.1%	3.3%	1.9%
C14-Wood Product Mfrg	0.9%	2.7%	2.6%	1.6%
P80-Preschool and School Education	2.3%	2.5%	2.3%	0.0%
M69-Profess, Scientific & Techn Svce	7.7%	2.1%	2.2%	-5.5%
H44-Accommodation	1.7%	2.1%	2.1%	0.4%
A05-Agric, Forestry & Fishing Support	1.4%	1.4%	1.5%	0.2%
G39-Motor Vehicle and MV Parts Retail	1.1%	2.1%	2.1%	1.0%
C25-Furniture and Other Mfrg	0.9%	1.8%	1.8%	0.8%
C13-Textile, Leather, Clothing & Footwear	0.8%	1.5%	1.4%	0.6%
E31-Heavy and Civil Engin Construction	0.5%	1.1%	1.1%	0.6%
F37-Other Goods Wholesaling	1.8%	1.4%	1.5%	-0.3%
G40-Fuel Retailing	0.5%	1.3%	1.2%	0.7%
F33-Basic Material Wholesaling	0.9%	1.4%	1.5%	0.6%
Q86-Residential Care Svce	0.5%	1.0%	1.0%	0.5%
C24-Machinery and Equipment Mfrg	1.3%	1.5%	1.5%	0.3%
Q87-Social Assistance Svce	1.1%	1.1%	1.2%	0.1%
R91-Sport and Recreation Activities	1.7%	1.3%	1.3%	-0.4%
F36-Grocery, Liquor, Tobacco Wholesale	0.7%	1.1%	1.1%	0.4%
O77-Public Order, Safety and Regul Svce	0.3%	0.8%	0.9%	0.5%
O75-Public Administration	0.0%	0.0%	0.0%	0.0%
C19-Polymer Product, Rubber Mfrg	0.4%	1.0%	1.0%	0.7%
L67-Property Oper & Real Estate Svce	2.6%	0.8%	0.9%	-1.7%
P82-Adult, Community & Other Educ	0.9%	1.1%	1.1%	0.2%
Q85-Medical & Other Health Care Svce	3.7%	0.8%	0.8%	-3.0%
C-Other Mfrg	1.9%	3.6%	3.6%	1.7%
I-Other Transport, Postal & Warehousing	1.2%	1.7%	1.7%	0.5%
F-Other Wholesale Trade	2.4%	1.9%	1.9%	-0.5%
Residual industry category	6.7%	4.6%	4.8%	-1.9%

Note: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.



**Table 11: Firm analysis: Characteristics of treatment and comparison groups (size ≤ 50)—  
production sample**

	Potential comparison	Matched comparison	Matched treatment	Raw difference
Mean annual employment	6.2	11.8	11.8	5.6
Mean monthly earnings	\$2,370	\$2,175	\$2,078	-\$292
Annual employment growth	8%	13%	11%	3%
Hiring rate	11%	14%	14%	3%
Firm age if less than 36 months (months)	25.1	25.4	25.5	0.4
Firm age ≥ 36 years	70%	77%	77%	6%
% low earners	59%	65%	65%	7%
% male	24%	30%	31%	6%
% young	46%	48%	48%	2%
Previous subsidy	5%	43%	44%	38%
Log (capital)	10.68	11.04	11.04	0.36
Log (intermediates)	11.98	12.49	12.50	0.52
Capital growth	11%	15%	15%	4%
Intermediates growth	8%	12%	12%	4%
Output growth	10%	15%	15%	5%
Multi-factor productivity	0.17	0.11	0.11	-0.06
Number of observation-months	3,074,646	49,377	10,743	

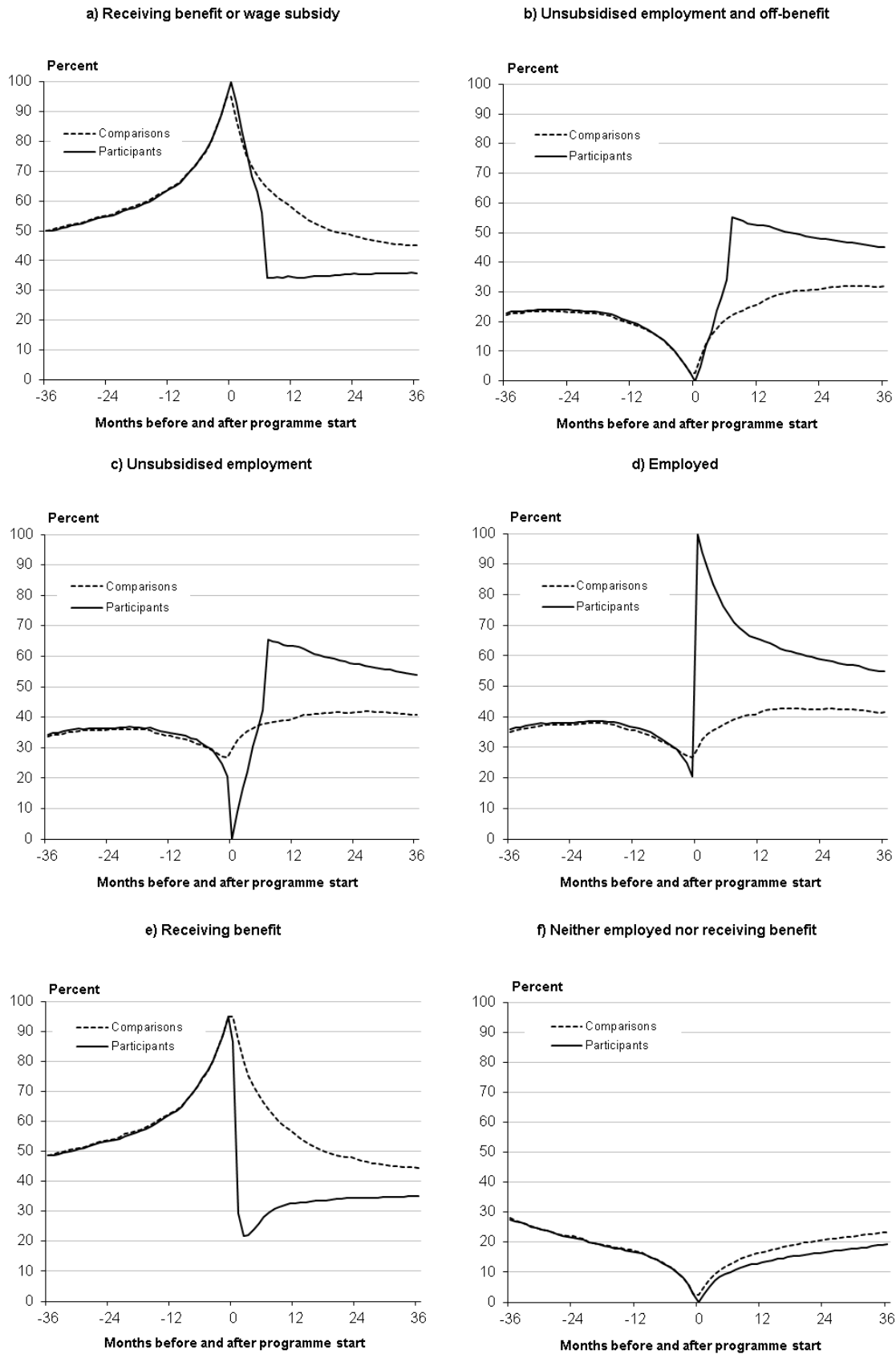
Note: All counts have been randomly rounded to base 3. The means for the matched comparison group are weighted means, based on the contribution of each observation to the matched sample. The reported observation count is the sum of weights. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

**Table 12: Firm analysis: Summary of average effect of treatment on the treated**

	In month prior to subsidy start		In month of subsidy start			12 months later	36 months later
	Mean total empl.	ATT (Subs. empl.)	Subsidy starts	ATT (Other hires)	ATT (total empl.)	ATT (total empl.)	ATT (total empl.)
<b>(a) Main analysis sample</b>							
All (emp ≤ 50)	11.7	0.2	1.09	0.48	1.39	0.82	0.52
<b>Employment size class</b>							
(0,2]	1.5	0.0	1.04	0.15	0.96	0.60	0.43
(2,5]	3.6	0.1	1.05	0.22	1.04	0.49	0.29
(5,10]	7.5	0.1	1.08	0.43	1.28	0.61	#0.22
(10,20]	14.7	0.3	1.12	0.63	1.62	0.96	0.74
(20,50]	31.8	0.5	1.17	0.96	2.10	1.54	#1.05
(50,100]	72.9	0.5	1.21	2.50	4.02	3.77	#5.16
(100,250]	162.6	0.7	1.28	6.63	7.32	#3.23	#3.70
Above 250	1380.0	1.4	1.57	58.95	#238.40	#251.87	#248.41
<b>By year (emp ≤ 50)</b>							
2003	11.8	0.2	1.10	0.54	1.45	0.69	0.54
2004	11.8	0.2	1.09	0.46	1.38	0.87	#0.44
2005	11.7	0.2	1.09	0.51	1.48	0.93	0.71
2006	11.3	0.2	1.08	0.44	1.39	0.93	0.51
2007	11.5	0.2	1.09	0.39	1.22	0.69	#0.39
<b>(b) Production sub-sample</b>							
All (emp ≤ 50)	12.0	0.2	1.08	0.38	1.28	0.78	0.63
<b>Employment size class</b>							
(0,2]	1.5	#0.0	1.02	0.21	0.97	0.65	0.40
(2,5]	3.6	0.1	1.04	0.19	0.95	0.51	0.33
(5,10]	7.4	0.1	1.06	0.38	1.18	0.56	0.44
(10,20]	14.4	0.2	1.11	0.52	1.41	0.68	#0.45
(20,50]	31.5	0.5	1.18	0.57	1.83	1.60	1.60
(50,100]	73.1	0.5	1.22	#2.23	#3.76	#5.25	#4.52
(100,250]	167.5	0.7	1.26	5.67	#5.95	1.60	#-0.99
Above 250	1614.7	1.4	1.60	90.05	338.98	351.90	341.05
<b>By year (emp ≤ 50)</b>							
2003	11.9	0.2	1.09	0.29	1.22	#0.56	#0.53
2004	12.3	0.2	1.10	0.45	1.23	0.83	#0.68
2005	12.2	0.2	1.09	0.46	1.39	0.87	#0.73
2006	11.7	0.2	1.08	0.38	1.33	1.03	#0.87
2007	12.0	0.1	1.06	0.36	1.23	#0.70	#0.31

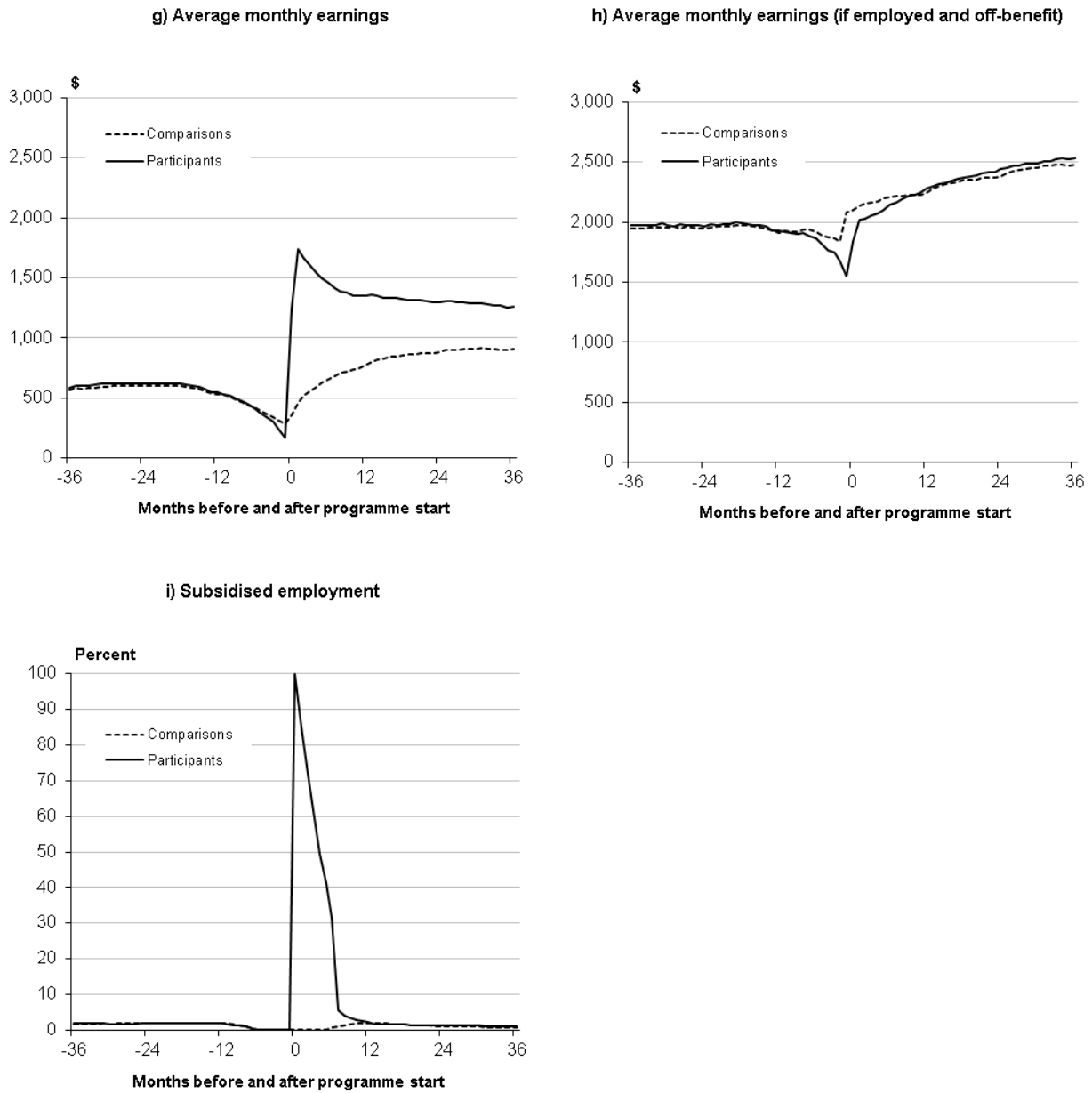
Notes: ATT refers to 'average effect of treatment on the treated'. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. All ATT estimates are significant at the 5% level, unless indicated by a hash (#). Statistical significance is calculated based on bootstrap standard errors (100 replications, sampled at the firm level prior to propensity estimation). Square brackets indicate that the value is included in the range; parentheses indicate that the value is excluded.

**Figure 1: Selected outcomes for participants and matched comparisons**



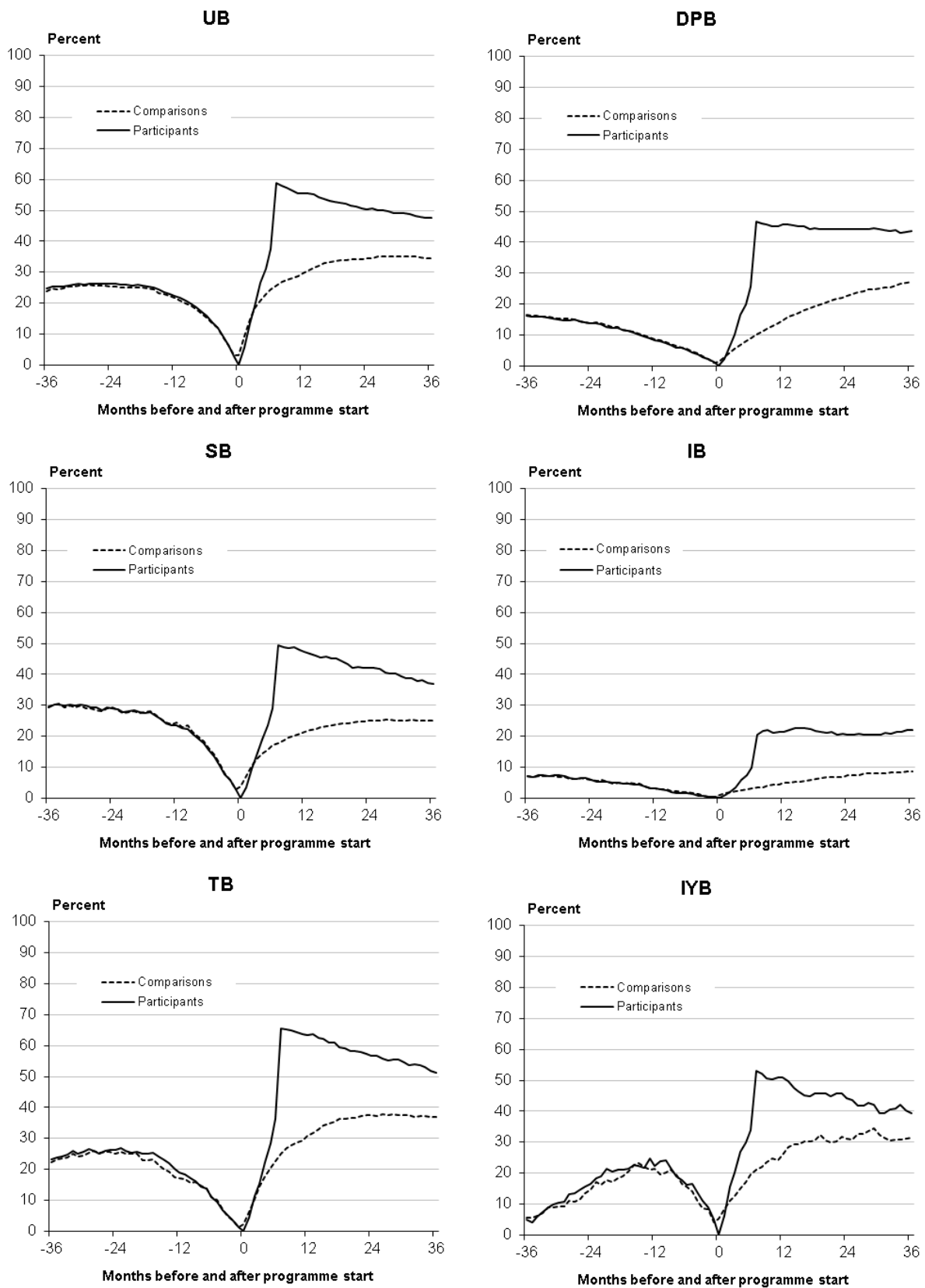
Notes: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

**Figure 1 cont. Selected outcomes for participants and matched comparisons**



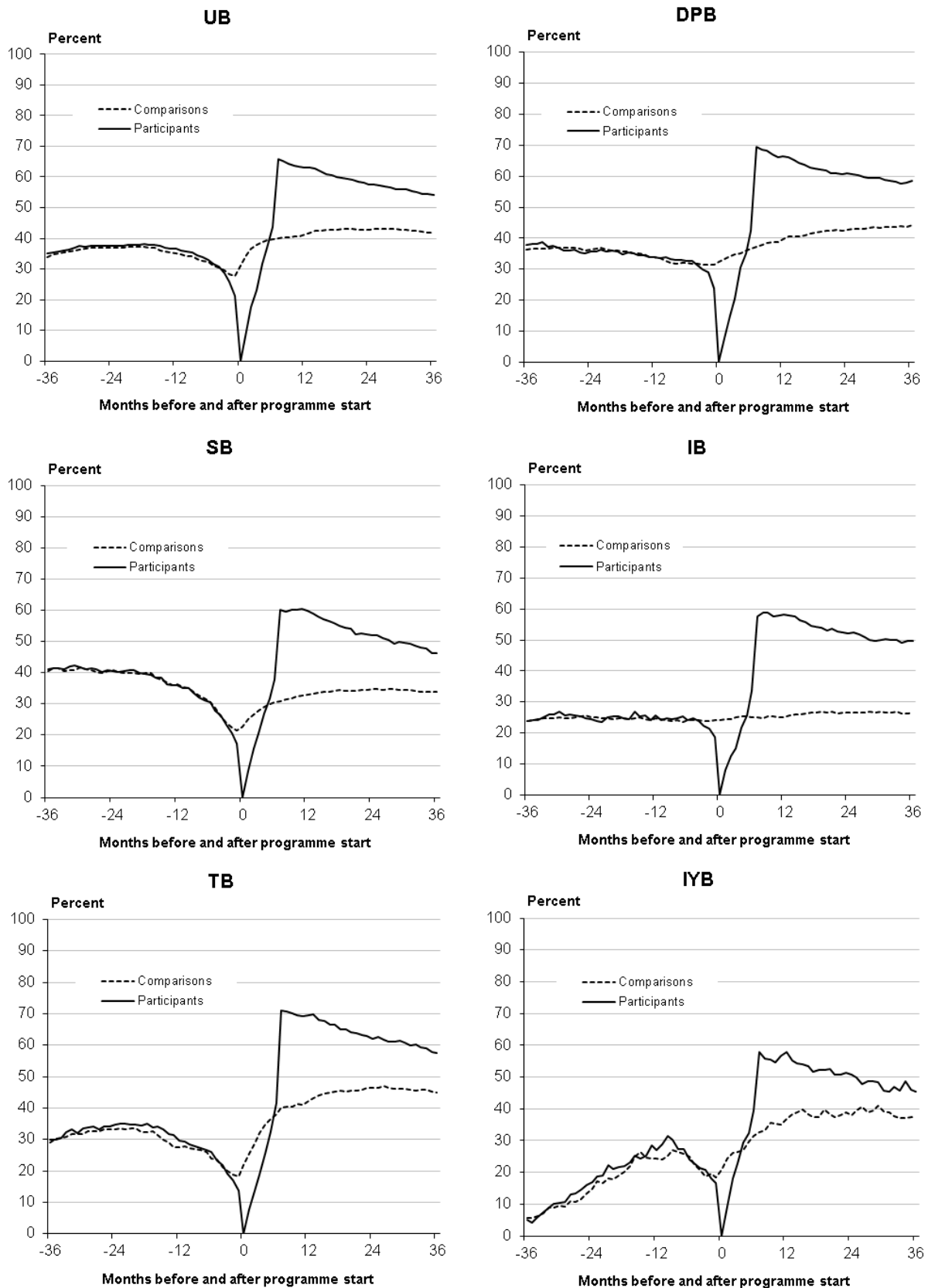
Notes: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand

**Figure 2: Percentage in unsubsidised employment and off-benefit, participants and matched comparisons, by benefit type**



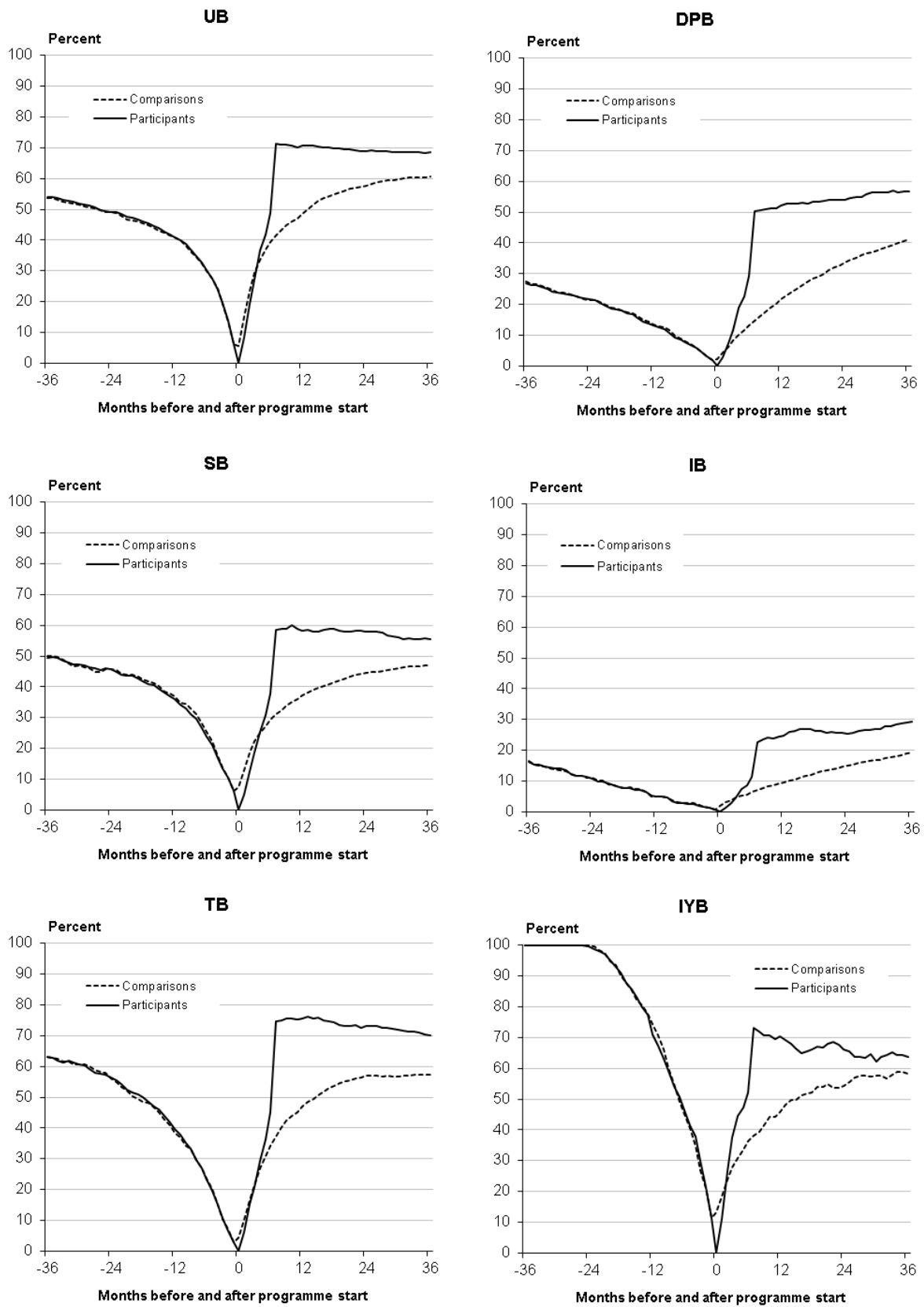
Notes: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. UB = Unemployment Benefit; DPB = Domestic Purposes Benefit; SB = Sickness Benefit; IB = Invalid's Benefit; TB = Training Benefit; IYB = Independent Youth Benefit.

**Figure 3: Percentage in unsubsidised employment, participants and matched comparisons, by benefit type**



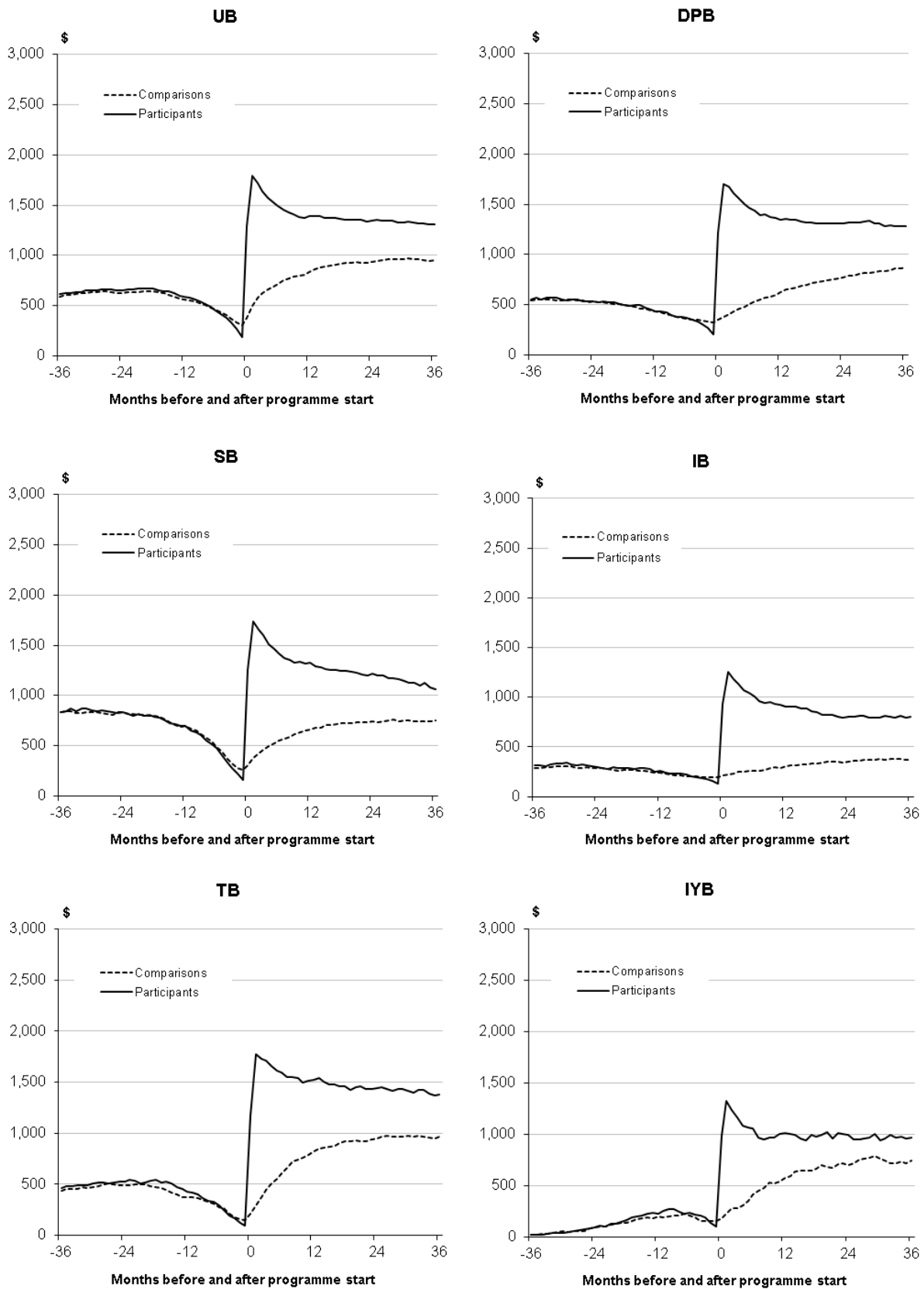
Notes: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. UB = Unemployment Benefit; DPB = Domestic Purposes Benefit; SB = Sickness Benefit; IB = Invalid's Benefit; TB = Training Benefit; IYB = Independent Youth Benefit.

**Figure 4: Percentage off-benefit, participants and matched comparisons, by benefit type**



Notes: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. UB = Unemployment Benefit; DPB = Domestic Purposes Benefit; SB = Sickness Benefit; IB = Invalid's Benefit; TB = Training Benefit; IYB = Independent Youth Benefit.

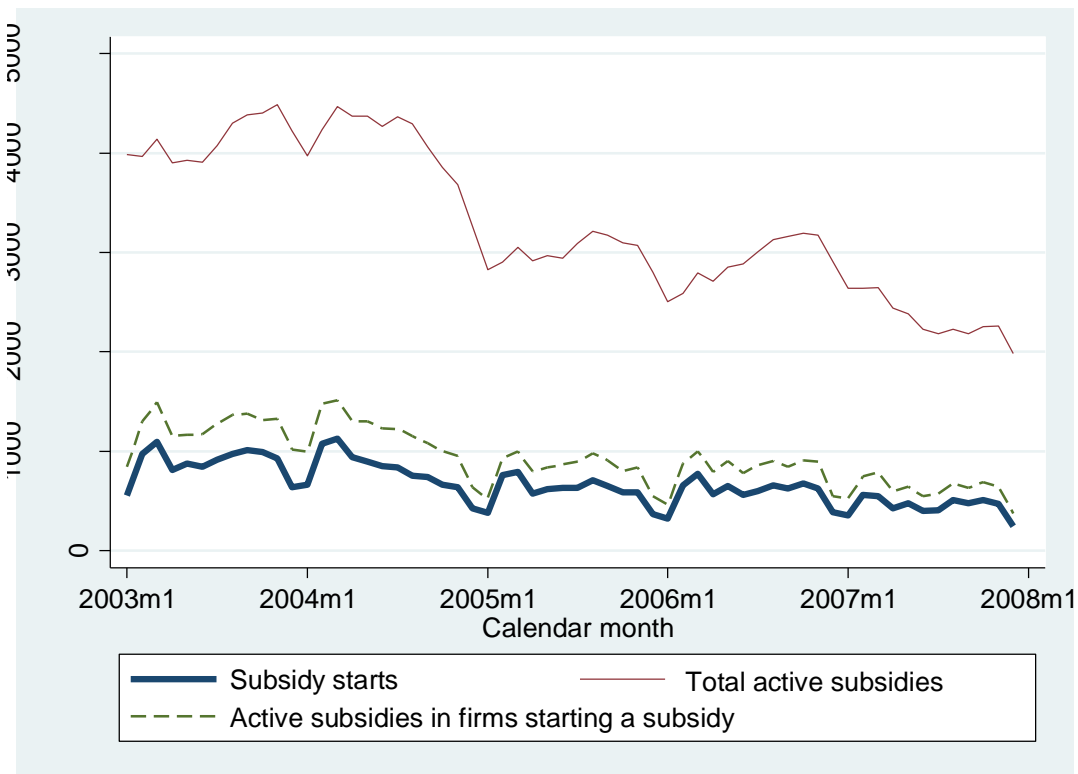
**Figure 5: Average monthly earnings (including those with no earnings), participants and matched comparisons, by benefit type**



Notes: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. UB = Unemployment Benefit; DPB = Domestic Purposes Benefit; SB = Sickness Benefit; IB = Invalid's Benefit; TB = Training Benefit; IYB = Independent Youth Benefit.

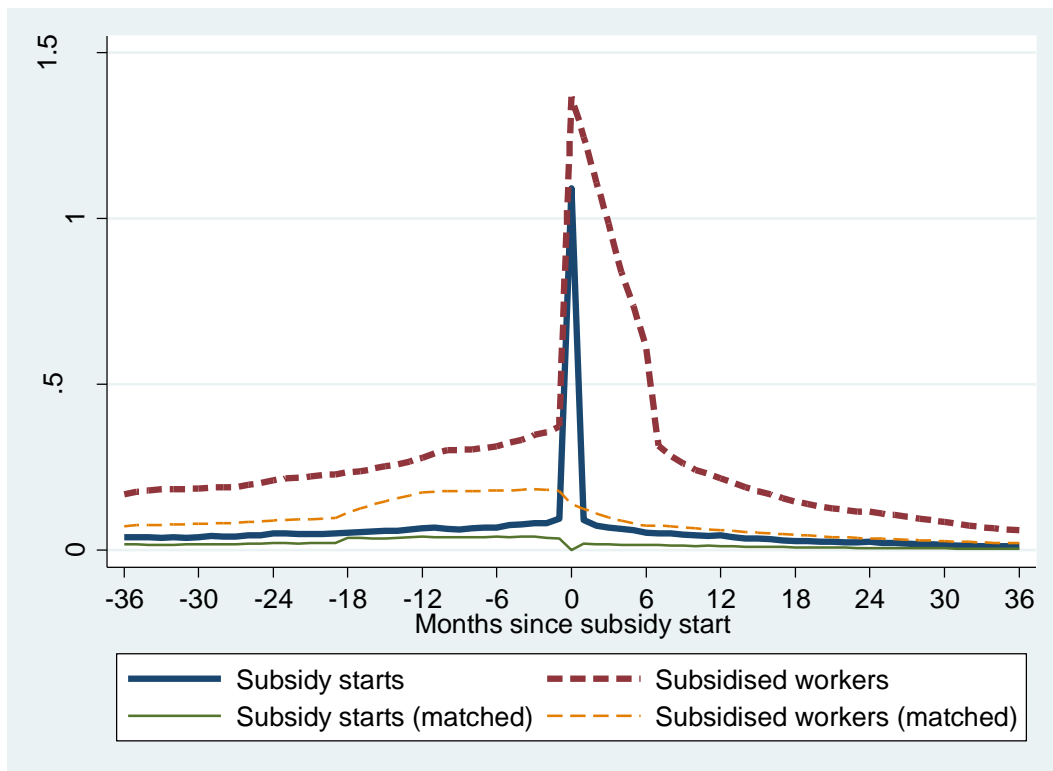


**Figure 6: Firm analysis: Subsidy starts and the number of subsidised workers**



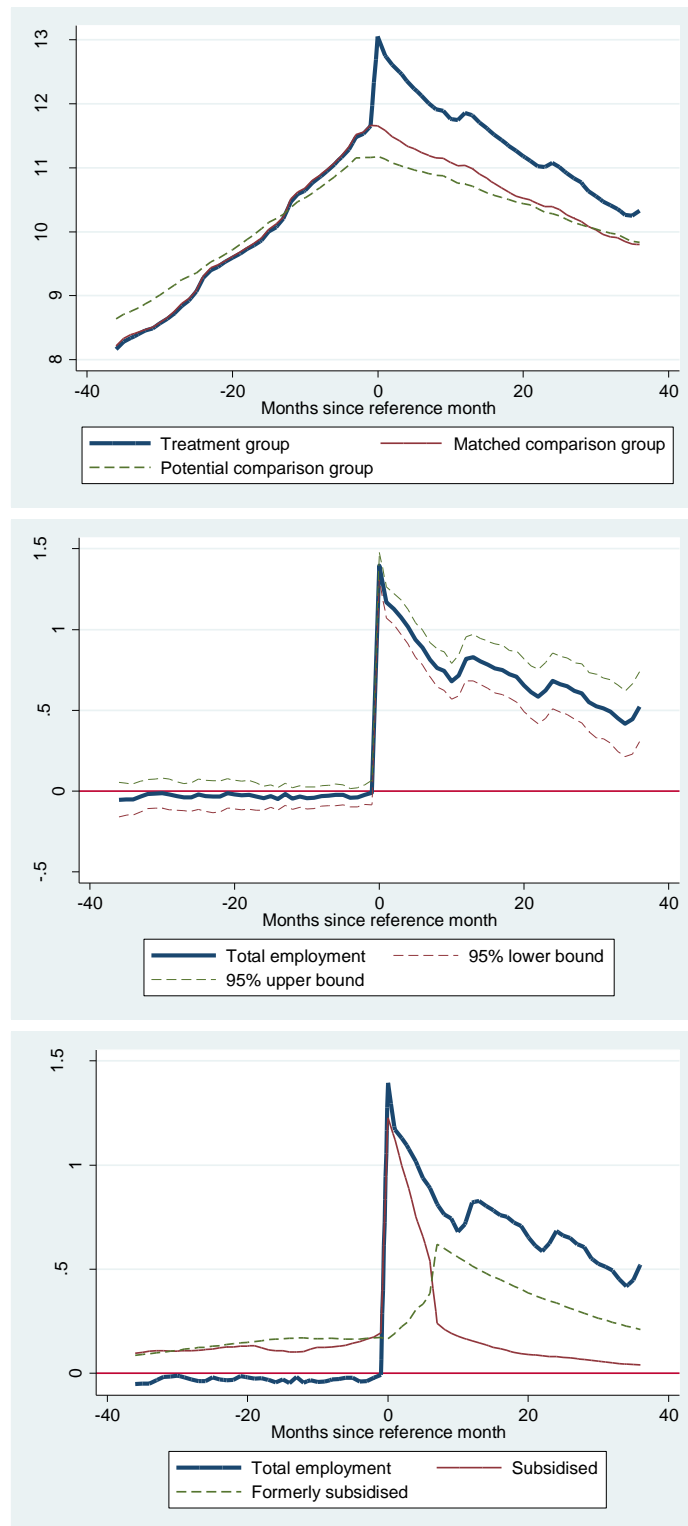
Note: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

**Figure 7: Firm analysis: Contribution of subsidised workers to employment (for firms with mean annual employment 50 or less)**



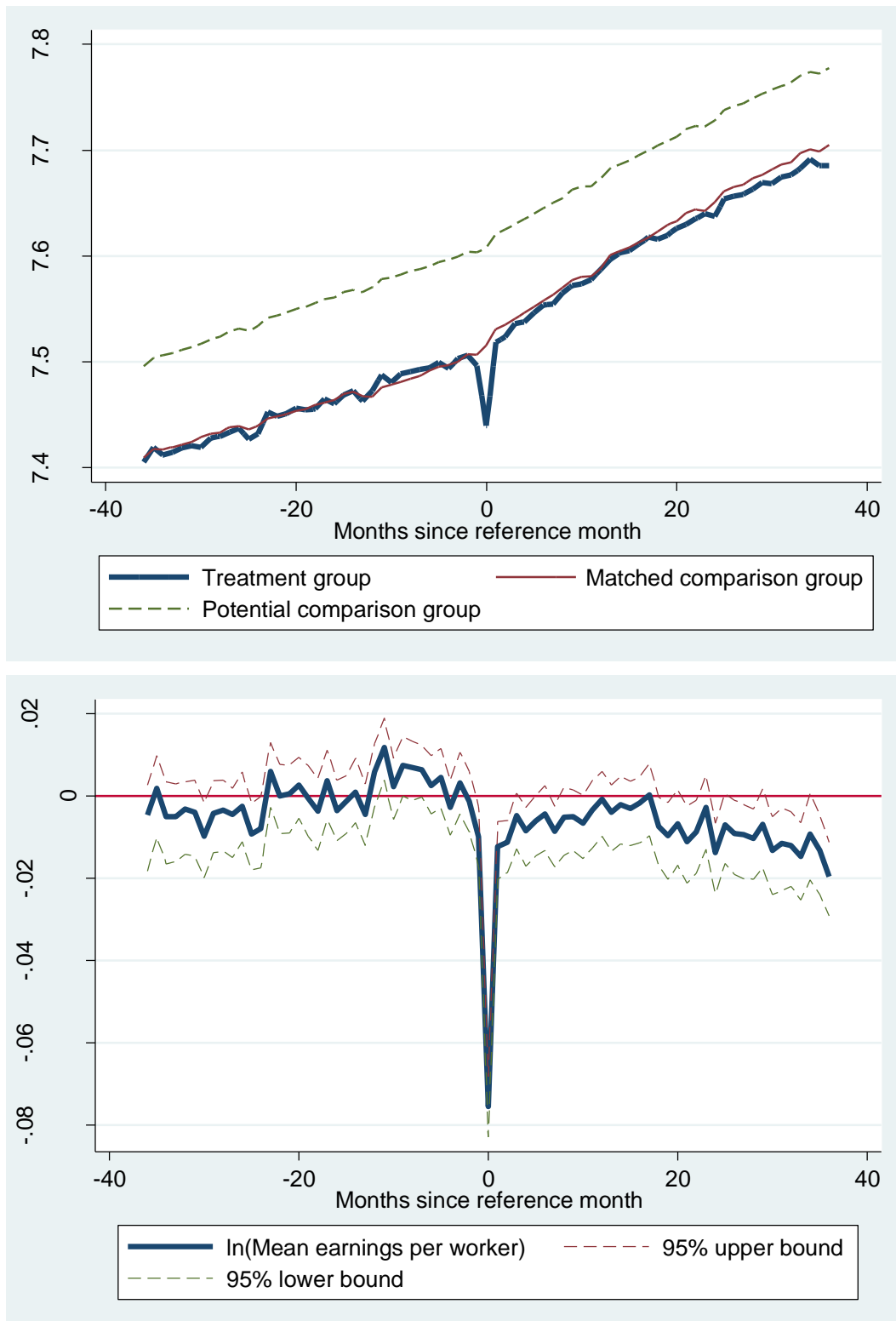
Note: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

**Figure 8: Firm analysis: Outcomes for treatment and comparison groups (for firms with mean annual employment 50 or less)**



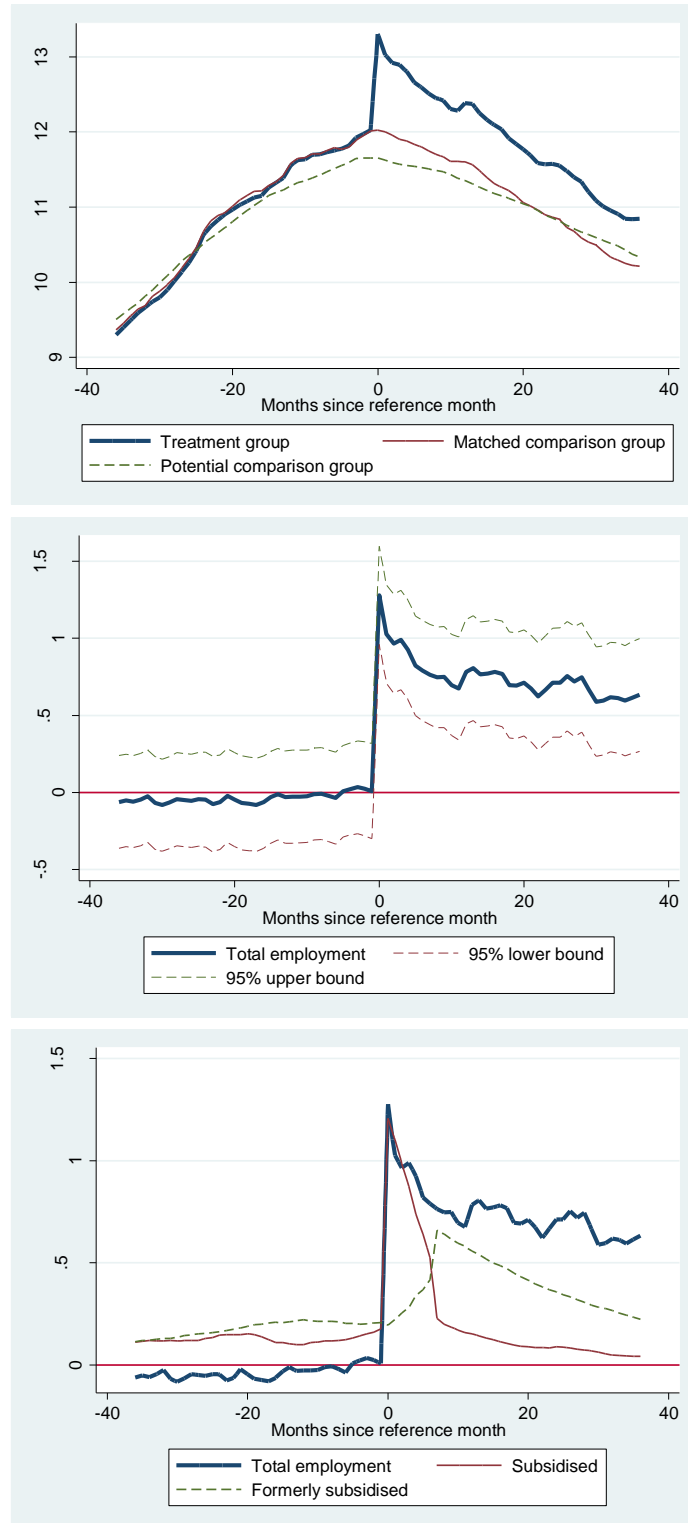
Note: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. Confidence intervals in the middle panel are calculated based on bootstrap standard errors (100 replications, sampled at the firm level prior to propensity estimation).

**Figure 9: Firm analysis: Mean earnings for treatment and comparison group (for firms with mean annual employment 50 or less)**



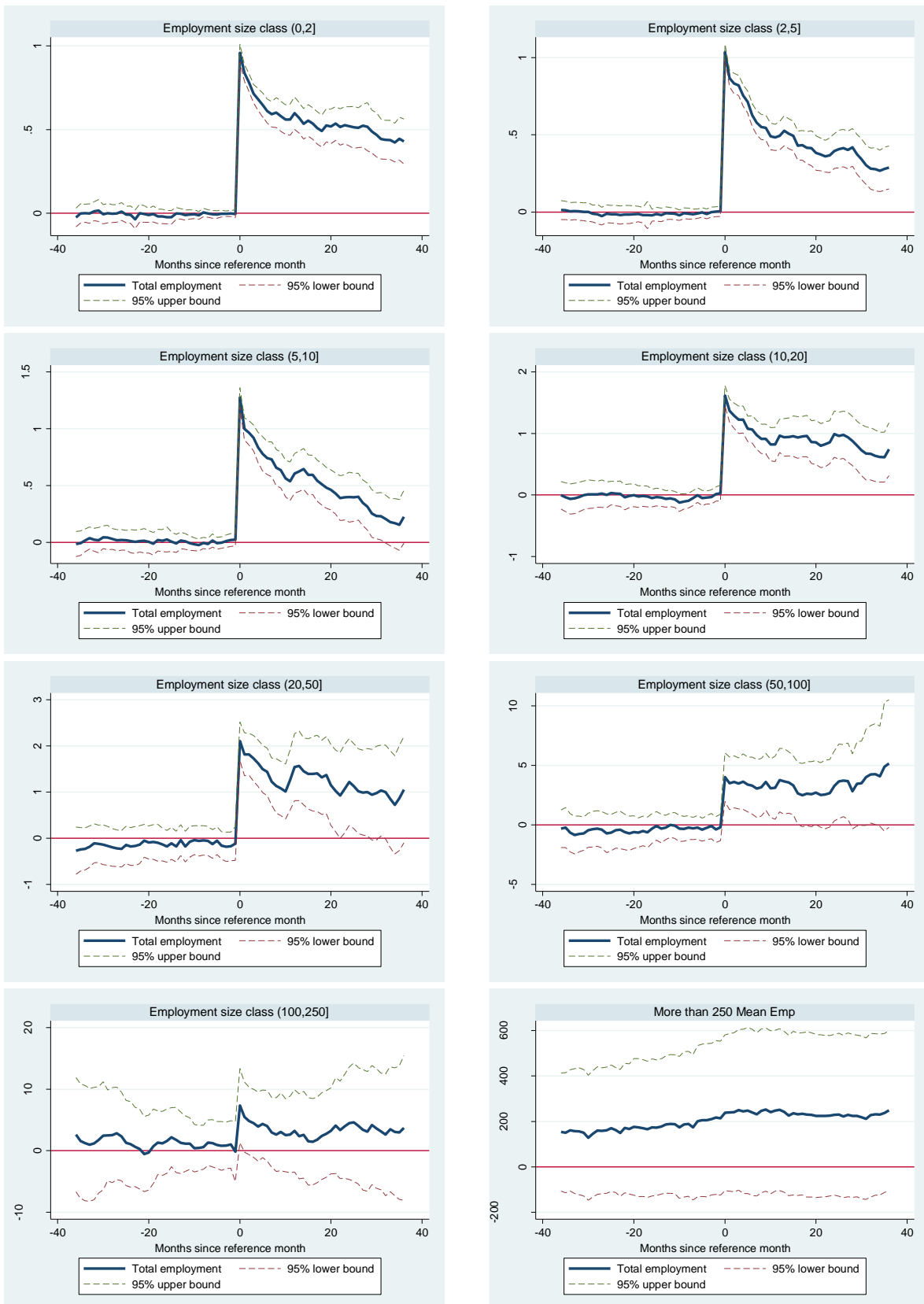
Note: ATT refers to 'average effect of treatment on the treated'. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. Confidence intervals in the lower panel are calculated based on bootstrap standard errors (100 replications, sampled at the firm level prior to propensity estimation).

**Figure 10: Firm analysis: Outcomes for treatment and comparison groups (production sample)**



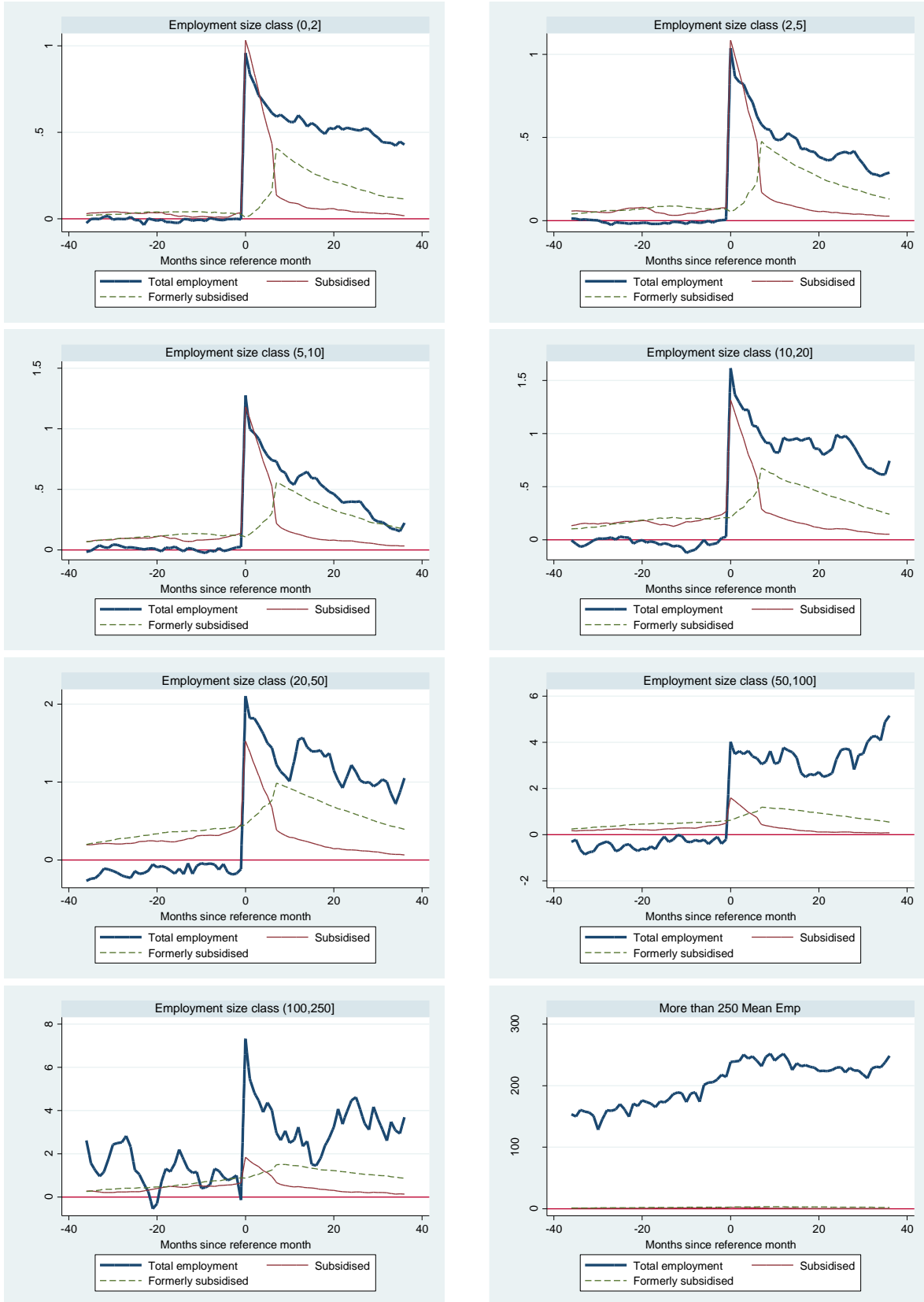
Note: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. Standard errors in the middle panel are not adjusted for the fact that the propensity score is estimated.

**Figure 11: Firm analysis: Employment effects (ATT by size class)**



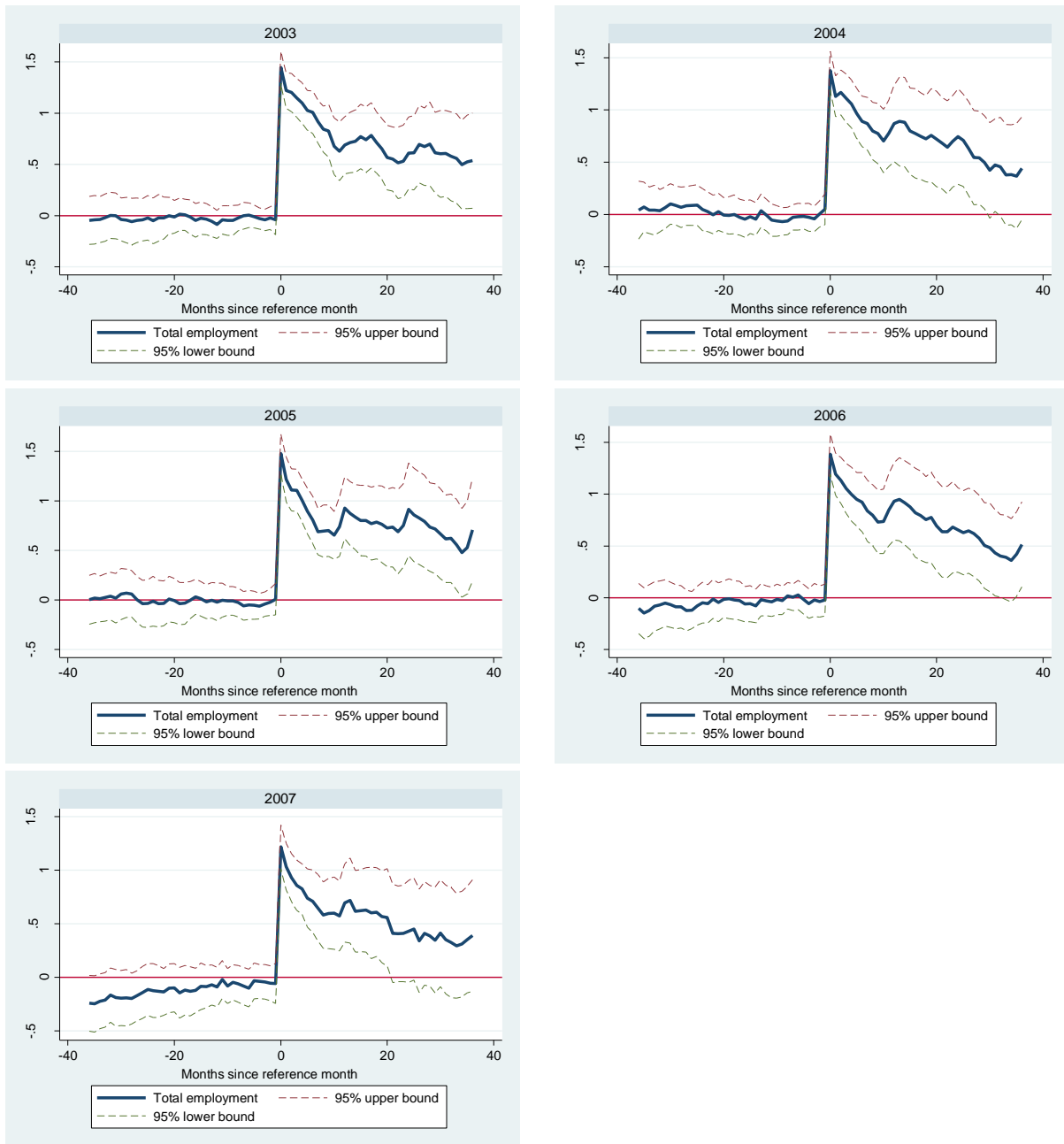
Note: ATT refers to 'average effect of treatment on the treated'. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. Confidence intervals are calculated based on bootstrap standard errors (100 replications, sampled at the firm level prior to propensity estimation). For employment size classes, square brackets indicate that the value is included in the range; parentheses indicate that the value is excluded.

**Figure 12: Firm analysis: Treatment effects (ATT by size class)**



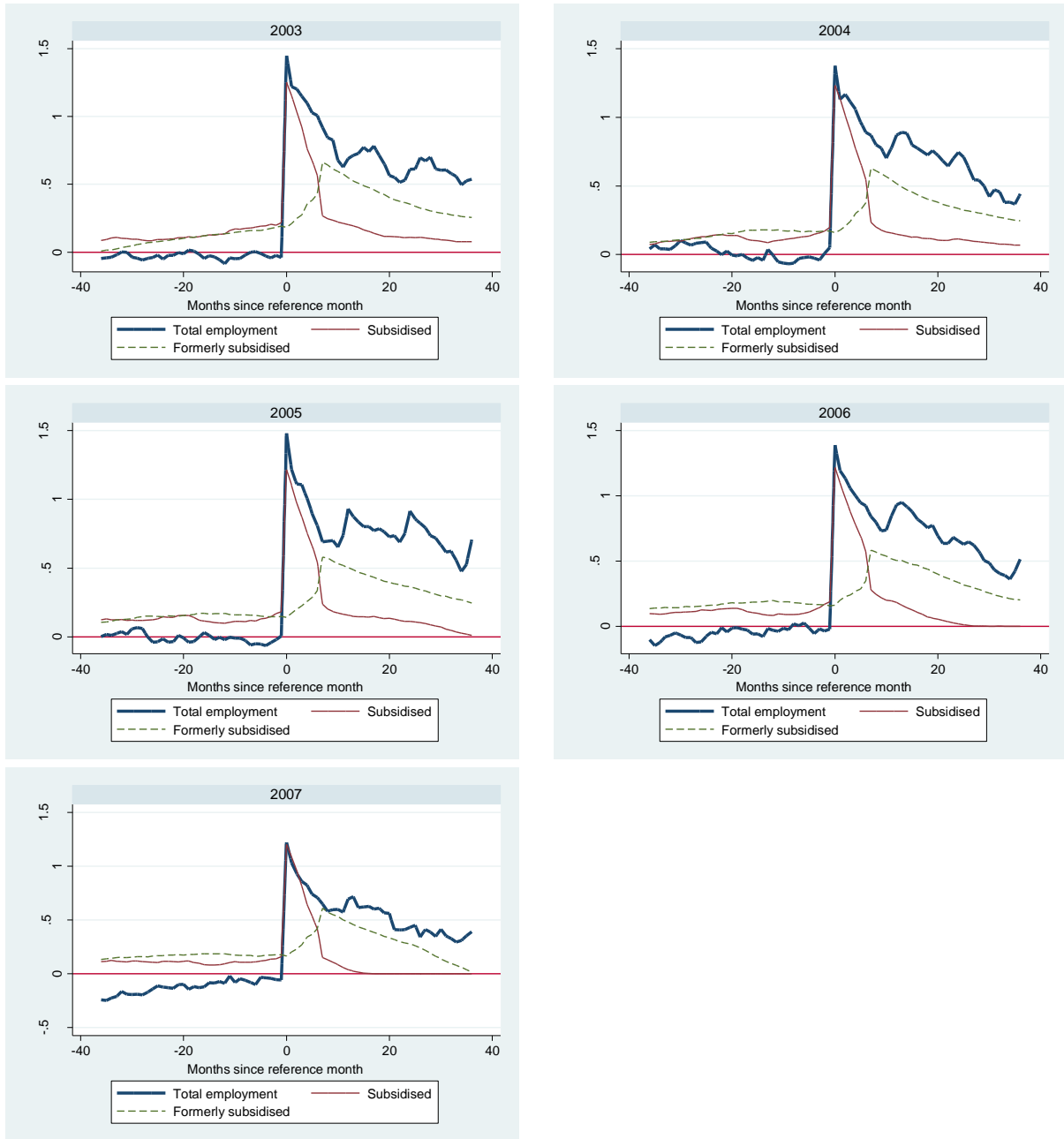
Note: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. For employment size classes, square brackets indicate that the value is included in the range; parentheses indicate that the value is excluded.

**Figure 13: Firm analysis: Employment effects (ATT by year)**



Note: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. Confidence intervals are calculated based on bootstrap standard errors (100 replications, sampled at the firm level prior to propensity estimation).

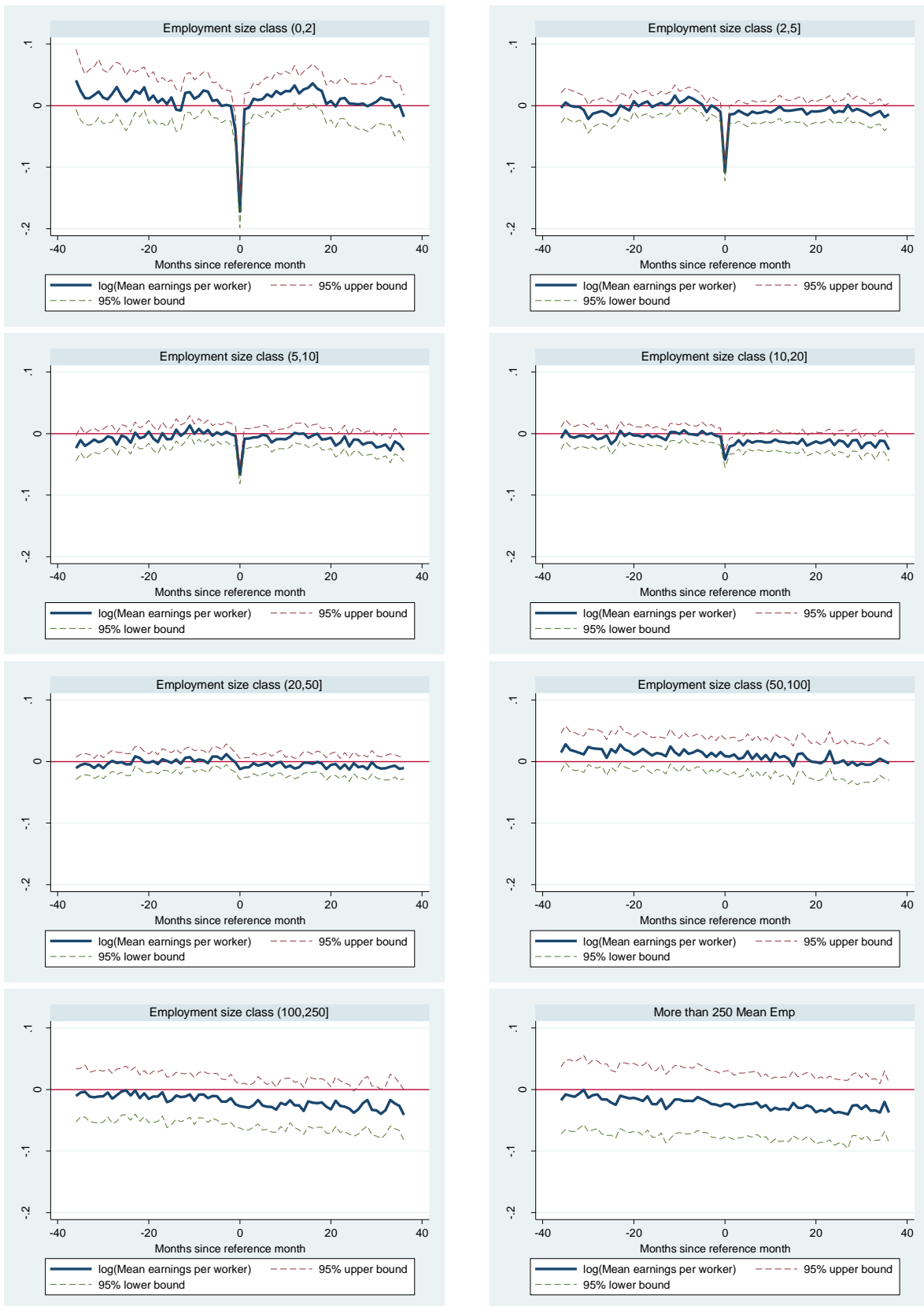
**Figure 14: Firm analysis: Treatment Effects (ATT by year)**



Note: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

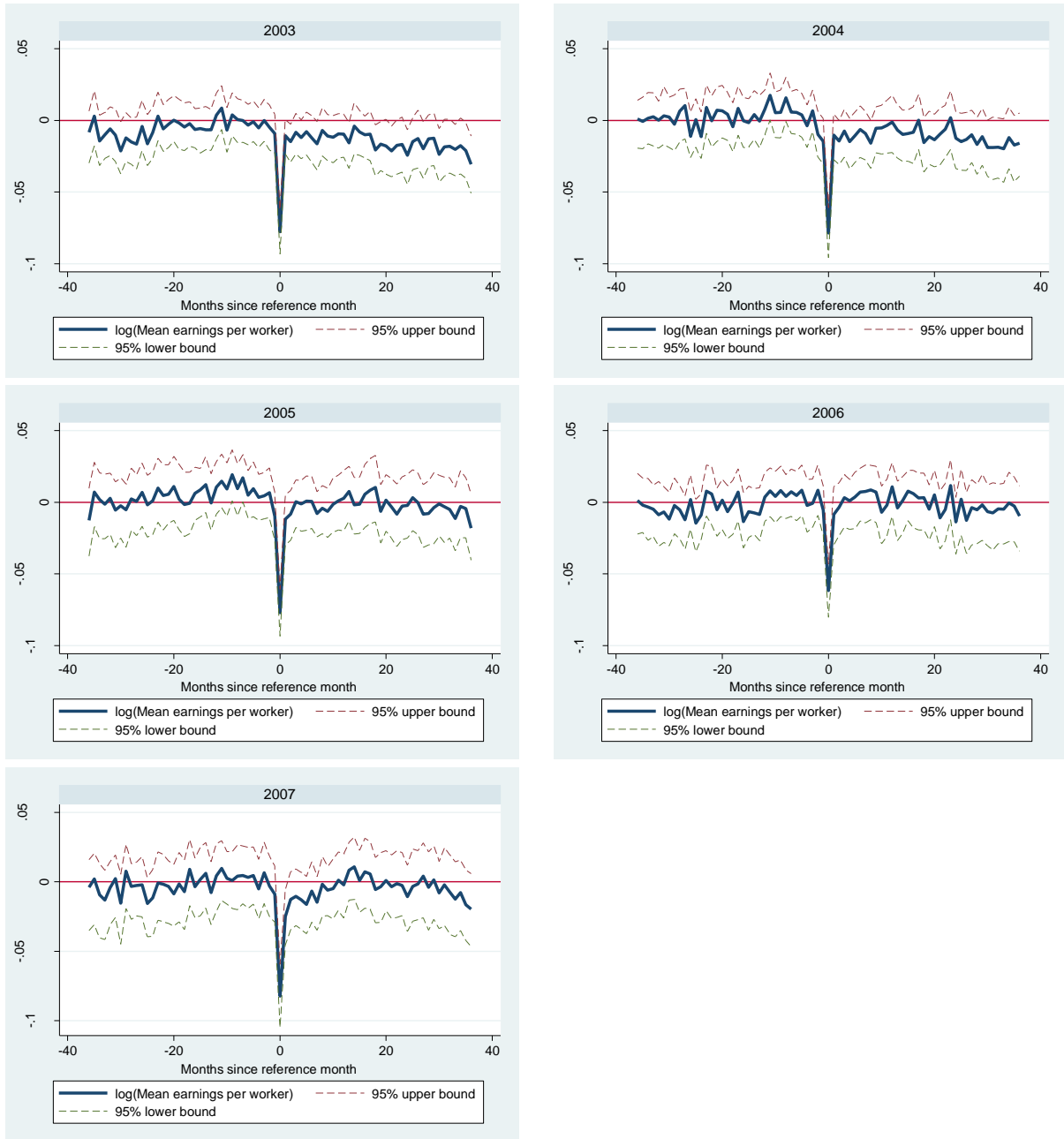


**Figure 15: Firm analysis: Mean earnings effects (ATT by size class)**



Note: ATT refers to 'average effect of treatment on the treated'. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. Confidence intervals in the middle panel are calculated based on bootstrap standard errors (100 replications, sampled at the firm level prior to propensity estimation). For employment size classes, square brackets indicate that the value is included in the range; parentheses indicate that the value is excluded.

**Figure 16: Firm analysis: Mean earnings effects (ATT by year)**



Note: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. Confidence intervals in the middle panel are calculated based on bootstrap standard errors (100 replications, sampled at the firm level prior to propensity estimation).

## APPENDIX

**Appendix Table 1: Number of subsidised job starts by programme and year**

Subsidy programme						
Year	<i>Job Plus Training (on the job)</i>	<i>Job Connection</i>	<i>Job Plus</i>	<i>Job Plus Training (pre-employment)</i>	<i>Skills Investment</i>	Total
2003	747	246	11064	336	-	12447
2004	612	267	9966	312	-	11163
2005	522	519	7308	150	-	8505
2006	414	531	7122	117	-	8187
2007	90	60	1902	66	4050	6168
Total	2385	1623	37362	978	4050	46470

Note: Counts have been randomly rounded to base 3. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

**Appendix Table 2: Recorded and modified wage subsidy duration**

Duration (number of calendar months)	All recorded starts, recorded duration	All job starts, recorded duration	All job starts, modified duration	Job-seeker study population, modified duration
1	8.8	7.3	15.6	15.3
2	12.4	11.7	14.0	13.6
3	10.6	10.5	10.8	10.7
4	12.8	13.5	12.5	12.5
5	8.5	9.1	8.3	8.3
6	10.6	11.1	9.9	10.1
7	30.9	31.6	25.1	25.8
8+	4.4	5.3	3.9	3.8
Total	59987	46470	46470	38580

Note: Counts have been randomly rounded to base 3. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

**Appendix Table 3: Estimated impacts 1 year after starting a subsidised job by benefit type and year**

	N	1 year						
		Percentage receiving benefit 12 months later	Percentage employed 12 months later	Percentage employed and off-benefit 12 months later	Number of months receiving benefit over the following 12 months	Number of months employed over the following 12 months	Number of months employed and off-benefit over the following 12 months	Average total earnings over the following 12 months
<b>Total</b>	38,808	-23.3	23.5	26.2	-1.6	0.9	2.0	9,960
<b>Benefit type</b>								
Domestic Purposes	4,251	-31.0	27.4	31.4	-2.4	1.2	2.4	11,660
Invalid's	2,028	-16.2	31.9	17.1	-1.1	1.6	1.2	9,020
Independent Youth	597	-22.4	20.1	22.5	-2.0	1.1	2.0	7,640
Sickness	2,883	-21.4	26.3	25.0	-1.4	1.4	1.9	10,740
Training	2,628	-29.1	28.0	32.8	-2.1	1.2	2.5	12,010
Unemployment	26,334	-22.1	21.5	25.5	-1.5	0.7	1.9	9,510
<b>Year</b>								
2003	10,608	-23.6	24.1	26.6	-1.9	1.1	2.2	10,070
2004	9,546	-23.7	23.7	26.8	-1.7	0.9	2.0	10,030
2005	7,149	-23.9	23.9	26.3	-1.6	0.9	1.9	9,940
2006	6,609	-22.7	23.5	25.7	-1.4	0.8	1.8	9,970
2007	4,899	-21.5	21.1	24.3	-1.4	0.9	1.9	9,640
<b>Benefit type by year</b>								
Domestic Purposes—2003	957	-26.0	26.2	26.0	-2.0	1.2	2.0	11,210
Domestic Purposes—2004	1,017	-28.3	26.3	29.5	-2.2	1.1	2.2	11,700
Domestic Purposes—2005	762	-28.0	24.3	28.2	-2.2	1.0	2.2	10,670
Domestic Purposes—2006	855	-39.5	31.5	39.3	-2.8	1.2	2.8	12,480
Domestic Purposes—2007	654	-35.2	29.2	35.4	-3.0	1.5	3.1	12,310
Independent Youth—2003	183	-26.1	26.4	26.2	-2.0	1.2	2.1	7,540
Independent Youth—2004	153	-16.2	12.6	17.1	-1.9	0.8	1.8	6,880
Independent Youth—2005	120	-25.9	23.6	25.4	-2.6	2.1	2.9	9,440
Independent Youth—2006	s	s	s	s	s	s	s	s
Independent Youth—2007	s	s	s	s	s	s	s	s

**Appendix Table 3 cont. Estimated impacts 1 year after starting a subsidised job by benefit type and year**

	N	1 year						
		Percentage receiving benefit 12 months later	Percentage employed 12 months later	Percentage employed and off-benefit 12 months later	Number of months receiving benefit over the following 12 months	Number of months employed over the following 12 months	Number of months employed and off-benefit over the following 12 months	Average total earnings over the following 12 months
Invalid's—2003	324	-17.4	36.7	18.0	-1.1	1.9	1.3	9,570
Invalid's—2004	414	-17.2	32.0	16.8	-1.2	1.5	1.2	9,200
Invalid's—2005	510	-15.2	30.3	16.3	-1.0	1.6	1.1	8,370
Invalid's—2006	435	-12.9	32.6	14.5	-0.8	1.6	1.1	8,910
Invalid's—2007	348	-19.7	29.0	21.0	-1.4	1.4	1.5	9,410
Sickness—2003	447	-25.8	27.6	28.4	-1.8	1.6	2.2	11,260
Sickness—2004	567	-20.2	25.7	24.1	-1.4	1.4	1.9	10,690
Sickness—2005	546	-20.5	27.4	25.1	-1.4	1.4	1.9	10,590
Sickness—2006	651	-20.0	26.9	23.0	-1.3	1.2	1.6	10,280
Sickness—2007	669	-21.5	24.6	25.4	-1.3	1.3	1.9	11,020
Unemployment—2003	8,031	-22.7	22.6	26.2	-1.8	0.9	2.2	9,760
Unemployment—2004	6,840	-23.4	22.6	27.0	-1.6	0.8	2.0	9,760
Unemployment—2005	4,767	-23.4	22.0	26.2	-1.5	0.7	1.8	9,630
Unemployment—2006	4,017	-20.1	20.0	23.8	-1.1	0.5	1.6	9,230
Unemployment—2007	2,676	-17.9	16.8	21.0	-1.0	0.5	1.5	8,370
Training—2003	642	-32.2	30.2	35.5	-2.5	1.6	2.9	12,350
Training—2004	534	-29.7	27.1	32.0	-2.0	0.9	2.2	10,970
Training—2005	426	-34.5	32.6	37.7	-2.4	1.5	2.8	13,160
Training—2006	549	-24.5	25.8	29.2	-1.7	1.0	2.1	12,090
Training—2007	477	-24.8	24.2	29.6	-1.9	1.1	2.3	11,620

Note: Counts have been randomly rounded to base 3. Estimates based on less than 100 participants have been suppressed (s). Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. Average monthly earnings are conditional on being employed and off-benefit.

**Appendix Table 4: Estimated impacts 3 years after starting a subsidised job by benefit type and year**

	N	3 year						
		Percentage receiving benefit 36 months later	Percentage employed 36 months later	Percentage employed and off-benefit 36 months later	Number of months receiving benefit over the following 36 months	Number of months employed over the following 36 months	Number of months employed and off-benefit over the following 36 months	Average total earnings over the following 36 months
<b>Total</b>	38,808	-10.2	12.8	13.0	-5.0	4.8	6.1	20,150
<b>Benefit type</b>								
Domestic Purposes	4,251	-16.5	15.0	16.8	-7.7	5.7	7.8	24,780
Invalid's	2,028	-12.2	22.9	13.9	-4.2	7.7	4.7	20,240
Independent Youth	597	-5.7	5.4	5.2	-4.4	3.3	4.5	13,470
Sickness	2,883	-9.9	12.8	11.9	-4.9	5.6	6.0	21,650
Training	2,628	-13.0	12.8	14.3	-6.3	5.4	7.3	24,030
Unemployment	26,334	-8.8	11.8	12.4	-4.5	4.3	5.8	18,950
<b>Year</b>								
2003	10,608	-10.4	13.3	13.8	-5.3	5.0	6.4	20,540
2004	9,546	-10.5	12.1	13.0	-5.1	4.6	6.1	20,280
2005	7,149	-11.1	14.6	14.5	-5.3	5.2	6.4	21,050
2006	6,609	-8.9	12.3	11.4	-4.5	4.6	5.6	19,600
2007	4,899	-9.4	11.1	11.3	-4.5	4.3	5.5	18,450
<b>Benefit type by year</b>								
Domestic Purposes—2003	957	-16.9	13.9	16.7	-6.9	5.7	6.9	24,210
Domestic Purposes—2004	1,017	-16.1	13.3	16.1	-7.1	5.3	7.4	24,700
Domestic Purposes—2005	762	-14.4	16.5	15.9	-7.0	5.4	7.1	22,970
Domestic Purposes—2006	855	-19.8	19.1	19.7	-9.2	6.7	9.3	27,890
Domestic Purposes—2007	654	-14.7	12.3	15.3	-8.4	5.5	8.3	23,780
Independent Youth—2003	183	-6.3	2.9	6.3	-4.7	3.5	4.7	12,220
Independent Youth—2004	153	-6.2	8.2	6.3	-4.0	3.3	4.5	13,960
Independent Youth—2005	120	-5.2	5.3	4.3	-5.4	5.1	6.1	16,760
Independent Youth—2006	s	s	s	s	s	s	s	s
Independent Youth—2007	s	s	s	s	s	s	s	s

**Appendix Table 4 cont. Estimated impacts 1 year after starting a subsidised job by benefit type and year**

	N	3 year						
		Percentage receiving benefit 36 months later	Percentage employed 36 months later	Percentage employed and off-benefit 36 months later	Number of months receiving benefit over the following 36 months	Number of months employed over the following 36 months	Number of months employed and off-benefit over the following 36 months	Average total earnings over the following 36 months
Invalid's—2003	324	-13.7	26.1	15.0	-4.7	8.8	5.2	22,120
Invalid's—2004	414	-14.5	25.1	15.2	-4.5	7.6	4.3	19,960
Invalid's—2005	510	-11.8	23.2	13.8	-3.9	7.3	4.6	18,590
Invalid's—2006	435	-7.6	21.6	10.7	-3.2	8.1	4.1	20,370
Invalid's—2007	348	-14.3	18.1	15.6	-5.3	6.9	5.7	21,110
Sickness—2003	447	-13.6	15.2	16.1	-6.2	6.5	7.0	24,100
Sickness—2004	567	-7.0	13.1	11.1	-4.1	5.2	5.5	20,290
Sickness—2005	546	-11.4	11.1	11.5	-5.0	5.7	6.1	21,930
Sickness—2006	651	-8.4	12.9	10.4	-4.8	5.6	5.6	20,870
Sickness—2007	669	-10.2	12.2	11.6	-4.7	5.4	6.0	21,680
Unemployment—2003	8,031	-9.1	12.9	13.2	-4.9	4.7	6.2	19,600
Unemployment—2004	6,840	-9.7	11.5	12.8	-4.8	4.3	6.1	19,730
Unemployment—2005	4,767	-10.0	13.9	14.6	-4.9	4.7	6.3	20,270
Unemployment—2006	4,017	-6.5	9.4	9.5	-3.5	3.5	4.9	17,070
Unemployment—2007	2,676	-6.7	9.2	9.3	-3.2	3.2	4.6	15,470
Training—2003	642	-12.5	13.2	15.4	-7.0	6.0	8.1	25,830
Training—2004	534	-12.8	7.6	10.9	-6.3	4.1	6.5	20,500
Training—2005	426	-16.5	15.5	17.3	-7.6	7.2	9.2	28,780
Training—2006	549	-10.6	14.7	14.5	-5.2	5.1	6.6	23,450
Training—2007	477	-13.3	13.7	14.0	-5.6	4.9	6.5	21,980

Note: Counts have been randomly rounded to base 3. Estimates based on less than 100 participants have been suppressed (s). Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

**Appendix Table 5: Estimated impacts 3 years after starting a subsidised job by benefit type**

	Unemployment Benefit							
	N	Receiving benefit 36 months later	Employed 36 months later	Employed and off-benefit 36 months later	Number of months receiving benefit over the following 36 months	Number of months employed over the following 36 months	Number of months employed and off-benefit over the following 36 months	Average total earnings over the following 36 months
<b>Total</b>	26,334	-8.8	11.8	12.4	-4.5	4.3	5.8	18,950
<b>Age</b>								
18–19 years	3,993	-9.0	9.9	10.9	-3.7	3.4	4.8	14,980
20–24 years	7,110	-7.4	9.7	10.5	-3.6	3.3	4.9	15,133
25–34 years	6,579	-5.8	10.6	10.6	-3.6	4.0	5.3	18,109
35–44 years	4,683	-10.1	12.8	13.4	-5.4	5.2	6.8	22,720
45–54 years	2,862	-13.8	16.6	18.2	-6.8	5.9	8.1	26,335
55–64 years	918	-16.3	22.3	24.2	-8.7	8.5	10.8	33,146
<b>Sex</b>								
Male	19,155	-8.3	12.2	12.6	-4.3	4.4	5.8	19,646
Female	7,182	-10.0	10.7	12.0	-5.0	4.0	5.9	17,085
<b>Ethnicity</b>								
Asian	1,077	-13.7	17.2	17.9	-6.0	6.5	7.8	25,396
European	11,340	-8.0	12.4	13.0	-4.1	4.3	5.9	19,148
Māori	10,545	-9.2	10.9	11.5	-4.7	4.1	5.5	18,157
Pacific	2,643	-7.6	10.0	10.4	-4.2	3.8	5.3	16,861
Other	585	-12.3	15.5	16.4	-6.5	6.3	8.0	26,607
<b>Current duration</b>								
< 6 months	10,710	-4.4	8.8	8.9	-1.9	2.5	3.8	13,090
6–< 24 months	9,648	-9.6	11.0	12.2	-5.3	4.5	6.4	20,615
2–< 4 years	2,760	-12.3	13.9	15.3	-6.9	6.2	7.9	25,193
4 years +	2,766	-21.1	21.8	22.7	-9.3	7.9	9.8	29,512



**Appendix Table 5 cont. Estimated impacts three 3 years after starting a subsidised job by benefit type**

	Domestic Purposes Benefit							
	N	Receiving benefit 36 months later	Employed 36 months later	Employed and off-benefit 36 months later	Number of months receiving benefit over the following 36 months	Number of months employed over the following 36 months	Number of months employed and off-benefit over the following 36 months	Average total earnings over the following 36 months
<b>Total</b>	4,251	-16.5	15.0	16.8	-7.7	5.7	7.8	24,780
<b>Age</b>								
18–19 years	s	s	s	s	s	s	s	s
20–24 years	516	-17.0	12.8	13.8	-7.1	5.8	6.5	20,995
25–34 years	1,572	-12.7	13.1	13.2	-6.7	5.1	6.8	22,490
35–44 years	1,494	-18.1	16.0	19.1	-8.4	5.8	8.5	26,612
45–54 years	471	-22.0	16.5	22.1	-9.3	5.9	9.4	29,294
55–64 years	s	s	s	s	s	s	s	s
<b>Sex</b>								
Male	654	-20.5	19.7	21.4	-9.9	8.5	9.9	34,795
Female	3,594	-15.8	14.2	16.0	-7.3	5.2	7.4	22,955
<b>Ethnicity</b>								
Asian	s	s	s	s	s	s	s	s
European	1,824	-17.7	17.0	19.7	-8.1	6.2	8.7	27,237
Māori	1,995	-15.2	12.7	13.6	-7.2	5.1	6.8	21,768
Pacific	318	-13.1	15.7	14.8	-7.1	6.3	7.6	26,831
Other	s	s	s	s	s	s	s	s
<b>Current duration</b>								
< 6 months	414	-7.6	13.4	14.1	-3.7	3.7	5.4	16,808
6–< 24 months	1,053	-14.5	15.2	16.2	-7.3	5.5	7.7	24,694
2–< 4 years	807	-14.3	11.8	13.7	-8.3	5.9	8.1	24,933
4 years +	1,842	-20.8	17.4	20.8	-8.5	6.4	8.4	26,947

**Appendix Table 5 cont. Estimated impacts three 3 years after starting a subsidised job by benefit type**

	Sickness Benefit							
	N	Receiving benefit 36 months later	Employed 36 months later	Employed and off-benefit 36 months later	Number of months receiving benefit over the following 36 months	Number of months employed over the following 36 months	Number of months employed and off-benefit over the following 36 months	Average total earnings over the following 36 months
<b>Total</b>	2,883	-9.9	12.8	11.9	-4.9	5.6	6.0	21,650
<b>Age</b>								
18–19 years	117	-14.1	10.8	10.1	-5.2	5.3	5.4	16,394
20–24 years	471	-7.9	8.5	7.3	-3.8	4.4	4.6	15,339
25–34 years	729	-5.2	6.6	6.3	-3.2	4.1	4.6	18,172
35–44 years	627	-11.3	13.3	13.1	-5.3	5.7	6.2	21,636
45–54 years	414	-10.6	15.0	14.5	-6.2	6.9	7.5	27,548
55–64 years	153	-16.3	20.2	21.0	-7.8	8.0	9.1	32,822
<b>Sex</b>								
Male	2,070	-8.5	12.3	11.2				
Female	810	-13.5	14.0	13.8	-5.8	5.7	6.3	20,170
<b>Ethnicity</b>								
Asian	s	s	s	s	s	s	s	s
European	1,749	-10.0	13.4	12.4	-4.7	5.4	6.0	21,993
Māori	831	-9.3	10.8	10.4	-4.8	5.3	5.5	19,265
Pacific	150	-9.4	10.6	12.3	-6.6	7.8	8.2	27,758
Other	s	s	s	s	s	s	s	s
<b>Current duration</b>								
< 6 months	915	-2.5	6.7	5.4	-1.4	2.9	3.3	13,553
6–< 24 months	1,086	-12.5	10.6	12.8	-5.5	5.5	6.5	22,877
2–< 4 years	375	-13.9	14.6	15.8	-7.3	7.5	8.1	27,960
4 years +	396	-17.1	23.9	19.6	-8.2	9.5	8.8	31,024

**Appendix Table 5 cont. Estimated impacts three 3 years after starting a subsidised job by benefit type**

	Invalid's Benefit							
	N	Receiving benefit 36 months later	Employed 36 months later	Employed and off-benefit 36 months later	Number of months receiving benefit over the following 36 months	Number of months employed over the following 36 months	Number of months employed and off-benefit over the following 36 months	Average total earnings over the following 36 months
<b>Total</b>	2,028	-12.2	22.9	13.9	-4.2	7.7	4.7	20,240
<b>Age</b>								
18–19 years	s	s	s	s	s	s	s	s
20–24 years	312	-10.4	23.6	13.2	-3.9	7.5	4.1	16,882
25–34 years	537	-9.9	21.3	11.7	-3.9	6.7	4.3	17,596
35–44 years	570	-13.6	18.4	12.9	-4.6	6.9	4.7	20,963
45–54 years	354	-12.1	26.2	14.8	-4.3	8.7	5.3	23,489
55–64 years	147	-7.6	25.8	15.6	-2.7	9.7	4.8	26,361
<b>Sex</b>								
Male	1,428	-13.9	23.5	15.1	-4.8	7.8	5.1	21,709
Female	603	-8.2	21.3	11.2	-3.0	7.3	3.8	16,763
<b>Ethnicity</b>								
Asian	s	s	s	s	s	s	s	s
European	1,407	-12.1	23.4	14.1	-4.5	7.9	5.0	20,312
Māori	456	-11.4	18.7	13.2	-3.5	6.5	4.2	19,192
Pacific	s	s	s	s	s	s	s	s
Other	s	s	s	s	s	s	s	s
<b>Current duration</b>								
< 6 months	s	s	s	s	s	s	s	s
6–< 24 months	297	-12.4	26.6	18.2	-5.5	8.6	6.2	25,547
2–< 4 years	336	-17.3	23.7	16.7	-5.4	9.1	5.7	25,090
4 years +	1,242	-11.4	23.8	11.8	-4.1	8.0	4.2	19,228

**Appendix Table 5 cont. Estimated impacts three 3 years after starting a subsidised job by benefit type**

	Training Benefit							
	N	Receiving benefit 36 months later	Employed 36 months later	Employed and off-benefit 36 months later	Number of months receiving benefit over the following 36 months	Number of months employed over the following 36 months	Number of months employed and off-benefit over the following 36 months	Average total earnings over the following 36 months
<b>Total</b>	2,628	-13.0	12.8	14.3	-6.3	5.4	7.3	24,030
<b>Age</b>								
18–19 years	741	-10.8	9.2	10.6	-5.6	4.4	6.4	19,766
20–24 years	915	-11.3	9.0	10.7	-5.9	4.4	6.4	21,987
25–34 years	444	-14.1	13.8	14.2	-7.4	6.0	8.0	26,621
35–44 years	252	-8.2	12.9	14.9	-6.3	5.5	7.2	24,798
45–54 years	144	-19.7	19.8	20.9	-9.6	8.5	10.2	32,391
55–64 years	s	s	s	s	s	s	s	s
<b>Sex</b>								
Male	1,860	-13.2	13.4	14.9	-6.5	5.7	7.5	24,727
Female	768	-12.4	11.4	12.9	-6.1	4.7	6.8	22,346
<b>Ethnicity</b>								
Asian	s	s	s	s	s	s	s	s
European	1,119	-10.9	15.0	16.9	-5.7	5.7	7.9	25,141
Māori	1,128	-14.7	9.2	10.5	-7.0	4.7	6.4	21,815
Pacific	258	-13.5	13.3	13.3	-8.3	4.9	6.5	22,713
Other	s	s	s	s	s	s	s	s
<b>Current duration</b>								
< 6 months	681	-8.8	12.4	14.2	-3.8	3.6	5.5	18,253
6–< 24 months	1,167	-12.0	10.8	12.2	-6.8	5.3	7.5	24,782
2–< 4 years	264	-21.5	19.1	22.3	-11.3	9.5	11.7	35,561
4 years +	177	-20.9	18.0	21.0	-11.0	9.1	10.8	32,537

Note: Counts have been randomly rounded to base 3. Estimates based on less than 100 participants have been suppressed (s). Dollar figures are expressed in March 2009 dollars. The term “employed” refers to unsubsidised employment. Average total earnings includes months with no earnings and includes earnings from subsidised employment. Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

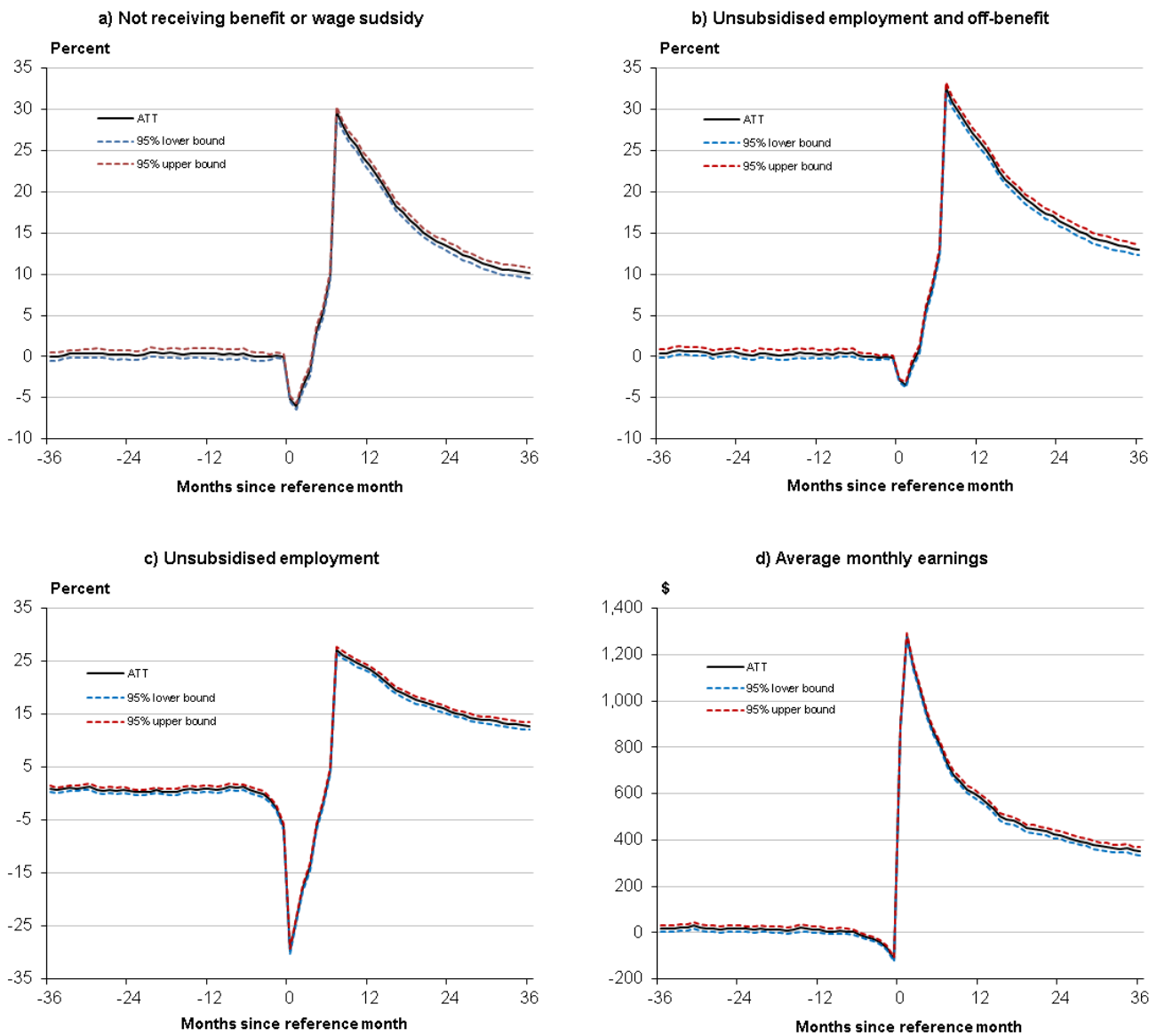
**Appendix Table 6: Firm analysis: Summary of covariate-balancing tests**

<b>Size class</b>	<b>pseudo-<math>R^2</math></b>	<b><math>\chi^2</math> from LR test (df = 296)</b>	<b><math>p</math>-value</b>	<b>Number of individual covariates failing balancing <math>t</math>-test (<math>p &lt; 0.05</math>)</b>
(0,2]	0.005	49.1	1.000	0
(2,5]	0.002	39.9	1.000	0
(5,10]	0.002	44.8	1.000	0
(10,20]	0.003	43.8	1.000	0
(20,50]	0.005	66.6	1.000	0
(50,100]	0.012	73.0	1.000	0
(100,250]	0.026	113.1	1.000	0
Over 250	0.034	194.3	1.000	45

36 prior monthly employment levels  
3 lagged mean annual employment  
3 lagged mean annual earnings  
1 industry dummy (residual category)  
Previous use of subsidies  
Employment volatility

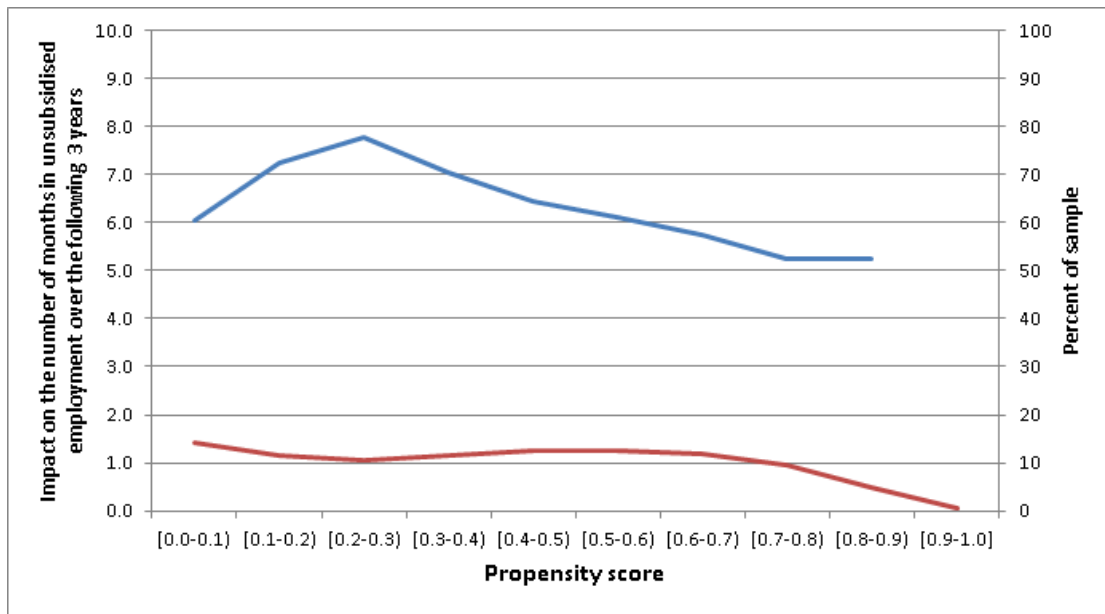
Note: The pseudo  $R^2$  is from a probit regression of treatment on all covariates, using the matched treatment and comparison groups. The  $\chi^2$  and associated  $p$ -value is from a likelihood ratio test of joint insignificance of all matching variables in the regression. The final column reports the number of individual covariates for which there is a significant difference in means between the treatment and matched comparison groups ( $p < 0.05$ ). Square brackets indicate that the value is included in the range; parentheses indicate that the value is excluded.

## Appendix Figure 1: Estimated impacts, all benefit types



Note: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand. ATT: Average Treatment effect on the Treated. Confidence intervals are calculated based on bootstrap standard errors (100 replications, sampled at the individual level prior to propensity estimation).

**Appendix Figure 2: The proportion of participants and the estimated impact by propensity score**



Note: Figures have been derived from the Integrated Data Infrastructure (IDI) prototype managed by Statistics New Zealand.

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