Labour Market Conditions, Applications and Grants of Disability Support Pension (DSP) in Australia

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Abstract
Detiorating labour market conditions worsen the financial situation of the disabled, reduce the opportunity costs of disability benefit program participation, and increase the demand for the benefit; they may also lead the administrative authority to lower the eligibility criteria to accommodate the impact of worsening labour market conditions. This paper uses Australian aggregate data to shed light on the impact of labour market conditions on applications and grants of the Disability Support Pension (DSP) in Australia. The results provide supportive empirical evidence to the theory that worsening labour conditions increase applications and grants of disability benefits. The results also show that policy changes play an important role in the growth of the program.

1. Introduction
The Disability Support Pension (DSP) is the payment for people of working age with an illness or injury for a prolonged period of time that prevents them from undertaking full time employment. Prior to 1991, this payment was known as the Invalid Pension (IP). In this paper both the Invalid Pension and the Disability Support Pension are referred to as DSP.

Over the last three decades, the DSP program has grown rapidly. The number of DSP recipients increased from 134,000 in 1971 to 602,000 in 2000, with an average annual growth rate of 5.32 per cent. This growth is much greater than that of the DSP age eligible population, which increased from 7.8 million in 1971 to 12.2 million in 2000, with an average annual growth rate of 1.55 per cent. 1

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1 The eligible age band for DSP is between 15 and the Age Pension age. For males the Age Pension age is 65. For females the Age Pension age was 60 years before 1995. But from 1995, for every two years the female Age Pension age has been raised by a half-year and this will continue until it reaches 65. However, for simplicity, this paper does not consider the change in the female Age Pension age and therefore defines the DSP age eligible population as 16 to 64 (inclusive) for males and 16 to 59 (inclusive) for females.

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The number of DSP recipients at a point of time can be viewed as a pool with an inflow (i.e., new grants of recipients) and an outflow (i.e., recipients leaving the benefit). Using the inflow-outflow framework, Cai and Gregory (2003) show that over the period 1971 to 1999 the increase in the inflow rate, defined as the ratio of the new grants to the DSP age eligible population, contributed more to the growth of the DSP program than the decrease in the outflow rate. Also, over the period 1971 to 1999 the change of the number of DSP recipients was closely associated with inflows each year. Therefore, to explain the growth of the DSP program, the increase in inflows need to be better understood. This is the purpose of the current paper.

The paper examines the factors that determine the inflow rate to the DSP program, focusing on the effect of labor market conditions on applications and grants of disability benefits in the context of program growth. It is found among other things that an increase in the unemployment rate significantly increases the application and grant rates of disability benefits. Simulation results indicate that changes in the unemployment rate over the period 1970 to 1999 could explain 40 per cent of the increase in the number of DSP recipients over this period.

The rest of this paper is organised as follows. Section 2 discusses theoretical issues in the relationship between labour market conditions and applications and grants of disability benefits, and presents a brief survey of the literature. Section 3 discusses the data, model specification and reports empirical results. Section 4 simulates the impact of the unemployment rate on DSP program growth using estimated parameters from Section 3. Section 5 sets out the conclusions.

2. Theories and the Literature
Participation in the disability benefit program mainly proceeds through two steps involving two decision-makers—the disabled individuals and the program administration. The disabled individual decides whether to apply for the benefit, given their health condition; and the administrative authority decides whether to grant the benefit. Labour market conditions may play a role in both processes.2

Aarts and de Jong (1992) argue that disability behaviour is not only determined by clinical factors but also determined by vocational factors, such as the demands of the workplace, the willingness of employers to adapt to the disabled worker’s limitation and the supply of suitable jobs. Worsening labour market conditions induce a higher probability of disability benefit applications through reduced labour demand for the disabled workers and (then) discourage job seeking. Impairment of a disabled worker often reduces the worker’s productivity and flexibility and makes them less competitive in the labour market. A surplus of labour supply resulting from a recession aggravates this competitive disadvantage. During a recession, the probability of being laid off is also high for the disabled and the probability of finding a new job is low (Daly, 1994).

2 Cai (2002) provides a model of disability benefit participation, which explicitly incorporates the impact of labour market conditions.
Many disabled persons might also have other productivity characteristics which induce a high unemployment risk, such as old age, low education and unstable work experiences. Therefore, worsening labour conditions fall disproportionately on this group and make it more difficult for them to acquire earned income. They turn to other income sources, such as the disability benefit. Hogelund (2000) labels the impact of deteriorating labour market conditions on the disability benefit application as a ‘push perspective’. In addition, Autor and Duggan (2003) argue that once the disabled workers become unemployed in the recession, their opportunity costs of applying for disability benefits become lower, a ‘pull perspective’.

While the demand for disability benefits will go up during an economic recession, the response of the supply side will depend on the objectives of the administrative authority (or the government). If the government wants to contain the growth of the program, it will counteract increasing applications by implementing more stringent eligibility rules. Alternatively, if measured unemployment is of great concern to the government, the administrative authority may increase benefit grants to accommodate the increasing demand. In this case the disability benefit program is used as a means to reduce unemployment. The reason that the administrative authority can manipulate disability benefit program inflows in this way is that the eligibility criteria, set up by legislation, are often not well defined and necessarily involve subjective interpretation. Although eligibility for disability benefits often appears to be based only on medical conditions, the actual criteria allow socio-economic factors to come into the administration’s decision process (Cass, Gibson and Tito, 1988).

The earliest studies using econometric methods to explain the growth of the disability benefit program dated back to 1974 and 1975 (see, Lando, 1974; and Hambor, 1975). These two US studies were stimulated by the sharp increase in applications and grants of Social Security Disability Insurance (SSDI) before 1975. Both studies used national aggregate time series data and focused on the effect of the business cycle represented by the unemployment rate. Using the quarterly data from 1962 to 1973, Lando (1974) found that a one percentage point increase in the unemployment rate raised the applications for SSDI by two to four per cent depending on specifications. However, using a shorter data period from 1964 to 1971, Hambor (1975) estimated a larger impact of seven per cent. Using a slightly modified model from that utilised by Lando (1974) and quarterly data from 1964 to 1978, Lando, Coate, and Kraus (1979) confirmed the significant impact of the unemployment rate on applications.

Recent studies on the impact of the unemployment rate on the SSDI program in the US have used cross-states and time series data. Stapleton, Coleman

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3 There are two programs in the US providing disability benefits: Social Security Disability Insurance (SSDI) and the Supplementary Security Income (SSI). SSDI is based on earnings and covers only those employed, while SSI is not employment related but subject to a means-test.

4 The impact of the unemployment rate on SSI was also examined in these studies. The estimated effect on SSI was lower than that on SSDI. See Rupp and Stapleton (1995) for a summary of these study results.
and Dietrich (1995) used the period 1988 to 1992, and estimated that a one percentage point increase in the unemployment rate raised applications for SSDI by four per cent. Their estimated effect on the final grants was three per cent. Using a longer time period from 1980 to 1993, Stapleton and Dietrich (1995) estimated that a one percentage point increase in the unemployment rate was associated with a two per cent increase in the initial determinations of SSDI during the year of the unemployment rate increase, a three per cent increase after one year and a five per cent increase after two years. Also using data over the period 1988 to 1992, but differentiating the applications and grants by gender, Rupp and Stapleton (1995) estimates an elasticity of SSDI applications per capita with respect to the unemployment rate of 0.27 for men and 0.13 for women, and an elasticity of SSDI grants of 0.18 for men and 0.06 for women. Only the estimated elasticity for women was not significant.

British studies using time series data also found a positive link between Invalidity Benefit (IVB) claimants and the unemployment rate over time (see, HMSO, 1985; and Creedy and Disney, 1989). Disney and Webb (1991) also employed cross-sections (counties) and time series data to examine the effect of unemployment. Instead of using applications or grants as the dependent variables, they used the proportion of individuals in the eligible population of a particular region in receipt of IVB as the dependent variable. After controlling for the replacement rate, the population over 55 years of age and regional dummies, they found a significant impact of the unemployment rate on the dependent variable. They also estimated the effect of the unemployment rate on the individual probability of IVB receipt using Family Expenditure Survey data. By applying a Probit model to the 1980, 1984 and 1988 data respectively, they found that the unemployment rate significantly raised the individual probability of receiving IVB, although the estimated coefficients were different across the three years. Molho (1991) also found that the local (female) unemployment rate had a significant effect on a woman’s probability of entering IVB, although this impact was not significant for men (Molho, 1989).

Another related study by Piachaud (1986) examined the effect of unemployment on the proportion of older males (aged 55-59, and 60-64) who stated in the Censuses of England that they were disabled (defined as permanently sick or disabled). Piachaud first used 1981 cross-counties data and regressed the proportion of the disabled on the unemployment rate. Then, he regressed the change in the proportion of disabled from 1971 to 1981 on the change in the unemployment rate over the same period and the unemployment rate in 1971, again using county variation of these variables. In both regressions, for both age groups, Piachaud found the coefficients on the unemployment rate and the change of the unemployment rate were significant and concluded that increases in unemployment had been significantly correlated with increases in the number of older males stating they were disabled. He attributed half of the increase in disability over the period 1971 to 1981 to a worsening labour market.

5 Deviations from the regional mean over time rather than the levels of the variables are used in the regression to avoid non-stationarity.
In Australia, the impact of labour market conditions on the usage of the Invalid Pension (and other income support payments) was noted by Stricker and Sheehan (1981). When examining the hidden unemployment problem in the 1970s in Australia, Stricker and Sheehan found that the Invalid Pension was one avenue of hidden unemployment and that worsening labour market conditions were associated with a higher usage rate of this pension.

Stricker and Sheehan’s finding was based on time series data. Carter and Gregory (1981) provided supportive results using cross sectional data. Specifically, they found that regions with a higher unemployment rate also had a higher usage rate of the Invalid Pension (and other income support payments, such as sickness benefit) among males aged 15 and over.

One problem with using the usage rate in this cross-regional study is that the higher usage rate of income support payments may not be caused directly by higher unemployment. It is highly likely that regions with higher unemployment have lower living costs and are more attractive for people living on income support payments (Morrow, 2000). The usage rate was defined by the above Australian authors as the percentage of the number of Invalid Pension recipients to the relevant population. However, the number of recipients is determined not only by current inflows, but also by inflows in the past and the continuation rate of inflows (see, Cai and Gregory, 2003; and Klerman and Haider, 2001). The theory discussed earlier suggests that labour market conditions have a direct impact on inflows. Therefore, the usage rate may not be a good measure to analyse the impact of labour market conditions on income support recipients. A focus on inflows and outflows may provide a better analysis.

3. Empirical Evidence from Australia

This section uses Australian data to examine the response of DSP applications and grants to changes in labour market conditions. The response of applications depends not only on the parameters of the disability benefit program, but also on the availability and values of other substitutional and complementary benefit programs. For example, the relative value of disability benefits to unemployment benefits may be important when an unemployed disabled worker decides on whether to apply for disability benefits. Furthermore, the response of grants also depends on how the government implements the eligibility rules, for example, whether or not discretion is allowed in determining eligibility (Bound and Burkhauser, 1999). Therefore, the institutional differences between the Australian income support system and that of other countries imply that the estimated impacts of labour market conditions using Australia data could be different from that in other countries. However, what we are interested in is whether the relationship between labour marked conditions and applications and grants of disability benefits can be found in Australia. Comparing the magnitude of the impact with that estimated from other countries is not the main interest of the current paper.

The Data

Like most studies we use Australian aggregate data to test the theory. Two data sets are collected and used for the empirical analysis: the aggregate
time series only data and the cross-states-time-series data. The following variables are constructed using both data sets: the application rate (app_rate), defined as the number of applications per 1000 DSP age eligible population; the grant rate (grant_rate), defined as the number of grants per 1000 DSP age eligible population; the population ratio (p50_pop), defined as the ratio of the population aged 50 to the Age Pension age to the DSP age eligible population; and the replacement rate of DSP benefits (replace_rate), defined as the ratio of the maximum single pension rate to male average weekly earnings.

The basic data (i.e., the numerators and denominators of above variables) are taken from different sources. DSP applications, grants, and pension rate are taken from a variety of publications by the social security administrative authority. Other data, such as the DSP age eligible population, the average weekly earnings and the unemployment rate are taken from relevant ABS publications.

It should be kept in mind that the time periods covered by the two data sets are different because of data availability on the number of DSP applications and grants. The cross-states-time-series data set covers only the period 1971 to 1987. The aggregate time series data set covers a longer period than the cross-states-time-series data set. Of the aggregate time series data, the number of DSP applications is available for the period 1970 to 1995, while the number of DSP grants can be compiled for the period 1967 to 1999. As will be discussed later, because of time period difference of the two data sets, the model estimation is applied to both of them.

To get a flavor of the relationships between the application rate, the grant rate and the unemployment rate, figure 1 presents these three rates using the aggregate time series data. The application and the grant rates matched each other very closely. Both increased steadily to the end of the 1970s, experienced a drop in the early 1980s and then increased very quickly. The application rate appeared very stable between 1984 and 1990, while the grant rate showed a slight decline. Between 1991 and 1992 both increased sharply.

The close association between the application and grant rates might suggest one of two things: Either most of the incremental applications over the period met the unchanged eligibility criteria if the decision rule did not change in response to an increase in the applications; or, if the incremental applicants possessed a different level of disability, the decision rules must have varied in response to changes in applications.

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7 Applications and grants by state between 1971 and 1987 come from William Nichol (1988). National applications and grants between 1967 and 1995 come from DSS (July 1997). National grants between 1996 and 1999 were estimated by the authors using the FaCS full Longitudinal Data Set (LDS) data. The pension rate comes from the DSS and FaCS annual reports each year.
8 The DSP age eligible population is derived from Australian Demographic Statistics (ABS 3101.0). Male average total weekly earnings (AWE) is taken from Average Weekly Earnings, Australia (ABS 6302.0). Up to 1981 June quarter data is used for each year and after 1981 the May quarter is used. The unemployment rate was as in February each year and taken from Labour Force, Australia (ABS 6202.0).
9 Descriptive statistics of the cross-states-time-series data can be found in Cai (2002).
Another striking point standing out from figure 1 is the variation of the application rate at the time when policy (or eligibility criterion) changes took place. Over the last three decades there were three important occasions when policy changes to DSP took place. In 1980, the administrative authority tightened DSP eligibility rules by putting greater emphasis on medical factors and reducing the impacts of socio-economic factors. However, the legislative eligibility criterion, which required at least 85 per cent of permanent incapacity for work, did not change at all; only interpretation of the criterion and the focus of the assessment process were changed. In 1987, in addition to the previous criterion of at least 85 per cent of the permanent incapacity, a new requirement that 50 per cent of that incapacity be caused directly by a physical or mental impairment was added. In 1991, with the introduction of the Disability Reform Package (DRP) the DSP eligibility criteria were changed to: (i) introducing a minimum impairment threshold of 20 percent; (ii) replacing the concept of 85 per cent permanently incapacitated for work by an inability to work for at least 30 hours a week at full award wages for at least the next two years, due to a physical, intellectual or psychiatric impairment (DSS, 1992).

The coincidence of application variations and policy changes suggests that the applications of those with disabilities respond to the tightness of screening and the relaxation of the eligibility criteria. As noted earlier, the policy change in 1980 did not alter the legislative eligibility criteria and only tightened the administrative implementation of the rules. It is interesting to note that a change in implementation not only reduced the grant rate but also decreased the application rate, suggesting a close relationship between applications and screening stringency. This

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10 This new policy did not last long because of considerable criticism of this change. With the change of government in 1983, this policy change was reversed and socio-economic factors were again allowed to play a considerable role in the assessment process (Cass, Gibson and Tito, 1988).
relationship is also noted from the US experience.\textsuperscript{11} It is not clear why this occurs. One explanation may be that the potential applicants are fully aware of the eligibility requirements, form their own probability of being successful if they apply and then adjust their application decision. Another possibility is that potential applicants may not have enough information about the eligibility requirements for DSP. But, when they apply for other income support payments, such as unemployment benefits, government officials may suggest they apply for DSP if eligible. Since government officials normally know the eligibility criteria better than applicants, the applications may then vary with changes in the eligibility criteria. Given that most people are unlikely to be fully aware of the income support system, the latter seems the more likely explanation for the relationship between applications and screening stringency.

The relationship between the change in the application rate (and the grant rate) and the change in the unemployment rate is the focus of the paper. The increase in the unemployment rate during the 1970s was clearly associated with the increase in the application and grant rates. The increases in the unemployment rate between 1981 and 1983 and between 1990 and 1992 were also followed by increases in the application and grant rates, but policy changes also occurred during these two periods. However, the decrease in the unemployment rate since 1993 was not associated with a decrease in the grant rate. This may be because population ageing started to have some impact.

Model Specification

The basic model is as follows,

\[
y_t = \alpha + \beta_1 \text{unem}_{-1} + \beta_2 \text{unem}_{-1} + \beta_3 \text{p50}_{-1} + \beta_4 \text{replace}_{-1} + \beta_5 \text{time}_{-1} + \phi_1 \text{year}_{-80} + \phi_2 \text{year}_{-87} + \phi_3 \text{year}_{-91} + \mu
\]

where \(y_t\) is either the application rate (\text{app}\_rate) or the grant rate (\text{grant}\_rate) and \(\mu\) is the disturbance term.

Note that not only the current unemployment rate (\text{unem}\_rate) but also the one year lagged unemployment rate (\text{unem}\_rate\_t) is included in the equation.\textsuperscript{12} \textsuperscript{13} For the application equation, the inclusion of the lagged unemployment rate is not because individuals respond to past changes in

\textsuperscript{11} Over the 1976 to 1978 period, the application rate fell more steeply in states that had tightened their screening (Bound and Burkhauser, 1999). Using the variations in the screening stringency among states, Parsons (1991) estimated an elasticity of applications with respect to the screening stringency instrumented by the initial award rate to be 0.45. Stapleton, Kevin, Coleman, Dietrich and Livermore (1998) re-estimated Parsons’ equation, including demographic and business cycle controls, and found that doing so reduced the magnitude of the estimated coefficient by 50 per cent. However, Bound and Burkhauser (1999) believe that these elasticities underestimate the long-run effect of the eligibility standard on the application rate.

\textsuperscript{12} The unemployment rate is used to represent labour market conditions in this paper. Hoynes (2000) argues that this may not be the best measure to use. Following Hoynes’ suggestion, we tried to use the ratio of employment to working age population as an alternative measure. As expected, we found the employment ratio variable had a significant and negative impact on the DSP application and grant rates. However, following the literature, we only report the estimation results using the unemployment rate in this paper.

\textsuperscript{13} Longer lagged unemployment rates were tried, but they did not produce significant coefficients. So, they were excluded from the final model.
labour market conditions; rather, it is because there may be a time difference between changes in labour market conditions and individual applications for disability benefits. That is disability benefit applications resulting from worsening labour market conditions may lag the changes in labour market conditions. Indeed, when examining the sources of DSP recipients, Cai (2002) found that over 40 per cent of new DSP recipients each year came from unemployment benefit recipients and among them more than 50 per cent had more than one unemployment spell and had received unemployment benefits for more than a half year. This suggests that upon becoming unemployed during a recession, potential applicants may not apply for DSP immediately. The delay of applications may arise because it takes time for individuals to obtain relevant information, such as the changes in labour market conditions and the availability and requirements of the disability benefit. In addition, due to the possible adverse effect of DSP applications on future earnings (see, Aarts and de Jong, 1992; and Halpern and Hausman, 1986), when becoming unemployed during a recession, individuals may still search for employment for a while before deciding to apply for disability benefits. Because the grant of DSP benefits is an event after DSP applications, the justifications for the inclusion of the lagged unemployment rate in the application equation automatically apply to the grant equation.

The variable, $p50\_pop$, is included to control for changes in population structure (e.g., population ageing). Changes in population structure impact on aggregate DSP applications and grants because the disability incidence rate is higher among older people than among young people. It is found that people aged 50 and over are more likely to enter DSP than people of younger age (Cai and Gregory, 2003). The inclusion of the replacement rate variable ($replace\_rate$) is obvious because it represents the relative attractiveness of DSP participation. A time trend variable ($time\_tr$) is also included to control for the possible general trend of the DSP participation. This general trend may, among other things, result from the increasing awareness of the availability of DSP benefits. Year dummies are included to reflect the policy changes in the DSP program. For this purpose, all years after a policy change are coded as one, while years before the policy change are coded as zero. For example, the year dummy variable, $year\_80$, which controls for the policy change in 1980, takes a value of zero before 1980 and a value of one from 1980 onwards. Note that, for the cross-states-time-series data, only one year dummy variable, $year\_80$, is included because the data ended in 1987.

Notably, policy changes in other income support programs may also have impacts on DSP applications and grants because these benefits may be substitutes or complements to DSP benefits. Cai and Gregory (2003) provide a summary of policy changes in other benefits that may impact on the DSP program. However, it is very difficult to incorporate all the policy changes in other benefits in the model. In the final model policy changes in other benefits were not included.

As mentioned earlier, two data sets are used to estimate equation (1): the aggregate time series data and the cross-states-time-series data. Each data
The assumption on the disturbance term $\mu_t$ are different when using different data sets. In the equation using the aggregate time series data the assumptions on $\mu_t$ follow the standard linear regression model specifications. But in the equation using the cross-states-time-series data, the assumptions on $\mu_t$ are that the variances are different across states and, although there is no autocorrelation within a state, there are cross-state correlations. In the cross-states-time-series model, the specifications for the error term are $\text{var}(\mu_{it}) \neq \text{var}(\mu_{jt})$ for $i \neq j$, $\text{cov}(\mu_{it}, \mu_{i,t-1}) = 0$, and $\text{cov}(\mu_{it}, \mu_{jt}) \neq 0$ for $i \neq j$.

Because the data are essentially time series, there is a concern on the stationarity of the variables in the literature. For instance, Disney and Webb (1991) noted that, for the British studies using time series only data, the time series data were heavily time-trended and Augmented Dickey Fuller (ADF) test for the presence of co-integration was rejected. Early US time series studies did not provide test statistics on variable stationarity. From chart 1 in Lando, Coate and Kraus (1979), it appears very likely that the dependent variable is non-stationary. Using cross-sectional and time series data cannot get around the non-stationarity problem. But, if the time period is short, and the variation of the cross sectional observations is large, as in the Stapleton, Coleman and Dietrich’s (1995) studies, the non-stationarity problem may not be as serious as in the pure time series analysis.

As for our data, especially the aggregate time series data, the ADF test shows that, except for the variable, $\text{p50_pop}$, all other variables are integrated of order one (i.e., I(1)). But in principle, all these variables cannot be non-stationary because they are ratios and their values are bounded between zero and one. In addition, the residuals from the regression using the levels

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14 These specifications are based on the test of the residuals from a pooled regression. Means and the correlation coefficients of the residuals across states can be found in Cai (2002). DSP is a federal income support program. Any change impacting on this program will exert the same impact across states. This may justify the cross-state correlation assumption. Other specifications on the error term are also tried. However, the reported specifications produce the highest log-likelihood.
of the variables are stationary, implying that there exist cointegration relationships between the I(1) dependent variable and the I(1) explanatory variables. Therefore, non-stationarity may not be a problem to the data.\textsuperscript{15} However, to test the robustness of the relationships between the application and grant rates and the unemployment rate, estimations using the first differences of the variables were conducted and the significance of the unemployment rate variable was confirmed for both the application and grant equations, suggesting that the significant impacts of the unemployment rate on DSP applications and grants are not spurious.

**Estimation Results**

**The application rate equation**

Table 1 presents the time series only and cross-states-time-series results for the application rate equation. Both data sets produce a significant impact of the unemployment rate on the application rate and it is the one-year-lagged unemployment rate that matters rather than the current year unemployment rate. This justifies the inclusion of this variable; but as discussed earlier, the mechanism through which the delay occurs is not very clear.\textsuperscript{16}

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**Summary statistics of model specification**

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<td>Prob&gt;Chi2</td>
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</table>

Note: a. Standard errors are in parentheses. ***, Significant at 1 per cent significance level; ** 5 per cent; * 10 per cent.

\textsuperscript{15} The test results for stationarity can be found in Cai (2002).

\textsuperscript{16} McKinnish (2003) suggests another explanation for the significant lagged effect of labour market conditions on social security benefit participations: the lagged impact may reflect in part the effect of long-term changes in labour market conditions.
The coefficients of both the unemployment rate variables imply that a one percentage point increase in the unemployment rate will raise the application rate by 22.5 per cent (cross-states-time-series results) to 40.6 per cent (aggregate time series only results) over two years. The magnitude of our estimation is not comparable with other studies in the literature for the reasons given at the beginning of this section. In addition, the definition of the dependent variable in this paper is also different from other studies. Most studies mentioned earlier use the number of applications as the dependent variable, while we use the application per 1000 age eligible population.

Using the averages of the application and unemployment rates over the period 1970 to 1995, our estimated coefficient on the unemployment rate implies an elasticity of the DSP application rate with respect to the unemployment rate of 0.15 to 0.29, which is surprisingly not far from the elasticity estimated by Rupp and Stapleton (1995), as quoted earlier.

The control variable, the replacement rate, is not significant in any regression. While the variable, \( p50_{\text{pop}} \), is not significant in the aggregate time series only data regression, it is significant in the cross-states-time-series data regression and the sign is also as expected – population aging raises the application rate for disability benefits. This may be because the cross-states-time-series data produce more variation in this variable, which makes its impact identifiable.

The significance of the coefficient on year_80 implies that the change in the administration’s rules in 1980 did have a significant negative effect on applications, even though the legislative eligibility criteria did not change. This suggests that tightening the qualification requirements for DSP may not need legislative changes in the eligibility criteria. Tightening the administrative rules will work in terms of reducing DSP applications. As discussed earlier, the explanation may be that individuals do have their own subjective conceptions of the probability of being granted the benefit when they make application decisions, and then the tightened decision rules discourage applications; or that potential applicants seek advice from government agencies before making applications. The advice reflects the varying implementation rules.

Change in the legislative eligibility criteria in 1987 put more emphasis on medical requirements and was intended to tighten the eligibility criteria. At the time this tightening occurred the unemployment rate was falling. In the regression, when the impact of the unemployment rate is controlled for, the impact of the 1987 policy change is insignificant.

The aggregate time series only results also show that the policy change in 1991 had a significant positive impact on the application rate. This indicates that the 1991 policy change implied a relaxation of the eligibility criteria for DSP. Also note that the magnitude of the coefficient on the 1991 year dummy is very big compared with that of the unemployment rate.
The grant rate equation
Table 2 presents the results for the grant rate equation. It appears that an increase in the unemployment rate significantly raises the grant rate, at least for the next year. The magnitude of the coefficients implies that a one percentage increase in the unemployment rate would raise the grant rate by 15 to 23 per cent. Comparing the coefficients on the unemployment rate in table 2 with those in table 1, it appears the impact of the unemployment rate on the grant rate is smaller than its impact on the application rate. This may suggest that the incremental applicants as a consequence of a recession might not on average have a disability as serious as those who would apply irrespective of labour market conditions.

Table 2  Estimation Results of the Grant Rate Equation

<table>
<thead>
<tr>
<th></th>
<th>Aggregate Time Series Only</th>
<th>Cross-states-time-series</th>
</tr>
</thead>
<tbody>
<tr>
<td>unem_rate</td>
<td>0.0069</td>
<td>-0.0336</td>
</tr>
<tr>
<td></td>
<td>(0.1002)*</td>
<td>(0.0456)</td>
</tr>
<tr>
<td>lag unem_rate</td>
<td>0.2241**</td>
<td>0.1791***</td>
</tr>
<tr>
<td></td>
<td>(0.0852)</td>
<td>(0.0468)</td>
</tr>
<tr>
<td>p50_pop</td>
<td>0.2314</td>
<td>0.0885***</td>
</tr>
<tr>
<td></td>
<td>(0.1780)</td>
<td>(0.0319)</td>
</tr>
<tr>
<td>replace_rate</td>
<td>-0.0710</td>
<td>-0.0024</td>
</tr>
<tr>
<td></td>
<td>(0.0835)</td>
<td>(0.0293)</td>
</tr>
<tr>
<td>time trend</td>
<td>0.0993**</td>
<td>0.0823***</td>
</tr>
<tr>
<td></td>
<td>(0.0446)</td>
<td>(0.0378)</td>
</tr>
<tr>
<td>year_80</td>
<td>-1.9511***</td>
<td>-1.3771***</td>
</tr>
<tr>
<td></td>
<td>(0.4369)</td>
<td>(0.2563)</td>
</tr>
<tr>
<td>year_87</td>
<td>0.0240</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.4927)</td>
<td></td>
</tr>
<tr>
<td>year_91</td>
<td>1.1373***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.3868)</td>
<td></td>
</tr>
<tr>
<td>constant</td>
<td>-0.7547</td>
<td>1.2913**</td>
</tr>
<tr>
<td></td>
<td>(3.7620)</td>
<td>(0.6053)</td>
</tr>
</tbody>
</table>

Summary statistics of model specification

<table>
<thead>
<tr>
<th></th>
<th>Aggregate Time Series Only</th>
<th>Cross-states-time-series</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of obs.</td>
<td>33</td>
<td>102</td>
</tr>
<tr>
<td>F(,)</td>
<td>28.83</td>
<td></td>
</tr>
<tr>
<td>Prob&gt;F</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.9057</td>
<td></td>
</tr>
<tr>
<td>Adj-R-square</td>
<td>0.8743</td>
<td></td>
</tr>
<tr>
<td>D-W test</td>
<td>2.27**</td>
<td></td>
</tr>
<tr>
<td>Log-likelihood</td>
<td>-55.20</td>
<td></td>
</tr>
<tr>
<td>Wald Chi2 (6)</td>
<td>64.18</td>
<td></td>
</tr>
<tr>
<td>Prob&gt;Chi2</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Note: a, Standard errors are in parentheses. ***, Significant at 1 per cent significance level; ** 5 per cent; * 10 per cent.

Again the replacement rate is not significant in both regressions. While the variable p50_pop is significant in the regression using cross-states-time-series data, implying population ageing significantly raises the grant rate as expected, this is not confirmed in the regression using aggregate time series only data.

As in the application rate equation, the change in the eligibility criteria in 1980 and 1991 significantly reduced and increased the grant rate, respectively. Comparing the coefficient on the 1980 year dummy in the application and grant rate equations, the estimate in the grant rate equation...
is less than that in the application rate equation. This suggests that, although the tightened eligibility criteria in 1980 deterred applications as noted earlier, it was more effective in reducing grants. The latter was the purpose of tightening the administrative rules at that time.

The policy change in 1991 had a larger impact on the application rate than on the grant rate. This may reflect the inconsistency of the meaning literally conveyed by the changed eligibility criteria and the intention of the policy changes. One of the objectives of the introduction of the Disability Reform Package (DRP) in 1991 was to contain the rapid growth of the DSP program (DSS, 1992). However, from the results here, the new eligibility criteria might well be a relaxation of the eligibility requirements. On the one hand, the relaxed eligibility criteria attracted more applicants; on the other hand, with the intention of reducing the number of DSP recipients, the administrative authority might have to implement the changed rules more restrictively. These then resulted in a larger impact on applications and a smaller impact on grants.

4. Simulating the Impacts of the Unemployment Rate on the Growth of the Program

This section simulates the impact of the unemployment rate on the grant rate and on the number of DSP recipients. The focus here is on grants because from the simulated grant rate it is possible to estimate the subsequent impact on the number of recipients. Specifically, this section shows what the grant rate and the number of DSP recipients would be between 1971 and 1999 if the unemployment rate were kept at the 1970 and 1971 levels.

The approach here is simple. Using the model in the first column in table 2 and the actual values of other variables, a hypothetical (or simulated) grant rate can be computed if the unemployment rate is fixed at the values in 1970 and 1971. Once the simulated grant rate is obtained, an estimation of the hypothetical number of recipients can be calculated using the following identity:

$$ DSP_t = DSP_{t-1} + I_t - O_t = DSP_{t-1} + P_t \times grant\_rate_t - DSP_{t-1} \times outflow\_rate_t, $$

(2)

where

- $DSP_t$: number of DSP recipients in year $t$;
- $I_t$: number of inflows or grants in year $t$;
- $O_t$: number of outflows in year $t$;
- $P_t$: DSP age eligible population in year $t$;
- $outflow\_rate_t$: the outflow rate of DSP recipients in year $t$.

First, figure 2 presents the actual grant rate, the model predicted grant rate and the hypothetical grant rate by fixing the unemployment rate at 1970 and 1971 levels (1.6 and 1.7 per cent, respectively). Comparing the actual and the predicted grant rates indicates that the estimated model fits the aggregate data quite well. The difference of the model predicted grant rate

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17 For more discussion on this point, see Cai and Gregory (2003).
and the calculated hypothetical rate could be attributed solely to the impact of the unemployment rate, which is shown by the bottom line in figure 2. From 1970 to 1999 the predicted grant rate increased by 3.41, from 3.45 to 6.86. The hypothetical grant rate increased by 1.76, from 3.40 to 5.16. Thus, about one half (1.65) of the increase in the predicted grant rate could be attributed to the impact of the unemployment rate, and another one half (1.76) to other factors.

**Figure 2 Actual, Model Predicted and Hypothetical Grant Rate by Fixing the Unemployment Rate at 1970 and 1971 Levels, 1971 to 1999**

To assess the subsequent effect of the grant rate on the number of DSP recipients, figure 3 presents the actual, model predicted and the hypothetical numbers of DSP recipients. When calculating these projections, the actual outflow rate in each financial year, which can be found in Cai and Gregory (2003), is used. The difference between the model predicted and the hypothetical numbers of recipients reflects the impact of the unemployment rate. But note that the difference in each year reflects the accumulated effect of the impact of the unemployment rate on previous years’ DSP inflows, since the impact of inflows on the number of DSP recipients takes a long time to complete. This explains why the difference between the model predicted and the hypothetical numbers of DSP recipients is not big over the period 1974 to 1979 when the change in the unemployment rate was very large.

The total impact of the unemployment rate over the period 1970 to 1999 can be assessed by comparing the increases in the number of DSP recipients over this period between the model predicted and the hypothetical recipients. From 1970 to 1999, the model predicted number of recipients (with the unemployment rate change) increases by 431,000, while the hypothetical number of recipients (without the unemployment rate change) increases by 254,000. The difference 177,200 can be attributed to the changes in the unemployment rate, and it is about 30 per cent of the number of recipients in 1999 and 40 per cent of the increase in the actual number of recipients from 1970 to 1999.
Figure 3 Actual, Model Predicted and Hypothetical Number of Recipients by Fixing the Unemployment Rate at 1970 and 1971 Levels, 1971 to 1999

The growth in the number of DSP recipients can be divided into three periods, 1970-1979, 1980-1990 and 1991-1999, and the two significant policy changes (in 1980 and 1991) corresponded to these periods. Therefore, it is worthwhile to do the same exercise as above to simulate the impacts of the unemployment rate and policy changes for each period. Table 3 summarises the results.

Table 3  Changes in the Number of DSP Recipients Attributed to Policy Changes and the Unemployment Rate Changes by Period

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy impact</td>
<td>-126.78</td>
<td>80.72</td>
<td>0</td>
</tr>
<tr>
<td>Unemployment impact</td>
<td>29.63</td>
<td>13.83</td>
<td>43.77</td>
</tr>
<tr>
<td>Actual change</td>
<td>85.88</td>
<td>97.06</td>
<td>260.75</td>
</tr>
</tbody>
</table>

Note:  
(1) 1987 policy change is ignored because its impact is not significant.  
(2) The impact of 1980 policy change is accounted for in the 1980-1990 period.  

In all three periods, the changes in the unemployment rate had positive impacts on the number of DSP recipients. The biggest impact took place in the 1991-99 period, with an increase of 43,770 persons. Even so, the impact of the unemployment rate during this period was smaller than the impact of the policy change in 1991, which increased the number of DSP recipients by 80,700, almost doubling the impact of the unemployment rate. The impact of the 1980 policy change was very big, reducing the number of DSP recipients by 126,800 over the period 1980 to 1990.

5. Conclusion
The theory suggests that worsening labour market conditions can lead to an increase in the number of applications for disability benefits. If the
administrative authority has an accommodating policy, then the number of
grants would also increase in response to an economic recession. Using
Australian aggregate data, this paper confirms that worsening labour market
conditions, represented by an increase in the unemployment rate, increase
the application and grant rates of DSP benefits, which then lead to an increase
in the number of DSP recipients. Simulated results show that changes in the
unemployment rate over the period 1970 to 1999 could explain 40 per cent
of the increase in the number of DSP recipients over this period.

Another important factor in determining application and grant rates over
the last three decades is policy changes. The policy changes in 1980 and
1991 had significant impacts (in opposite directions) on both the application
and grant rates. However, controlling for the impact of the unemployment
rate, the 1987 policy change seemed to have little impact.

Simulation results show that policy changes in 1991 could explain 31 per
cent of the increase in the number of DSP recipients over the period 1991 to
1999. No matter what the intentions were of the government at that time,
the policy change in 1991 was a relaxation of the eligibility criteria. This is
supported not only by a comparison of the new policy with the old one
(Cai and Gregory, 2003), but also by application responses. As noted earlier,
applications respond to the tightness of screening. No matter what the
reason is for this relationship, the dramatic increase in applications after
the new policy in 1991 suggests that the eligibility criteria were relaxed. It
is puzzling that, given the government’s objective of containing the growth
of the number of DSP recipients, it actually relaxed the eligibility criteria
with the 1991 policy change.

Policy change in 1980 played a very important role in reducing the
application and grant rates. In contrast to the 1991 policy change, there
was no legislative change in the eligibility criteria in 1980, yet it still
effectively reduced applications and grants. This suggests that the tightness
of access to DSP benefits may not necessarily require a change to the
legislation.

The cross-states-time-series data produce a significant coefficient with an
expected sign on the variable that measures population structure change.
This implies that population ageing will increase applications and grants.
This result, however, is not confirmed with the aggregate time series data,
perhaps because the variation of this variable in the aggregated time series
data is not large enough. This issue requires further investigation because
it is often speculated that population ageing may be one of the important
factors behind the recent rapid increase in DSP recipients.

All regression results show that the relative level of DSP benefit represented
by the replacement rate has no impact on the application and grant rates.
This does not mean that economic incentives are unimportant. It is just that
over the period considered there had been little change in the replacement
rate. However, there may be considerable incentive effects across programs
in respect to benefit level, which makes DSP benefits more attractive than
other income support payments.
In contrast to the broadly confirmed finding that the worsening labour conditions increase applications and grants of disability benefits, there is no evidence that a recovery or a boom of an economy will move disability benefit recipients out of the program. Using FaCS administrative data, Cai (2002) found that the unemployment rate has no impacts on the hazard rate of DSP recipients. The asymmetric impact of labour market conditions implies that when individuals make a decision on whether to participate in the DSP program, they take into account labour market conditions and their prospects of employment. But, once on the program, labour market conditions are not important in affecting their decision on whether to leave the program. In other words, while an economic recession pushes the disabled into the DSP program, a boom will not draw them out. Because once in, DSP recipients tend to stay on the program for a long time, the above findings suggest that we need to search for better programmatic responses to the variation of labour market conditions.

References


