Employment Contracts and Effort: Why Do Temporary Workers Take Less Absence?

Steve Bradley*, Colin Green† and Gareth Leeves‡

August 1, 2007

Abstract

There is growing evidence that the nature of employment contracts, in particular the degree of employment protection, affects worker effort. Using personnel data drawn from a large public sector labour force, we investigate whether, and through which channels, temporary employment contracts influence worker absence. Specifically, we focus on the role of risk of job loss and the availability of opportunities for conversion to permanent contracts. We demonstrate that a large proportion (68% to 69%) of the temporary-to-permanent absence differential can be explained by observable and unobservable individual and workplace characteristics. However, some contract specific effect on absenteeism cannot be accounted for. Risk of job loss and promotion opportunities have significant and separate effects on temporary workers' absence.

KEYWORDS: Absenteeism, Effort, Temporary Contracts.

JEL CODE: J29, J45, M54.

*Economics Department, University of Lancaster, UK
†Centre for e-Science, University of Lancaster, UK
‡School of Economics, St Lucia, University of Queensland, Australia 4072.

1 Introduction

There is growing evidence that the characteristics of employment contracts affect worker effort (Ichino and Riphahn 2004, Engellandt and Riphahn 2005). A key characteristic is the degree of employment protection. Variations in employment protection have been shown to be associated with variations in workers' absence behaviour. For instance Riphahn and Thalmaier (2001) and Ichino and Riphahn (2004) demonstrate that German public sector workers who were subject to very high degrees of employment protection had a 2.4% higher absenteeism rate than public sector workers without such employment protection. Similarly, Ichino and Riphahn (2005), using personnel data from an Italian bank, exploited legislative rules on probation periods to demonstrate that once employment protection legislation becomes active, workers take markedly more absence, approximately 0.04 of a day per week. This suggests that the risk of job loss leads to increased worker worker effort.

The very nature of work contracts with limited employment protection, such as temporary employment, may result in their use by employers to screen workers for permanent positions (Booth, Francesconi and Frank 2002, Green and Leeves 2004). Hence, temporary workers may have an incentive to modify their absenteeism so as to signal effort and increase their likelihood of gaining a permanent contract. In this case, the possibility of gaining permanency affects temporary workers effort, rather than fear of dismissal *per se*.

This paper analyses the effects of temporary and permanent contracts on worker absenteeism using longitudinal personnel data for an entire public sec-

tor workforce. This data is advantageous in a number of ways and enables us to substantially extend previous research. Our data effectively covers a multi-organisation, multi-plant workforce. This gives rise to variation in not only working conditions, but other pertinent factors such as the relative use of temporary contracts, likelihood of transition to permanent employment and risk of non-renewal for temporary workers. Previous research has been based on either, single firm data where this variation is not present, or survey data which lacks the same workplace level information. With our data we aim to address three issues. First, we identify the contribution of a range of personal and workplace characteristics to observed differences in temporary and permanent absenteeism behaviour and establish if this contract effect on absenteeism behaviour is robust to the inclusion of controls for individual specific unobserved heterogeneity. Second, we focus on absence behaviour of workers who change from temporary to permanent contracts. For this analysis, we use a cohort of temporary workers in an attempt to control for prior sorting of workers into contract types. Thirdly, we examine the impact on absence of two specific features of the temporary worker's contract; variations in opportunities to gain a permanent contract and the risk of separation from the workplace. By doing so, we seek to determine if workers' absence behaviour respond to threat and incentives that are related specifically to temporary employment contracts.

The remainder of the paper is structured as follows. The next section provides some background on the public sector workforce, an outline of the data and examines the contribution of personal and workplace charcateristics to the

difference in absenteeism between temporary and permanent workers. Section 3 outlines a theoretical framework to illustrate the impact of incentives on temporary workers absence behaviour. Section 4 presents the results of the cohort analysis, while section 5 concludes.

2 Background and Preliminary Evidence

2.1 The Queensland Public Sector Workforce

The data used in this study are based on the administrative personnel records of the Queensland State Government. This data was collected in order to facilitate human resource management and is known as the Minimum Obligatory Human Resources Information (MOHRI) database. It represents the minimum level of human resource information that the Queensland Government's agencies are required to collect and report to the central government agency for industrial relations purposes. The database holds quarterly information on approximately 180,000 public sector workers and in this study refers to the period from quarter 1 2001 to quarter 2 2004, inclusive.

In Australia, state governments account for 65.8% of all public sector employees and have responsibility for core services, such as education, health, emergency services and law enforcement. The remaining public sector employees work in the federal government (23%) and local government (11.2%). The Queensland State Government is the third largest in Australia, servicing a population of approximately 3.6 million people and making up approximately 12.5%

of the total employed labour force in the State.

Workers in the Queensland public service can be employed on one of four types of contract, casual, temporary, permanent or contract. The latter is a special case involving instances such as one off sub-contracting, and these individuals do not represent ongoing members of the workforce. Casual employees are, in essence, hired on a common law basis each time they are commissioned for work. They have no entitlements to annual holiday pay or paid sick leave (ABS 1996). We exclude these two groups of workers from the subsequent analysis. Temporary contracts are fixed term contracts, that are renewable. Permanent contracts are tenured, and hence permanent employees are very difficult to fire. There are, however, no differences in holiday or sick pay entitlements between the two types of workers.

INSERT TABLE 1

Table 1 provides an overview of the Queensland public sector labour force, split according to contract status. The permanent worker takes on average 5 and a half hours more absence a quarter than temporary workers. Temporary workers are, on average, younger, have considerably lower tenure than permanent workers and work less hours (have a lower Full Time Equivalency). There are also noticeable differences in occupational structure between the two groups, with temporary contracted workers more likely to be in Other Professional, Intermediate or Elementary Clerical, Sales and Service work. They are also less likely to be employed as nurses or teachers. Temporary workers are also slightly more likely to be indigenous Australians (Aboriginal or Torres Strait Islander

(ATSI) or from an Asian background.

INSERT TABLE 2

There are large variations in the use of temporary contracts across Queensland State Government departments, and also variation in rates of separation (g) and transition to permanent contract status (γ). This is demonstrated in Table 2 which provides summary statistics on temporary contract use by department. To maintain anonymity of departments we do not report names or number of employees. For simplicity we report summary statistics for those in quarter 1 2003 only. On average, roughly 16% to 17% of departmental workforces are temporary, 10% of these temporary workers separate from the public sector in a quarter and 7% gain permanency. The correlations between these three variables (see Table 2) provide weak evidence that agencies with a higher proportion of temporary workers have lower temporary separation rates and lower rates of transition to permanency This suggests that some departments, with relatively more temporary workers, employ temporary workers in ongoing employment contracts with a low probability of gaining a permanent employment contract, but where there is also a low risk of separation.

2.2 Why do Temporary Workers Take Less Absence?

To examine the contribution of observable worker and workplace characteristics to the difference between temporary and permanent absence we estimate the following model:

$$A_{it} = \beta X_{it} + \delta W_{it} + \eta w_{it} + \phi Perm_{it} + \varepsilon_{it} \quad (1)$$

where A_{it} is the hours of absence taken in quarter t by worker i, X_i is a vector of personal characteristics, W_i is a vector of workplace and work-related characteristics (including tenure), w_i is the hourly wage rate. If temporary contracts are used as part of a screening period then wages are likely to be endogenous. We investigate this hypothesis by estimating all models omitting wages or including a one quarter lagged wage. $Perm_i$ is the workers contract status, here denoted by a dummy variable for permanent contract status (the omitted case is temporary employment). Estimation of (1) provides a baseline estimate of the difference in permanent and temporary absence behaviour conditional on observable workplace and personal characteristics. This model is initially estimated on the complete 14 quarter panel of MOHRI using OLS with standard errors are clustered at the individual level, and the results are reported in column 2 of Table 3.

INSERT TABLE 3.

Looking at the coefficient on permanent contract status in Table 3, the OLS estimates suggest that just under 40% of the temporary to permanent difference in absence reported in Table 1 was due to observable characteristics. Nonetheless, a 3.4 hour per quarter difference in absenteeism remains.

Our longitudinal data allows for the estimation of (1) with the inclusion of individual specific fixed effects to control for unobservable differences in absence propensity between permanent and temporary contracted workers. Time

invariant personal characteristics are subsumed in the worker fixed effects:

$$A_{it} = \alpha_i + \beta X_{it} + \delta W_{it} + \eta w_{it} + \phi Perm_{it} + \epsilon_{it} \quad (2)$$

Estimates of ϕ are identified in this model by workers moving between contract states. Column 4 provides estimates from maximum likelihood estimation of (2). The contract effect on absence reduces by over an hour when compared to the OLS estimates, but remain at 2 hours per quarter and is statistically significant at the 1% level**.** These results demonstrate that there are differences in temporary and permanent workers' absence behaviour that are not solely due to observable or unobservable personal and workplace characteristics.

However, the data that we have used so far in the analysis is pre-sorted insofar as individuals have already been assigned into temporary and permanent contracts within the public sector labour force. Previous research on the role of temporary employment as a port of entry into permanent employment suggests this will not be a random process (Booth, Francesconi and Frank 2002, Green and Leeves 2004). For example, if there is a screening process of temporary workers then one may expect the poorer job matches to be terminated first. Temporary workers exerting less effort may also be less likely to have contracts renewed. As a result estimates of ϕ from (1) or (2) are likely to be biased.

To address these issues of pre-sorting and selection, we focus on a cohort of new workers in the public sector who enter on temporary contracts. This is the empirical strategy adopted to examine the effects of the transition to permanent status on absenteeism. In addition we introduce variables relating to potential

incentives for temporary workers to exert greater or lesser effort, namely the availability of permanent job slots and the degree of separation risk. The next section outlines a theoretical model indicating how these incentives would affect the absence decision of temporary workers, this in turn provides some *a priori* expectations on their likely effect.

3 A Model of Absence and Contract Status

This section provides a brief outline of the absence decision for temporary workers, and the role of separation risk and the probability of gaining permanency. Full derivations are available in the Appendix.

Assume that a workers' utility is derived from effort and absence. Work effort causes disutility and absence lowers overall effort, hence absence (A) is positively related to utility. Wages are also positively related to utility.

$$U_i = U(w, A_i) = w + A_i \tag{3}$$

The discounted utility of temporary employment is given by:

$$rV_i^{ET} = w_T + A_i + (1-g)C(A_i)(V^U - V_i^{ET}) \tag{4}$$

where the discount rate is r, $V^{ET}$the value of being employed on a temporary contract and V^U the value of being unemployed. A standard assumption in models of worker absence is that the risk of dismissal is increasing in absence.

Here the main source of separation risk for temporary workers is not having their contract renewed. The variable g is the extent to which temporary contracts within a department are subject to renewal as they lapse, where $g = 0$ implies all contracts are at risk of non-renewal as they lapse and $g = 1$ means all contracts are renewed as they lapse and $0 < g < 1$. The probability of renewal is a positive convex function of worker absenteeism $C(A)$ ($C^{'} > 0$ and $C^{''} > 0$). The worker chooses absence to maximise utility from temporary employment when faced with the possibility of non-renewal and unemployment. Solution of this problem identifies that absence will be decreasing as separation risk increases.

Effort levels may be affected by the likelihood of gaining permanent employment. The expected discounted utility of permanent employment ($E(rV^{EP})$) is given by:

$$E(rV_i^{EP}) = E(w_P) + A_i + (1-\gamma)C(A_i)(V_i^{ET} - E(V_i^{EP})). \tag{5}$$

The probability that a worker is offered a permanent position is represented by $(1-\gamma)C(A_i)$. The probability of conversion is a function of absenteeism $C(A)$. The variable γ represents the proportion of temporary contracts within a department that will possibly be converted into permanent positions. If $\gamma = 0$ then all contracts are potentially subject to conversion and if $\gamma = 1$ no temporary contracts are likely to be made permanent, γ lies in the range $0 < \gamma < 1$ (see Table 2 column 4 for the actual values in our data). As before the worker will choose absenteeism to maximise utility from obtaining permanent employment

based on a comparison of the marginal benefits and marginal cost. Solution of this problem suggests workers will decrease absence as level of potential conversions increase. Workers do not directly observe g and γ, instead expectations would be based on information within the department, including recent separation and permanency conversion rates.

This model suggests that a worker on a temporary contract will be subject to influences that reduce absenteeism, related to the nature of their employment contract. As outlined above, this may occur through the risk of separation or the likelihood of conversion to permanency. In the next section, we use cohort data on temporary workers to first examine whether worker's absence behaviour changes upon gaining a permanent contract. We then use our data set to exploit variations in renewal and conversion rates, and examine the role of these two factors in influencing worker absence.

4 Absenteeism and the Transition to Permanent Employment

The cohort used is all workers who entered the public sector workforce during the first year of our MOHRI data. The cohort is selected in this way in an attempt to maximise the sample size of temporary contracted entrants whilst allowing sufficient time to observe their subsequent absence behaviour. We then follow these workers for up to 13 additional quarters, subject to their remaining in the public sector workforce. Summary statistics for the cohort

sample, disaggregated by gender, are reported in the Appendix as Table A1.

INSERT FIGURE 1 and 2

Using our data we can plot the absence behaviour over time for the cohort of temporary entrants. We plot absence behaviour separately for males and females, and all subsequent cohort analysis is stratified by gender. Figures 1 and 2 plot mean worker absence by quarter in the public sector (i.e. the x-axis runs from the quarter of entry into the public sector through to the last quarter). It is immediately noticeable that temporary workers take very little absence in the first two quarters. Ichino and Riphahn (2005) observe a marked increase in absence after 12 weeks of employment which in their data is associated with the beginning of employment protection provisions. Here we observe a marked increase in absence in a similar time period, the 3rd quarter of tenure. In our data this is not associated with any change in employment protection. As these authors noted in an earlier study (Ichino and Riphahn 2004) this could represent the effect of early career concerns (Holmstrom 1992). Workers have an incentive to take less absence early in their career because monitoring is likely to be higher since supervisors have little knowledge of their abilities. This incentive will decrease with time as monitoring will be likely to decrease. Hence, absenteeism will increase with tenure. However it is unclear why this effect would be so dramatic between the 2nd and 3rd quarter.

INSERT FIGURE 3 and 4

The key interest is in how absence behaviour changes with contract status. Figures 3 and 4 present temporary workers' absence normalised to the time

at which they transit to permanent employment. Specifically, time 0 on the x-axis refers to the quarter in which the worker made the transition from a temporary to a permanent contract. As a result period 0 covers a quarter within which we do not perfectly observe the timing of the transition between contract types. Hence we do not know exactly how much of the absence in this period occurred whilst the worker was on a temporary contract. Thus, the best comparison is between the periods denoted -1 and 1. The raw difference in absenteeism calculated in this way reveals marked gender differences in the initial contract effect on absence. For males, there is only a minor increase in absence of 0.84 hours per quarter, in contrast for females the differences is 2.62 hours per quarter. An alternative approach is to look at mean differences in absenteeism over the whole period before and after transition, which reveals a mean difference of 4.66 hours per quarter and 4.07 hours per quarter for males and females, respectively.

We now seek to examine more formally if temporary workers absence increases following a move to permanent employment. First consider the simple empirical model where an worker's absence (A_{it}) is a function of personal characteristics (X_{it}), workplace characteristics (W_{it}), the wage rate (w_{it}) and contract status ($Perm_{it}$):

$$A_{it} = \beta X_{it} + \delta W_{it} + \eta w_{it} + \phi Perm_{it} + \varepsilon_{it} \tag{6}$$

As noted above, we imperfectly observe the timing of the transition from

a temporary to a permanent contract. As a result, we exclude the quarter of transition from the analysis.[1] Estimation of (6) by OLS provides a contract differential of 3.00 and 1.94 hours per quarter for males and females, respectively (columns 2-5, Table 4). Hence, for males 36% of the observed 4.66 hour difference in behaviour before and after a worker gains permanency is due to observable personal and workplace characteristics. The corresponding figure for females is 52% of the observed 4.07 hour difference in absence.

However, these estimates of the contract effect on absenteeism may be biased by selection effects related to the retention of temporary workers within the public sector. Specifically, there may be some relationship between workers' unobserved absence propensity and their likelihood of separating from the public sector. For instance, workers with lower absence propensities may have better outside options and hence be more likely to quit the public sector prior to gaining a permanent contract. In this case, the assignment of permanent contracts to temporary workers may involve a degree of adverse selection. Investigation of absence levels of temporary workers who separate reveals that absence levels were higher, by approximately 2.5 hours, than those who remained in the public sector. Importantly, this figure did not vary markedly between those who quit and those who were fired. This does not support the argument that the assignment of temporary workers to permanent contracts may be affected by adverse

[1] In all estimations this has a small positive effect on the estimate of the contract status effect. For instance, for the OLS model reported in Table 4 the permanent contract effect on absenteeism is 2.563 including the quarter of transition and 3.002 excluding this quarter for males and 1.743 including the quarter of transition and 1.941 excluding this quarter for females. All estimates are also robust to the exclusion of wages, or the inclusion of lagged wages.

selection. In addition, temporary workers who gain permanency may, in terms of their propensity to be absent, be unobservably different from those who do not gain permanency. Under the assumption that workers absence propensity (preferences) are time invariant we can utilise the panel structure of MOHRI and include individual level fixed effects to allow for this such that:

$$A_{it} = \alpha_i + \beta X_{it} + \delta W_{it} + \eta w_{it} + \phi Perm_{it} + \varepsilon_{it} \tag{7}$$

Where α_i is an individual specific time invariant fixed effect. Estimation of this model by MLE leads to a reduced estimate of temporary to permanent differential of 1.43 hours and 1.28 hours, respectively (columns 6-9 Table 4). When compared to the OLS estimates, this suggest that there are unobservable differences in absence propensities between temporary workers who gain permanency and those who do not.

Workplaces are also likely to vary in terms of absenteeism levels due to characteristics that are not directly observed in data. We introduce controls for unobservable workplace characteristics into equation (7) above. Ideally, this would include a fixed effect for every workplace in the public sector. However, this would require the inclusion of over 1500 fixed effects. This is computationally intensive therefore we include fixed effects for each of the 51 departments in the public sector (where Z_{ij} is a dummy that is equal to one if worker i is in department j at time t)[2]. This controls for differences in departmental

[2] There are never 51 departments at one point in time, generally there are 32-40 departments in any given quarter.

management practices:

$$A_{it} = \alpha_i + \omega Z_{ijt} + \beta X_{it} + \delta W_{it} + \eta w_{it} + \phi Perm_{it} + \varepsilon_{it} \tag{8}$$

Estimates of (8) by MLE are reported in Table 4 in columns 10 and 12. The inclusion of department dummies leads to a further reduction in the size of the permanent contract effect by approximately half an hour for males. There is no significant change for female workers. The permanent contract effect on absenteeism does not appear to be due to variations in departmental practices.

In this section we have sought to quantify the impact of contract status on absence behaviour by examining workers who enter the public sector labour force on temporary contracts and contrasting their absence behaviour to that when they gain a permanent contract. The evidence presented suggests that approximately 68% of the observed overall difference in hours of absence between the contract states of 4.66 for males can be explained by observed and unobserved personal and workplace characteristics. In turn, this can be broadly decomposed as 36% due to observed worker and workplace characteristics and an additional 32% due to unobserved worker and workplace characteristics**.** For females the corresponding figures are an overall observed difference of 4.07 hours of which 69% can be explained. Again, this can be decomposed as 52% due to observed worker and workplace characteristics and an additional 17% due to unobserved worker and workplace characteristics. Furthermore, after controlling for these factors there is no significant gender difference in the impact of contract status on absenteeism.

4.1 The role of contract renewal and transition rates

We now formally consider the effects of separation risk and the probability of permanency in conditioning temporary workers' absence behaviour. We proceed under the assumption that separation risk and the probability of permanency have separate and additive effects on worker absence. This leads us to estimate equation (8) with the addition of two extra terms. The issues then arises as to how to specify these terms in our estimating equation. The contemporaneous rate of g (separation risk) and γ (rate of conversion to permanent employment) are not directly observable to the worker when considering how much effort to exert. Hence, we assume workers base their expectations on recent departmental history. We use lagged values of the departmental rate of temporary contract non-renewal and the departmental conversion rate of temporary workers to permanent employment and use these to proxy g and γ, respectively. These lagged values will be observed with some imprecision by workers as not all personnel information may be available in the public domain. Nevertheless, our expectation is that absenteeism will be negatively related to separation risk and to conversion to permanency rates. There is no natural lag period to choose, so we experiment with a variety of lag structures, but report only models with a one lag period and an average of two lagged periods. The calculation of each of these variables exclude the ith individual. This leads to the following empirical specifications:

$$A_{it} = \alpha_i + \omega Z_{ijt} + \lambda g_{ijt-1} + \varphi\gamma_{ijt-1} + \beta X_{it} + \delta W_{it} + \eta w_{it} + \phi Perm_{it} + \varepsilon_{it} \quad (9)$$

$$A_{it} = \alpha_i + \omega Z_{ijt} + \lambda g^*_{ijt} + \varphi\gamma^*_{ijt} + \beta X_{it} + \delta W_{it} + \eta w_{it} + \phi Perm_{it} + \varepsilon_{it} \quad (10)$$

INSERT TABLE 5

where $g^* = (g_{t-1} + g_{t-2})/2$ and $\gamma^* = (\gamma_{t-1} + \gamma_{t-2})/2$. These results are reported in Table 5. Whilst there is some variation according to the lag specification used, the covariate estimates support the view that both the risk of separation and the probability of conversion to permanency decrease absenteeism (increase effort). It is worth emphasising that these models include departmental fixed effects, hence the estimated effects of separation risk and permanency on absenteeism are identified by variation in g and γ over time.

In unreported estimates, we estimated the regressions with both g and γ entered separately. The estimated effects remained robust to these alternative specifications, which suggests that the conditions for including these variables as separate and additive determinants of absenteeism are maintained in our data. Despite the statistical significance of g and γ in many of our specifications, their inclusion does not generally have a marked effect on the estimated overall permanent contract effect on absenteeism.

In further unreported tests, we interacted these two variables with a dummy

indicating permanent employment. We would expect that neither of these variables should influence absenteeism once an worker gains a permanent contract. Indeed these interaction terms were insignificant and approximately zero, whilst the sign and size of the coefficients on separation risk, probability of permanency and the permanent contract effect were unaffected

4.2 Additional Robustness Tests

Peer absenteeism behaviour may effect worker absenteeism (Ichino and Maggi 2000, Bradley, Green and Leeves 2007). With respect to employment contracts this could be important if, in the presence of a difference in absenteeism between temporary and permanent workers, temporary workers tend to be grouped together. In this case, this may lead to upwardly biased estimates of the permanent contract effect on absenteeism. We investigate this by introducing a control for average workplace absenteeism (excluding the *ith* individual). Estimating this model does not have a marked impact on the estimated permanent contract effect on absenteeism (columns 4 and 5 Table 6). In unreported estimates we also introduced lagged average workplace absenteeism (again excluding the *ith* individual), again this has no marked effect on the estimated permanent contract effect.

Absenteeism is likely to have a seasonal component, the underlying rates of actual sickness may not be stationary. If there is also seasonality in the timing of temporary to permanent transitions, these factors could lead to spurious estimates of contract status on absenteeism. An example of how this may effect

the estimated contract effect is if temporary workers are more likely to gain permanency in seasons where common causes of sickness such as the cold or influenza are more likely. We therefore introduce a control for the quarter of the year, and omit the first quarter (January to March). Estimates of the transition effect from this model suggest that seasonality in the data does not lead to any marked effect on the estimated temporary to permanent contract effect.

Finally, temporary and permanent workers may, on average, work in different geographic areas which vary in terms of underlying absence probability. We introduce postcode level fixed effects and re-estimate equation (8). The estimates of the permanent contract effect are reported in table 6. These suggest that the estimated contract effect on absenteeism is robust to variations in the geographical location of work of temporary and permanent workers.

5 Conclusion

It has previously been demonstrated that a worker's contract status influences their level of effort or absenteeism (Ichino and Riphahn 2005, Arai and Thoursie 2005). Using longitudinal personnel data drawn from a large public sector labour force, we investigate to what extent and through which channels temporary employment contracts influence worker absence. Our data is advantageous insofar as it covers a multi-organisation workforce. As a result, we observe variation in not only working conditions, but also temporary separation rates and conversion

rates to permanent employment. We find a difference between temporary and permanent worker absence that cannot be accounted for by observable and unobservable characteristics. This difference widens as tenure in the public sector increases, which is indicative of sorting over time. This leads us to use a cohort approach where we follow workers who enter the public sector labour force on temporary contracts and later move to permanent employment. Conditional on observed and unobserved characteristics we again find a difference between temporary and permanent absence.

A lack of job security and a desire to signal suitability for a permanent appointment represent two factors that may lead temporary workers to take less absence. We examine the relative role of job security or separation risk and opportunities for conversion to permanent contracts, where our theoretical model suggests that increases in separation risk and increased opportunity for conversion to permanent employment should condition temporary workers to exert more effort (take less absence). We find this to be the case for both factors and these effects are, in general, statistically significant. Quantitatively, the largest and most significant effects are observed when the conversion to permanency effect is measured as the average department conversion rate over the previous two quarters rather than as a one quarter lag and when separation risk is measured as a one quarter lag. The former could be viewed as a more consistent signal to temporary workers of the reward to effort. By contrast, temporary worker's effort appears to respond to most recent information on job security. Hence, there appears to be some variation in effort response to

information signals on potential rewards as opposed to penalties.

We demonstrate that a large proportion (68 to 69 %) of the differential in temporary and permanent rates of absenteeism can be explained by observed and unobserved personal and workplace characteristics. Nonetheless, some contract based difference in effort exists that is not readily explained by these factors such as differences in unobserved individual and workplace absence propensity; differences in observable absence associated characteristics (such as tenure) between temporary and permanent workers; temporary workers inherently lower job security; or temporary workers attempts to signal suitability for permanent employment through increased effort (lower absence).

REFERENCES

Audas, R. Barmby, T. and Treble, J. G., 2004. Luck, Effort, and Reward in an Organizational Hierachy,.Journal of Labor Economics 22, 379-395.

Australian Bureau of Statistics 1996. Standards for Labour Market Statistics, Cat.No. 1288.0, Canberra, AGPS.

Arai, M. and Thoursie, P. S. 2005. Incentives and selection in cyclical absenteeism, Labour Economics, 12, 269-280..

Barmby, T. Orme, C. D. and Treble, J. G., 1995. Worker Absence Histories: a Panel Data Study, Labour Economics, 2, 53-65

Barmby, T. and Stephan, G., 2000. Worker Absenteeism: Why Firm Size May Matter. The Manchester School 68, 568-577.

Barmby, T. Ercolani, M. G. and Treble, J. G., 2002. Sickness Absence: An International Comparison. The Economic Journal 112, F315-F331.

Booth, A., Francesconi, M. and Frank, J. 2002. Temporary Jobs: Stepping Stones Or Dead Ends ?, The Economic Journal, Vol 112, pp. 189-213.

Bradley, S., Green, C. and Leeves, G., 2007 Workers Absence and Shirking: Evidence from Matched Teacher-School Data, Labour Economics, 14, 319-334.

Chatterji, M. and Tilley, C. J., 2002. Sickness, Absenteeism, Preseteeism and Sick Pay. Oxford Economic Papers 54, 669-687.

Engellandt, A. and Riphahn, R. T., 2005. Temporary contracts and employee effort, Labour Economics, 12. 281-299.

Green, C. and Leeves, G. 2004. Casual Employment and Internal Labour Markets, Manchester School, 72,.658-676.

Holmstrom, B., 1992. Managerial Incentive Problems - A Dynamic Perspective in *Essays in Economics and Management in Honor of Lars Walbeck.* Helsinki: Swedish School of Economics, reprinted in Review of Economic Studies, 66, 169-182.

Ichino, A. and Maggi, G., 2000. Work environment and individual background: Explaining regional shirking differentials in a large Italian firm, Quarterly Journal of Economics, August, 1057-1090.

Ichino, A. and Riphahn., 2004. Absenteeism and Employment Protection: Three Case Studies, Swedish Economic Policy Review, 11. 95-114..

Ichino, A. and Riphahn, R. T., 2005. The effect of employment protection on worker effort: a comparison of worker absenteeism during and after probation, Journal of European Economic Association, 3, 120-143.

Jimeno, J. F. and Cortes, L. T., 1996. Effort, absenteeism and fixed term employment contracts, Revista Espanola de Economia, *1*3, 105-119.

Bridges, S. and Mumford, K., 2001. Absenteeism in the UK: A Comparison Across Genders, The Manchester School, 69, 276-284.

Riphahn, R. T and Thalmaier, A. 2001. Behavioral Effects of Probation Periods: An Analysis of Worker Absenteeism, Journal of Economics and Statisitics, 221, 179-201.

Table 1: Sample Means, Queensland Public Service 2001(1)-2004(3), Age 20-65
[4]

	Full Sample	
	Temporary	Permanent
Absence (hours in quarter)	7.747	13.234
Male	0.316	0.374
Hourly Wage ($AUD)	20.634	23.879
Age (years)	36.351	41.335
Tenure (years)	2.834	11.532
Non-English Speaking Background (NESB)		
European	0.022	0.024
Asian	0.040	0.025
Other	0.023	0.040
Aboriginal or Torres Strait Islander (ATSI)	0.032	0.019
Disability	0.040	0.068
Full-time Equivalency (FTE)	0.846	0.907
Workforce Temporary (%)	0.184	0.121
Establishment Size	980.350	952.752
Occupation:		
1. Manager	0.014	0.028
2. Other Professional	0.226	0.140
3. Teacher	0.179	0.251
4. Nurse	0.057	0.092
5. Associate Professionals	0.103	0.157
6. Tradespersons	0.034	0.026
7. Advanced Clerical and Service Workers	0.016	0.015
8 Intermediate Clerical, Sales and Service Workers	0.277	0.212
9. Intermediate Production and Transport Workers	0.004	0.009
10. Elementary Clerical, Sales and Service Workers	0.049	0.012
11. Labourers and Related Workers	0.041	0.058
Observations	345,273	2,117,276

[4] Source: MOHRI data.

Table 2: Temporary Workers by Department 2003(3)[5]

Dept No.	Temporary (%)	Separation Rate (g)	Transition Rate to Permanency (γ)
1	0.298	0.121	0.066
2	0.346	0.128	0.041
4	0.165	0.116	0.000
5	0.135	0.020	0.167
6	0.130	0.183	0.124
7	0.147	0.124	0.034
8	0.132	0.116	0.036
9	0.218	0.044	0.065
10	0.351	0.135	0.058
11	0.056	0.022	0.095
12	0.170	0.145	0.132
13	0.282	0.081	0.062
14	0.119	0.054	0.038
15	0.231	0.128	0.067
16	0.155	0.026	0.000
17	0.267	0.076	0.023
18	0.273	0.110	0.074
19	0.107	0.179	0.049
20	0.244	0.251	0.114
21	0.107	0.068	0.086
22	0.301	0.043	0.036
23	0.185	0.087	0.065
24	0.087	0.175	0.047
25	0.141	0.048	0.024
26	0.056	0.099	0.000
27	0.073	0.000	0.286
28	0.300	0.022	0.022
29	0.037	0.133	0.126
30	0.203	0.096	0.048
31	0.163	0.042	0.063
32	0.029	0.104	0.019
33	0.091	0.099	0.120
Mean	0.175	0.096	0.068
Median	0.159	0.099	0.060
	Correlations		
	Temporary (%)	g	
g	0.072		
γ	-0.233	-0.068	

Table 3: Determinants of Hours Absent per Quarter, Full MOHRI 2001(1) to 2004(3)[7]

	OLS		Fixed Effects	
	Coeff	Std. Err	Coeff	Std. Err
Permanent Contract	3.407*	0.083	2.074*	0.125
Male	-1.451*	0.093		
Age	-0.433*	0.028	-0.789*	0.089
Age^2	0.007*	0.001	0.021*	0.001
Tenure	0.367*	0.016	0.249*	0.018
$Tenure^2$	-0.005*	0.001	-0.005*	0.001
FTE	0.110*	0.001	0.054*	0.002
Hourly Wage ($AUD)	-0.190*	0.362	0.029**	0.012
Disabled	4.493*	0.223	0.653*	0.229
Non-English Speaking Background (NESB)				
European	0.047	0.260		
Asian	0.673*	0.247		
Other	0.522**	0.222		
Aboriginal or Torres Strait Islander (ATSI)	2.806*	0.281		
Establishment Size*100	0.041	0.003	0.024*	0.004
Workforce Temporary (%)	0.069*	0.004	0.036*	0.005
Occupation				
2. Other Professional	0.959*	0.248	1.497*	0.296
3. Teacher	-1.354*	0.245	1.274*	0.051
4.Nursing	5.094*	0.287	3.974*	0.475
5.Associate Professional	3.294*	0.263	1.735*	0.294
6. Tradespersons	3.757*	0.352	2.328*	0.564
7. Advanced Clerical and Service Workers	0.854**	0.367	1.696*	0.491
8. Intermediate Clerical, Sales and Service Workers	2.332*	0.269	2.304*	0.319
9. Intermediate Production and Transport Workers	4.113*	0.528	3.674*	0.711
10. Elementary Clerical, Sales and Service Workers	3.595*	0.417	2.041*	0.491
11. Labourers and Related Workers	5.187*	0.339	4.470*	0.469
Observations	2,172,079			

[7]Source: MOHRI data. *, ** indicate statistical significance at 1% and 5%, respectively.

Table 4: Absenteeism and the Transition to Permanent Employment, Temporary at Start Cohort[8]

s

	OLS				Individual Fixed Effects				Department Fixed Effects			
	Male		Female		Male		Female		Male		Female	
	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err
Permanent Contract	3.002*	0.933	1.941*	0.425	1.436**	0.602	1.287*	0.437	1.479**	0.609	1.257*	0.438
Age (years)	-0.430*	0.160	-0.137	0.125	2.298*	0.645	0.679	0.465	2.278*	0.649	0.631	0.469
Age^2	0.005*	0.002	0.001	0.002	-0.011	0.008	-0.010	0.006	-0.011	0.008	-0.009	0.006
Tenure (years)	2.007*	0.245	2.156*	0.216	1.501*	0.238	2.432*	0.206	1.501*	0.239	2.414*	0.211
$Tenure^2$	-0.054*	0.013	-0.090*	0.011	-0.031*	0.008	-0.095*	0.009	-0.030*	0.008	-0.096*	0.010
FTE	0.045*	0.007	0.063*	0.006	0.020	0.016	0.053*	0.009	-0.017	0.016	0.053*	0.009
Workforce Temporary (%)	0.029	0.016	0.041**	0.020	0.001	0.024	0.054**	0.023	0.001	0.024	0.056**	0.024
Log Establishment Size	0.471**	0.224	0.273**	0.117	0.539	0.319	0.624*	0.211	0.046	0.033	0.610*	0.218
Observations	15,179		28,697									

[8]Source: MOHRI data. *, ** indicate statistical significance at 1% and 5%, respectively. Controls for ethnicity, disability, occupation and wage rate included but not reported.

Table 5: Absence, Contract Security and Permanency Probability, Temporary at Start Cohort[10]

	(I) Male Coeff	Std. Err	Female Coeff	Std. Err
A - Lag One Period				
Permanent Contract	1.396**	0.700	1.529*	0.501
Separation Risk	-0.055*	0.021	-0.045*	0.015
Permanency Conversion Rate	-0.027	0.020	-0.025	0.013
Observations	12904		24407	
B - Average Two Lag Periods				
Permanent Contract	1.684**	0.082	1.594*	0.589
Separation Risk	-0.035	0.018	-0.016	0.013
Permanency Conversion Rate	-0.042	0.015	-0.045*	0.010
Observations	10885		20766	

[10] Source: MOHRI data. All models include controls for individual time varying characteristics, individual time invariant fixed effects, workplace characteristics and departmental level time invariant fixed effects.

Table 6: Absenteeism and Alternative Controls, Temporary at Start Cohort [11]

	Peer Effects				Seasonality				Postcode Fixed Effects			
	Male		Female		Male		Female		Male		Female	
	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err
Permanent Contract	1.681*	0.608	1.565*	0.437	1.567*	0.607	1.464*	0.437	1.850*	0.635	1.257*	0.438

[11] Source: MOHRI data. All models include controls for individual time varying characteristics, individual time invariant fixed effects, workplace characteristics and departmental fixed effects..

Figure 1: Hours Absence by Tenure (quarters), Temporary at Entry, Males

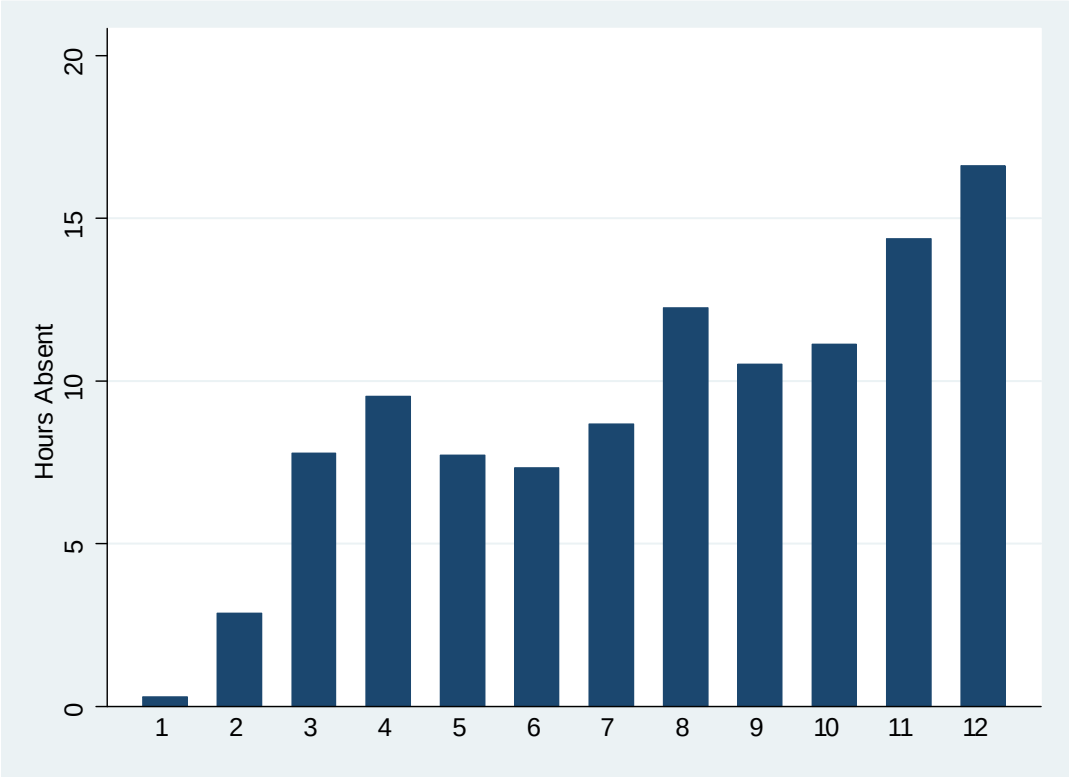

Figure 2: Hours Absence by Tenure, Temporary at Entry, Females

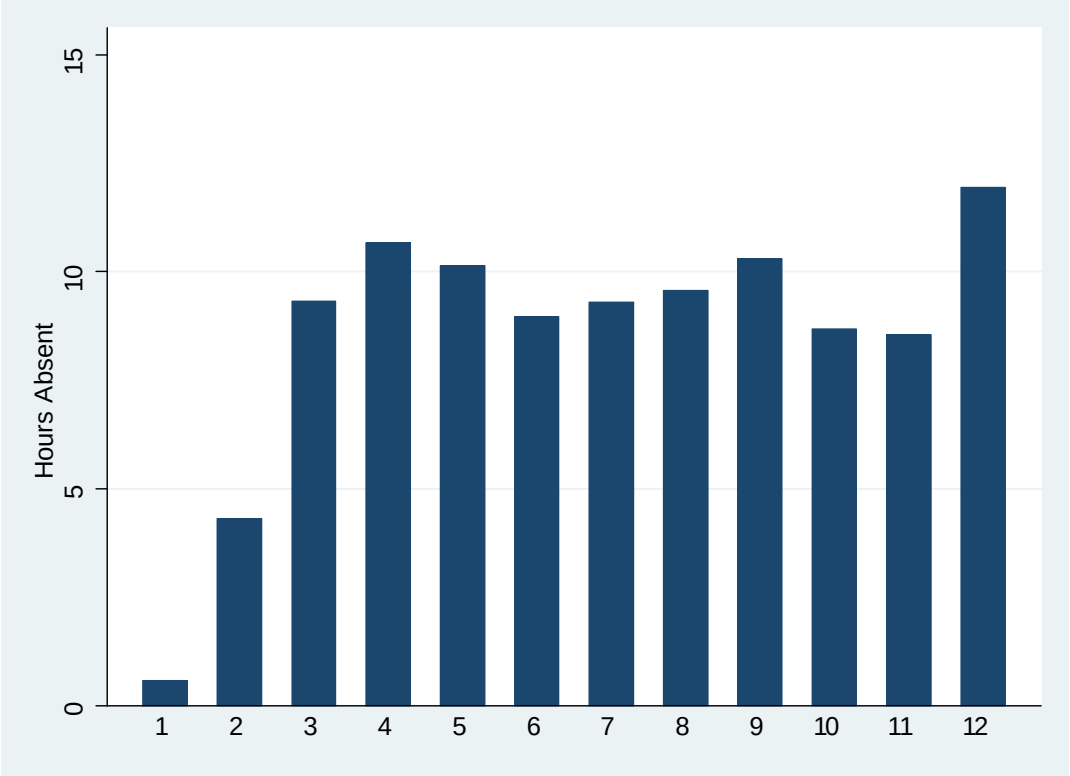

Figure 3: Sick hours by time until temporary to permanent transition (quarters), Males

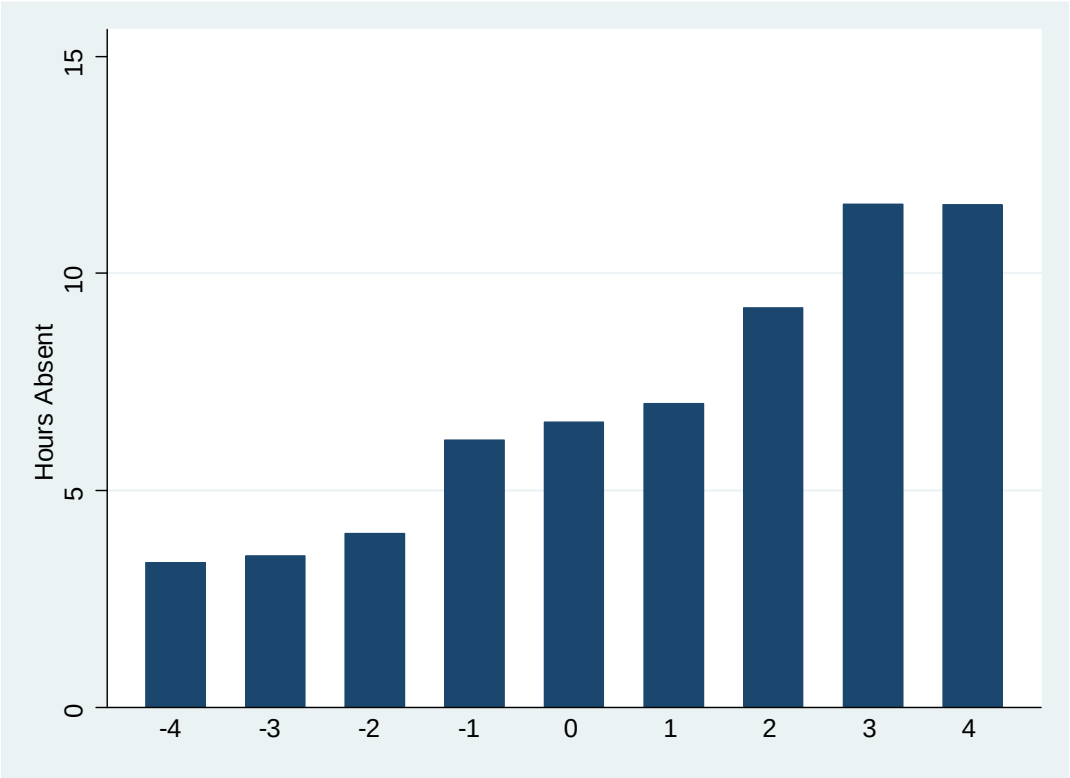

Figure 4: Sick hours by time until temporary to permanent transition (quarters), Females

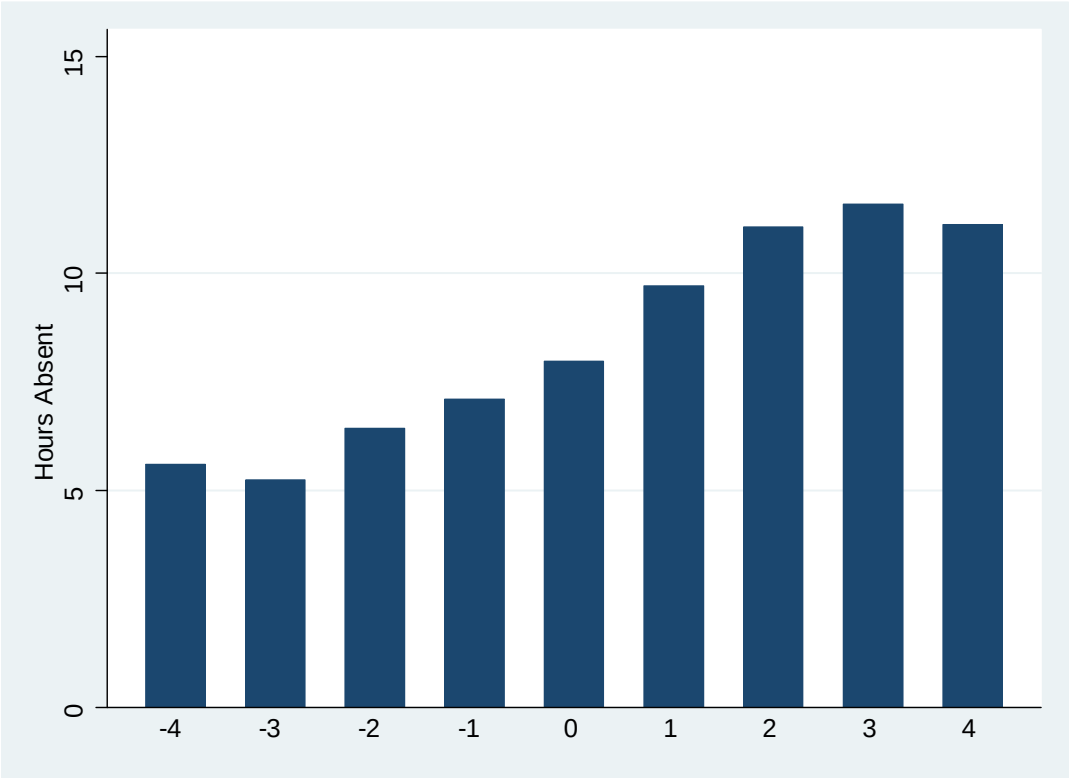

Table A1: *Sample Means by Gender, Temporary Entrant Cohort*

	Male	Female
Individual Absenteeism (hours in starting quarter)	0.297	0.591
Age (years)	33.609	32.156
Non English Speaking Background (NESB)		
European	0.017	0.023
Asian	0.032	0.017
Other	0.012	0.020
Disabled	0.014	0.015
ATSI	0.032	0.024
Full Time Equivalency (FTE)	0.941	0.877
Hourly Wage ($AUD)	18.344	17.790
Establishment Size	298.975	316.002
Workforce Temporary (%)	0.199	0.178
Occupation		
1. Manager	0.017	0.018
2. Other Professional	0.266	0.197
3. Teacher	0.137	0.206
4 Nurse	0.002	0.013
5. Associate Professionals	0.113	0.072
4 Tradespersons	0.088	0.002
5 Advanced Clerical and Service Workers	0.013	0.025
6 Intermediate Clerical, Sales and Service Workers	0.170	0.314
7 Intermediate Production and Transport Workers	0.011	0.002
8 Elementary Clerical, Sales and Service Workers	0.089	0.117
9 Labourers and Related Workers	0.094	0.034
Observations	2,075	3,788

Technical Appendix: Separation Risk, Permanent Contracts and Absence

Assume that a workers' utility is derived from work and absence Work effort causes disutility and absence lowers overall effort, hence absence (A) is positively related to utility. Wages are also positively related to utility.

$$U_i = U(w, A_i) = w + A_i \tag{11}$$

The discounted utility of temporary employment is given by:

$$rV_i^{ET} = w_T + A_i + (1-g)C(A_i)(V^U - V_i^{ET}) \tag{12}$$

where the discount rate is r and the value of being employed on a temporary contract is V^{ET}. The variable g is the degree to which temporary contracts within his/her department are subject to evaluation of worker effort as they lapse, where $g = 0$ implies all contracts are evaluated for renewal as they lapse and $g = 1$ means all contracts are terminated as they lapse and $0 < g < 1$. The probability of renewal is a function of worker absenteeism $C(A)$ ($C^{/} > 0$ and $C^{//} > 0$). The variable g is not directly observable for the worker but would be estimated from current information supplied by the employer and from recent history of termination and renewal in the department. Equation (4) states that the discounted utility of employment for a worker is equal to the instantaneous utility of employment, the first two terms of the right hand side, and the loss in utility from the probability of non-renewal, the second term. The loss in

utility is equal to the difference between the value of being unemployed (V^U) and the value of employment. It is assumed that all workers are hired initially on temporary contracts before conversion to permanent contracts. The discounted utility of permanent employment is given by:

$$E(rV_i^{EP}) = E(w_P) + A_i + (1-\gamma)C(A_i)(V_i^{ET} - E(V_i^{EP})). \tag{13}$$

The expected value of being employed on a permanent contract is $E(V^{EP})$.The probability that a worker is offered a conversion to a permanent position is represented by $(1-\gamma)C(A_i)$. The probability of of conversion is a function of absenteeism $C(A)$. The variable γ represents the proportion of temporary contracts within the department where the worker is located that are being evaluated for conversion to permanent positions. The evaluation of γ by the worker would be based on information within the department and the recent levels of conversion to permanent employment. If $\gamma = 0$ then all contracts are subject to evaluation and if $\gamma = 1$ no contracts are subject to evaluation and this lies in the range $0 < \gamma < 1$. The worker will choose absenteeism to maximise $E(rV_i^{EP})$ which, for all workers, is given by the condition:

$$\psi = 1 - (1-\gamma)C^{'}(A)(V^{ET} - E(V^{EP})) = 0. \tag{14}$$

Equation (6) illustrates how a worker will take absence until the marginal benefit is equated to the marginal cost We deal separately with the evaluation decisions relating to temporary and permanent work and temporary work and

unemployment. The two expressions for the value of temporary and permanent work can be used to produce the following expression for $E(V^{EP}) - V^{ET}$

$$E(V^{EP}) - V^{ET} = \frac{(E(w_P) - w_T)}{r + (1-g)C(A) + (1-\gamma)C(A)} \tag{15}$$

This expression can be combined with equation 6 to obtain the condition:

$$S = r + (1-g)C(A) + (1-\gamma)C(A) - ((1-\gamma)C'(A))(E(w_P) - w_T) = 0 \tag{16}$$

To determine the effect of higher rates of conversion to permanent positions on absenteeism we need to evaluate this equation which through implicit differentiation gives the expression

$$\frac{dA}{d\gamma} = -\frac{X_\gamma}{X_A} = \frac{r + (1-g)C(A)}{(1-g)C'(A) + (1-\gamma)C'(A) - (E(w_P) - w_T)((1-\gamma)C''(A))} > 0 \tag{17}$$

From this we see that workers will decrease absence as the proportion of jobs that could be potentially converted to permanent employment increases.

If a temporary worker is not renewed then the value of being in unemployment is defined by income when unemployed b (same for all workers) and the probability of finding another job η multiplied by the difference in value between employment and unemployment.

$$rV^U = b + \eta(V_i^{ET} - V^U). \tag{18}$$

The level of absenteeism which will maximise rV_i^{ET} is given by

$$\Phi = 1 - (1-g)C^{'}(A)(V^{ET} - V^U) = 0. \tag{19}$$

The two expressions for the value of work and unemployment can be used to produce the following expression for $V^{ET} - V^U$.

$$V^{ET} - V^U = \frac{w_T + A - b}{r + \eta + (1-g)C(A)} \tag{20}$$

This expression can be combined with equation 11 to give the following condition.

$$X = r + \eta + (1-g)C_i(A) - (w_T + A - b)(1-g)C_i^{/}(A) = 0 \tag{21}$$

To determine the effect of higher levels of non-renewal on absenteeism we need to evaluate equation (13) using implicit differentiation, which gives the expression

$$\frac{dA}{dg} = -\frac{X_g}{X_A} = \frac{r + \eta}{(1-g)C''(A)(w_T + A - b)} > 0 \tag{22}$$

If a worker is in work then $(w_T + A - b) > 0$ and workers will decrease absence as the percentage of jobs that potentially may not be renewed increases.