

Temporary versus permanent employment: Does health matter?

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Abstract

Health issues may inhibit active participation in the labour market and restrict the types of employment available to an individual. This paper presents an investigation into the influences of mental *and* physical health on employment type (full time, permanent, fixed term, contract, seasonal and casual) and employment propensity *per se*. Applications of bivariate probit regression illustrate a complex blend of effects of health on employment propensity and employment type. Being in physical pain does *not* influence employment propensity but does reduce the probability of being in full-time or permanent employment, with such people being more likely to work casually. In addition to adversely influencing employment propensity, having depression does (not) diminish the probability of being in permanent (full-time) employment. Applications of instrumental variable probit regression across employment type reveal that mental health is exogenous to most types of employment, except permanent. These results revitalize the debate on the need for greater awareness and understanding of the inhibiting effects of health on employment.

Acknowledgements: The authors thank Barrett Owen for excellent research assistance.

Keywords: Mental health; Physical health; Employment propensity; Employment type

JEL Classification: I1; J29

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1. Introduction

Permanent work is generally defined as “Workers who work all year and have an expectation of continuing employment” (Allan *et al.*, 1996). While there are numerous definitions of temporary employment, as Hardy and Walker (2002) review, temporary work tends to encompass any job that deviates from the definition of permanent employment, in that it is not continuing and it does not necessarily go on for the full year (Campbell, 1994). Temporary work may cover many types of employment including seasonal, contract, casual, fixed-term, etc. and all of these can, in a variety of ways, be described as precarious. There is growing research interest in the relationship between employment type and health, with particular foci on the increasingly precarious natures of work and the impacts of eroding employment security.

Although a multitude of factors have been identified as influencing employment type, one set of determinants that has not featured prominently in the literature is health, which is surprising considering that several studies have focussed on the opposite relationship, i.e. the impact of a change in employment type on health. The impact of health on employment may be crucial for our understanding because if people with poorer health have a higher propensity to find themselves in less-secure employment then the consequences may mean their overall well-being is affected, and possibly their mental health.¹ To fill this gap in the literature, this study evaluates the proposition that health issues inhibit active participation in the labour market and restrict the type of employment available to an individual.

This paper makes use of data sourced from the New Zealand General Social Survey and presents an assessment of the determinants of employment type (full time, permanent, fixed term, contract, seasonal and casual) and employment propensity *per se* with specific foci on the contributory effects of physical and mental health. Specifically, in addition to the expected covariates believed to influence a worker’s tendency to circumvent permanent employment and instead venture down the temporary employment pathway (such as age, marital type, presence of children, and education level), we make use of six self-assessed health variables that encompass both physical and mental health. The role that health issues play in influencing participation in temporary employment is investigated here in a more disaggregate fashion by analysing separately the four sub-groups of temporary work – fixed term, contract, seasonal and casual. Such finer analysis is an important contribution as a large amount of extant literature focuses only on permanent employment versus the aggregate group of temporary workers (see, for example, Morris and Vekker, 2001) or concentrates on just one category of employment type (see Güell and Petrongolo, 2007, who investigated determinants of converting fixed term into permanent contracts).

An important issue in this area is sample selection bias. Some factors may determine only whether a person is active in the labour market (employment propensity) or only the employment type when actively in work (full time, seasonal, etc.) while other factors may influence both these issues. In our empirical exercise we employ bivariate probit regression and conditional marginal effects estimation

¹ To date, the predominant conceptualisations of these insecure employment roles have been either as an opportunity for disabled workers to gain entry to permanent, secure employment or as a choice whereby such employment offers the flexibility that disabled workers are perceived to require when balancing employment alongside their own health requirements (Secker and Seebom, 2005), yet this assertion requires empirical investigation.

processes to control for those variables that impact on employment propensity before we identify the effects of the variables on employment type. Further, instrumental variable probit regressions are then estimated to investigate whether mental health issues are endogenous to employment type.

The remainder of this paper is organized as follows: Section 2 reviews the literature regarding the nature of the bi-directional relationships between employment and health. Section 3 outlines the data source and provides details on the six key health identifiers used in this study (three physical health and three mental health variables). Section 4 explains briefly the empirical approach undertaken and its contribution to understanding the determinants of entering into permanent versus temporary employment types. Section 5 reports key results and Section 6 concludes.

2. Underemployment: causes and consequences

While there are important debates over the extent of and reasons behind the increasing amount of non-permanent employment, data demonstrates that across the world, a non-trivial proportion of the workforce can now be described as occupying non-permanent employment (Burgess and de Ruyter, 2000; Vosko, 2006). Although there has been documentation of the phenomenal changes in the labour market towards either part-time or non-permanent employment types over the last two decades (Segal and Sullivan, 1997; Alba-Ramírez, 1998; Tan and Tan, 2002; De Jong *et al.*, 2009), there is a contemporaneous dearth of recognition of the influence of health on employment type.

New Zealand has a growing profile of temporary workers. The *Survey for Working Life* (ran by Statistics NZ in March 2008) found that 40 percent of temporary workers indicated that they would prefer a permanent job, which is an indication that a substantial number of these workers were not satisfied with their current employment type. Underemployment has become a major social issue during the past 20 years. Schied (1999) highlighted that when workers lose full employment they may accept partial employment, by for example involuntarily working part-time or at lower wages. Certainly, New Zealand's pattern of undesired temporary employment reflects such claims. Inadequate work has been termed "disguised unemployment" (Robinson, 1936), but it is not reflected in the standard unemployment statistics. From this perspective different forms of unemployment and inadequate employment together constitute 'underemployment.' The few studies that present research into this issue have found the adverse effects of inadequate employment to be more like those of job loss than continuing adequate employment (Dooley and Prause, 1998).

Much medical and psychological research on un/underemployment has concentrated on the possible damage to mental health or psychological well-being caused by unemployment, and it overlooks the issue of disadvantaged groups being found in disadvantaged employment (Hammarström and Janlert, 1997). That is, given the common observation that employed individuals are less depressed and show higher self-esteem than their unemployed counterparts, can we attribute this difference to employment type or does a pre-existing difference in mental health influence whether one will obtain and retain employment?

It is widely acknowledged that there are three possible channels by which workers find themselves in temporary employment (De Cuyper and De Witte, 2008; De Jong *et al.*, 2009). The first mechanism involves free choice reasons, i.e. workers *choosing* temporary placements due to their intrinsic qualities, such as greater levels of freedom and flexibility. The second group of workers are forced into temporary

positions due to constraints / obstacles faced in finding permanent work. The final group encompasses workers who choose temporary jobs with an aim of attaining a permanent job at a later stage. Using data from the USA's Current Population Survey, Morris and Vekker (2001) found that the majority of temporary workers would have preferred a permanent position (67 percent); close to a third of the temporary workers (32 percent) stated that it was the only type of job they could find, and another 8 percent hoped it would lead to a permanent job.² This is clear evidence of underemployment.

Socio-economic correlates

Many studies (Güell and Petrongolo, 2007; Segal and Sullivan, 1997; De Cuyper *et al.*, 2009) have found that younger workers are over-represented in temporary jobs. Within the 16-64 age band, it is likely that age is an important determinant as it is often correlated with experience and thus likely to be positively correlated with gaining permanent employment. For example, Corsini and Guerrazzi (2007) found the probability of moving from temporary to permanent jobs increased with age, until the age bracket of 35-44 years, after which it began to decline.

Gender is also a crucial factor in determining employment type with women tending to make up the majority of temporary workers (De Cuyper *et al.*, 2009; Morris and Vekker, 2001; Segal and Sullivan, 1997) perhaps because women find it more difficult to transition into permanent jobs (Alba-Ramírez, 1998; Corsini and Guerrazzi, 2007). Similarly, Güell and Petrongolo (2007) found that the likelihood of transitioning from temporary to permanent jobs increases for men with education, but decreases for women. Explanations for such patterns are the subject of significant debate. Firstly, Polachek (1975) suggest that women in general have different expectations from men and therefore, women make different investment decisions. Since women are all assumed to plan to abstain themselves from work for child bearing they are expected to choose the low occupations and hence in most cases they accumulate less human capital and have lower lifetime earnings as a result. Such explanations continue to be presented by Hakim (2000) in her preference theory, heavily influenced by human capital theories. Yet the concept of choice have been challenged (see Durbin, 2002, Acker, 2006 and Walby, 1997); the claim that women choose precarious employment in an attempt to balance work and home life is seen as highly problematic, not least because such choices are constrained by gendered social structures.

Other significant determinants of being in temporary versus permanent employment include education, marital type, ethnicity and previous unemployment experience. Morris and Vekker (2001) found temporary workers tend to have lower education levels than permanent workers. Bover and Gómez (2004) showed that having a university degree increases the likelihood of getting into a permanent position and at the same time decreases the probability of attaining a temporary one. Alba-Ramírez (1998) showed that transition rates from temporary to permanent work increase for men with higher education levels, but the same effect is not observed for women. In terms of ethnicity, there is growing research on this complex issue, such as Morris and Vekker (2001) who found that Blacks had a lower likelihood of being in permanent employment.

² Almost 20 percent of temporary workers in their study chose this employment pathway due to the constraints faced with working and being in school / training simultaneously.

Health

One set of determinants that has not featured prominently in the employment type literature is health. This is surprising, considering that several studies have focussed on the opposite relationship, i.e. the impact on health as a result of a change in employment type. For example, research by Isaksson and Bellagh (2002), Virtanen *et al.* (2003a) and Silla *et al.* (2005) investigated health as an outcome variable. Silla *et al.* (2005) found evidence that traditional temporary workers (those low in volition and employability) experienced the lowest health outcomes (in particular, low levels of well-being). Virtanen *et al.* (2003a) studied whether changing from a fixed-term to a permanent employment situation was followed by changes in health or health-related behaviours (such as sickness absence). Further research by Virtanen *et al.* (2005) emphasised the need for future work to investigate health status as an antecedent, since many dual labour market (neo-classical) theorists argue that those who are healthy are selected for core jobs, while those who are not, are selected for periphery jobs. This approach maintains that the allocation of jobs and resources in a free labour market economy is determined by supply and demand, with the implication that discrimination based on prejudice and stereotypes against certain social groups is irrational and has no place within the functioning of a rational and efficient market as it would be non-competitive.³

MacKay (1998) highlights the concept of unemployment and underemployment as a ‘choice’; unemployable through being unduly inflexible. This places the emphasis on the individual, their willingness to accept lower wages, poorer working conditions, or by physically moving location. From this perspective, it is inflexibility on the part of the individual that results in unemployment or unemployability, depoliticising organisational decision-making and exclusionary processes. In addition, for those who are underemployed, such an approach justifies their position in the labour market as a matter of choice or opportunity.

This attitude to exclusion is influenced by medical approaches to health. Here exclusion or propensity for non-permanent employment is an issue of individual deficit. Disability, and specifically mental health, in this context, has been used here to indicate inability or limitations in performing social roles and activities such as in relation to work, family or to independent living (Nagi, 1976). From such a perspective, any relationship between health and economic exclusion has been explained as causal; mental health impairs performance at the individual level, and in social performance (Nagi, 1976). Yet empirical evidence regarding the relationship between health status and its impact upon employment type is often restricted to uncovering the impact of precarious work. It has been argued that, people with disabilities have constituted a “contingent labour force” (Yelin, 1991). However, particularly for those with mental health issues, the dominant explanation for the relationship between disadvantage and mental health has been explained as symptomatic of poor employment. The suggestion that jobs for people with poorer health status are primarily characterised by underemployment is largely unexplored.

This study aims to tackle this gap in the literature by specifically investigating the impact of six self-assessed physical and mental health variables on employment propensity and employment type; for the latter issue we are able to analyse separately

³ According to this theory, any irrational discrimination against workers is naturally addressed by competitive mechanisms since employers evaluate workers in terms of their individual characteristics as they seek to maximize profit (Reich *et al.*, 1972).

the four sub-groups of temporary work (fixed term, contract, seasonal and casual) and such detailed analysis is novel in the literature.

3. Data

Given the lack of empirical investigation into the study of the effects of mental and physical health on entering into temporary versus permanent work, this research aims to fill this gap in the literature. According to the New Zealand General Social Survey 2008 (NZGSS) approximately 17.4 percent of those employed were in temporary occupations.⁴ The two biggest groupings were contract workers (6.8 percent) and casual employees (5.6 percent).⁵ It is important to recognise that although temporary work encompasses a range of categories of employment, there are substantial differences in the types of workers within each sub-group.⁶ For example, fixed term jobs tend to be held by prime age workers, with higher levels of skills and education, while casual employees tend to be unskilled and younger workers. Seasonal workers often have the lowest level of educational attainment (Dixon, 2010) and are less likely to be married.

The data employed in this study is sourced from the NZGSS, which is a new source of detailed information on the physical and mental health characteristics of New Zealanders, and it provides a wide array on data on the social and demographic characteristics of individuals aged 15 and over. The survey was conducted between April 2008 and March 2009 and 8,721 respondents were interviewed on several aspects of their lives (life satisfaction, knowledge, work type, housing, safety, education, social relationships and health).

For the purpose of this research, the outcome variables of interest are the different categories of employment type. Specifically, understanding the determinants of being in full-time versus part-time work, conditional on being employed; and being in permanent versus temporary (further subdivided into fixed term, contract, seasonal, casual) work, again conditional on being employed. These variables, along with the six health status indicators, and other covariates used in the upcoming empirical analysis are described in Table 1.

{Insert Table 1 about here}

In general, there are three physical health variables (Physical Health Limiting, Pain and Energy) and three mental health indicators (Depression, Health social, and Health accomplishing). All health variables have been coded in a similar fashion (categorical and ordered from one to five) such that the higher the value of the variable, the more detrimental the health of the individual. For instance, a value of five for the Pain variable signifies that during the past four weeks pain played a role of extreme interference with the individual's normal work, including work both within and outside the home. Conversely, a value of one is indicative of pain having no impact on an individual's normal work. In a similar manner, a value of five for the depressed variable (one of the mental health indicators) signifies that the individual

⁴ This covers the sub-categories of fixed-term, contract, seasonal and casual employment agreements.
⁵ These figures are representative of the NZ labour market – a similar proportion (4.9 percent) of casual employees was found in the *Survey for Working Life* (which ran as a supplement to the Household Labour Force Survey in the March quarter of 2008).
⁶ For clarity, note that full time workers may be full time permanent, full time casual, etc. The issue is whether they are full time per se. The same issue applies across all other employment types.

has felt depressed and downhearted all of the time during the past four weeks; whereas a value of one corresponds to them feeling depressed none of the time. A priori we expect that the effect of these health variables on different types of employment (such as full-time and permanent jobs) to be negative.

While we have three variables under each of the physical and mental health headings, they are by no means mutually exclusive categories of health type. In terms of the descriptive statistics provided in Table 1, most New Zealanders rate their health status relatively well. This is shown by the means for the six health indicators being closer to one, rather than five. The Energy variable is the worst health aspect for individuals in this sample, with a mean of 2.35. With respect to the remaining characteristics of the sample, it is fairly evenly divided along the gender line (50.3 percent male) and there are two distinct ethnic minorities (relative to the control group of NZ European) of Maori and Pacific Islanders (11.1 percent and 4.4 percent, respectively).

Table 2 provides a glimpse into the health status of workers versus non-workers; full-time versus part-time, and permanent versus a range of temporary contracts (fixed term, contractor, seasonal, and casual). Several patterns are evident within this table. Firstly, across all physical and mental health aspects, individuals not employed have poorer health, relative to those employed. While these means do not in themselves establish a causal link between health and employment type, along with past international literature investigating the general link between health status and employment (See Ojeda *et al.*, 2010; Cai and Kalb, 2006; Pelkowski and Berger, 2004), these statistics adds weight to the argument that healthy individuals are selected for employment, and those with poor health are not.

{ Insert Table 2 about here }

Another clear pattern in Table 2 is that part-time workers have inferior health status relative to those in full-time employment. Without further empirical investigation it is difficult to know which direction causation runs, or if it runs in both directions in a significant manner. This study presents an investigation into this issue by examining whether the various physical or mental health indicators influence different employment types, and we conduct Wald tests (in Section 5) to inspect the likelihood of reverse causation.

Finally, when comparing permanent workers to the sub-categories of temporary jobs, casual employees are identified as experiencing the worst health (with the highest means for all six health identifiers). While the lowest means (and therefore best self-assessed health status) were often experienced by permanent workers, there were a couple of notable exceptions. The category of workers with the most energy was seasonal workers, while contract workers had the lowest mean for health accomplishing (an indicator of mental health with respect to emotional problems such as depression and anxiety).

4. Econometric strategies

Contrary to the majority of approaches adopted elsewhere, this paper examines whether there are associations between a range of personal and health-related factors on employment *and* employment type. We assume that data takes the format shown in Figure 1, and a distinctive feature of this study is that it models these hypotheses at the same time, which are shown in Figure 1 as H1 and H2.

{Insert Figure 1 here}

It would not be out of the question to model only one of these issues, and it would be entirely appropriate to model the influence of types of health on employment propensity. However, care must be taken when attempting to identify the impact of health factors on employment type as such factors may influence the employment decision rather than the type of employment entered into given that the individual has entered the labour market. To circumvent this issue we explicitly assume a sequence in the employment propensity and employment type choices. A small extension of Figure 1, therefore, is presented in Figure 2, which illustrates that the first step in the process is whether the individual obtains employment, while the second stage is which employment type they enter.

{Insert Figure 2 here}

The numbers in Figure 2 corresponds to our data set, and specifically the employment per se and full-time employment type sequence. It reveals that the 62.6 percent of the sample are in full-time employment (62.6 percent of the sample = 77.5 percent * 80.8 percent).⁷ While this figure portrays whether the individual is in full-time employment or not as the second stage of the process, the analysis presented below repeats this methodological approach for the cases where the second step is either permanent, fixed-term, contract, seasonal or casual employment.

Undertaking an empirical examination of this type is fraught with potential sample selection issues that cause some members of the population to be less likely to be included than others. In our case, this issue refers to the potential non-random sampling of those who are employed (the first step in Figure 2). If our econometric method did not take into consideration that the results only correspond to individuals who are employed then we would effectively be suggesting that the employment type issue (the second step in Figure 2) corresponds to all individuals in the labour market. This could be incorrect because it would suggest equal probabilities of getting to step two; therefore such results should be constrained to correspond only to those individuals who are part of the first step in Figure 2, i.e. an analysis of the employment type outcome should explicitly exclude those who are not employed.

An appropriate method to employ in this instance is the bivariate probit and conditional marginal effects can be obtained where $P(\text{Full-time}=1 \mid \text{Employed}=1)$. Given the marginal effect estimates of these two conditional probabilities, it would be possible to identify whether the regressors, including health-related issues, contribute either to the employment decision, or the employment type decision, or to both. See the technical appendix below for further information.

The following section will interpret the results from employing the bivariate probit methodology to the case explained above, and specifically will discuss the marginal effects obtained from $P(\text{Full-time}=1 \mid \text{Employed}=1)$. The process will also be repeated whereby Full-time is replaced with other types of employment agreement, such as permanent, fixed-term, contract, seasonal and casual.

⁷ These figures are comparable to other sources of information regarding the proportion of full time workers in the NZ labour market. For instance, across the 2008 year (the same time during which the NZGSS was carried out), seasonally adjusted quarterly Household Labour Force Survey data indicate that full time workers range between 77 to 77.5 percent of the employed group in the labour market.

5. Results

Table 3 presents the results of the bivariate probit regressions where the first regression of each pair examines the probability that the individual is employed and the second regression examines the propensity that the individual is in a particular type of employment. There is consistency in the results across the table and many of the covariates yield the expected results. For instance, Maori and Pacific Islanders are less likely to be employed than European, males are more likely to be employed than females, respondents who have partners are more likely to be employed than people without partners, and those with children may face constraints on their ability to work as indicated by the negative coefficient. Relative to people in the 30-34 year old age bracket, those in the 35-39, 40-44 and 45-49 age groups are more likely to be working, perhaps because these age groups may be past the average child rearing age of the woman and because of the need for extra income to maintain the same level of welfare in family units as opposed to a household singleton. The 55-59 and 60-64 year old age groups were less likely to be employed, perhaps indicating the preference of employers to select and train younger workers in order to reap longer term returns from their investment in their workers. The results also corroborate existing knowledge that higher qualified individuals are more likely to be in employment.

{Insert Table 3 about here }

Turning our attention to the health-related variables, as expected all six variables have a negative association with employment type, but not all health-related variables have a statistically significant association.

With regard to the physical health variables, the only statistically significant variable is physical health limiting, suggesting that the more an individual's daily activities are limited as a result of their physical health status then the lower the propensity to be employed. None of the other physical health variables statistically significantly impact on employment propensity, suggesting that having physical pain and a lack of Energy are not significant barriers to being in employment per se.

All mental health variables consistently and statistically significantly adversely impact on employment propensity, suggesting that greater depression, problems interfering with social activities and issues that restrict the ability to accomplish activities are all associated with remaining out of employment.

The second of each pair of regressions, which present the results of estimations corresponding to H2 in Figure 1, consistently suggest that physical and mental health factors are associated with non-participation in particular employment types. The only statistically significant exception to this rule is the physical health attribute of pain which appears to be associated with a greater likelihood of being in casual employment. This result could be the effect of temporary and reoccurring pain channelling such individuals out of more formal employment positions. This conclusion, however, may be incorrect if there is sample selection bias into particular employment types which is dependent on being employed.

For an individual to be formally included in the employment type step in Figure 2, the individual must first be sample-selected into employment. Therefore, the results of the employment type regressions should not be biased by inclusion of individuals who are not employed, which is potentially the case in the second columns of these pair-wise regression results. Accordingly, the marginal effects corresponding

to the second of the two regressions are estimated conditional on the individual being employed, and these are presented in Table 4.

{ Insert Table 4 about here }

The results presented in Table 4 indicate a number of important issues. The first key finding is the scarcity of statistically significant mental health-related variables on the probability of being in a particular employment type. Along with the results presented in Table 3, this result suggests that while mental health factors are prevalent in adversely affecting employment propensity per se, they do not appear to significantly influence (at either the 5 percent or 1 percent levels) the propensity to be in particular types of employment, given that they are in employment.

In contrast, all of the three physical health variables appear to impact on different employment types, conditional on the individual already being in employment. Physical health limiting issues which limit the normal daily activities that the individual can do appear to have negative effects on the probability of being in full-time and permanent employment. In line with our expectations, having low levels of energy is associated with a reduced likelihood of being in seasonal work (such jobs typically place a higher physical demand on workers, relative to full-time employment). An interesting result shown in Table 4 is that while being in physical pain is associated with a 0.015 percent lower probability of being in full-time employment, it also increases the probability that the worker is in casual employment by 0.005 percent, again all conditional on the worker being in employment.

Endogeneity

The results presented within Tables 3 and 4 implicitly assume that the direction of causality is from health status to employment type. However, causation may run in the reverse direction if employment reduces the probability or severity of mental and physical health issues or if being unemployed accentuates an individual's physical or mental health status. This possibility has received little attention in the empirical literature that investigates the relationship between employment and health status. However, there are three recent contributions to this literature that are noteworthy. Cai (2009) made use of Household, Income and Labour Dynamics in Australia survey data to examine the nature of the relationship between wages and health. The results of that study found that better health status positively impacts on wages, but there was no significant evidence of a reverse effect from wages to health. In contrast, when Cai (2010) conducted similar research in terms of labour force participation, he found that the reverse effect from employment type to health status differed between gender. In particular, there was evidence of a negative and strong reverse effect for males, and a positive and weakly significant reverse effect for females. Schmitz (2011) also attempted to investigate the causal links between labour market status (specifically being unemployed) and health. His research analysed the impact of unemployment on health, with the use of the German Socio Economic Panel for the period of 1991 to 2008. Overall, his research found no evidence of the reverse impact that unemployment influences mental health.

Instrumental variable probit regression is an econometric method that permits statistical identification of endogeneity. However, it is often conducted with a caveat in place. The validity of the results from the instrumental variable regressions does rely on the suitability of the instrument chosen. Based on the data available within the

NZGSS, there is no appropriate variable available to instrument physical health, i.e. no variable that can be applied convincingly as one that influences physical health type, and does not directly influence employment type. However, there is an instrument available for mental health. This variable is termed *Calm* and is described in Table 1. Simply put, it is a dummy variable where one denotes that the respondent has felt mostly calm and peaceful over the last four weeks, and zero denotes otherwise. As evidence of the suitability of *Calm*, it should be noted that the absolute values of the correlations between *Calm* and each of the mental health related variables, not reported here for brevity, rest between 0.37 and 0.41; whereas the correlation between *Calm* and Employment is just 0.07.

In order to examine the possibility of endogeneity impacting our results in Table 3 and 4, a new dummy variable was created which equated to one if at least one of the three mental health issues was signalled by the respondent, and zero otherwise. This new dummy variable denoting overall mental health was then instrumented by *Calm*. Application of the instrumental variable probit regression, (with the use of *Calm* as the instrument, and while still controlling for physical health status via the three measures used thus far), allowed the calculation of Wald statistical tests (see Wooldridge, 2002, pp. 472-477). The null hypothesis with these tests is that the mental health factors are exogenous to the particular employment type and the results are presented in Table 5.

{Insert Table 5 about here }

The Wald statistics and corresponding significance levels are shown in Table 5 and indicate that there is only one employment type regression that is potentially impacted by endogeneity between employment type and mental health. However, it is important to note that this employment type is permanent jobs and this category accounts for 76 percent of the workers in our sample. The implication of this result is that caution needs to be taken when interpreting the coefficients and marginal effects for depressed, health social, and health accomplishing in the regression results related to permanent employment type. The relevant coefficients from the bivariate probit regressions in Table 3 suggested that all three mental health variables had a negative influence on employment per se and on the likelihood of employment in a permanent job. However, the subsequent marginal effects in Table 4 indicated the lack of an impact on finding a permanent job placement, conditional on being employed. It is possible that reverse causation has resulted in these marginal effects being insignificant i.e. that mental health has a detrimental impact on employment in a permanent job (conditional on being employed) and that being employed in a permanent job has a positive influence on an individual's mental health type. It is fairly logical to assume that being in a permanent job (and hence in a stable work environment) has a significant and positive impact on a worker's mental health state.

There appear to be no signs of endogeneity with respect to the full-time category or any of the temporary work agreements, at either the 5 percent or 1 percent significance levels. The lack of evidence supporting reverse causality in these cases is an interesting and major contribution to the literature because it suggests that mental health has a detrimental impact on employment (conditional on being employed) but that being employed in all but a permanent job has no significant impact on an individual's mental health status. It is particularly interesting to note that different results are identified for permanent and full-time employment states. Although there is a lot of overlap between these two categories it does point to the possibility that

being in permanent employment has a clear additional beneficial effect on mental health that is not shared by those in full-time employment. Further research is necessary here to identify whether the permanence of some types of employment adds extra peace of mind to employees which ameliorates mental health problems. Another possible reason for the significant Wald test result in the permanent employment regression could be that there is something unobservable that is positively related to both permanent work and mental health measures. Future research should focus on the complex relationships between different types of mental health issues and employment in a permanent job.

6. Conclusions

This paper presented an investigation into the impacts of mental and physical health issues on the propensity to be in employment per se and in employment types (e.g. full-time, casual, seasonal, etc.). This is the first paper to explore the effects on employment and employment type of both health issues simultaneously.

Results from this study illustrate that both mental and physical health issues significantly affect employment propensity. In particular, mental health variables appear to have a relatively strong negative influence. An interesting finding was that while both physical and mental health issues appear to significantly influence employment per se, they appear to have weaker effects on employment type.

In general the results emphasise three important themes. First, having controlled for various socio-economic factors (such as age, ethnicity and education), there is a substantial impact of the physical health-limiting factors on the propensity to be employed. Future research should focus on what specific types of physical health problems this variable encompasses and the severity of them. For example, it would be useful to know whether this variable signifies that physically-limited individuals are discriminated against in the labour market or whether such individuals prefer to remain unemployed. Second, there is a considerable impact of mental health issues on employment propensity. Again, it is unknown whether these variables are signifying that the mental health issue is adversely affecting their labour market options (based on the assumption that the issue is declared) or whether such individuals prefer to remain unemployed. Third, our results suggest that physical and not mental health issues significantly impact on the propensity to be in a particular type of employment, conditional on being employed.

Our findings also point to the possibility of reverse causality when examining the relationship between health and employment. Instrumental variable probit regression was applied to test for this endogeneity and the results of the Wald tests did call into question the insignificant marginal effects of the three mental health variables on permanent employment conditional on the individual being employed. There were no findings of endogeneity with respect to temporary work arrangements, i.e. our results indicate that the direction of causality, for mental health type, is from health to employment for these types of work, rather than the reverse.

It is important to recognise that while our empirical analysis has been able to control for *both* mental and physical health factors, it is beyond the scope of this study to investigate the complicated inter-relationships between physical health and mental health; for instance, it could be the case that mental health influences physical health and then employment. Future analysis is recommended down this track.

Overall, this study signals that public policy employment initiatives need to be aware of the impact of mental and physical health issues on the propensity to be in

different types of temporary and permanent employment arrangements. Promoting the employment opportunities of people with mental health should be a political priority, however the risk is that this is translated into ‘any old’ work, with little or no thought placed on aspirations, skills and abilities, and potentially forcing people into inappropriate and dissatisfying employment. Dividing people in this way is underpinned yet again by a medicalised view of mental health, with no consideration of the circumstances of employment. As Waddell and Aylward (2005) point out, while work is generally good for physical and mental health, there are major provisos, namely that physical and psychosocial conditions are satisfactory and provide a decent ‘human’ quality of work, and that work provides adequate financial reward and security.

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Table 1: Descriptive statistics

Variable	Definition	
Employed	Dummy variable: 1 for employed; 0 otherwise.	0.775 (0.418)
Full time	= 1 for employed full time (minimum 30 hours per week on average); = 0 for part time	0.808 (0.394)
Permanent	= 1 for permanent employment agreement; = 0 otherwise	0.760 (0.427)
Fixed Term	= 1 for fixed term employment agreement; = 0 otherwise	0.037 (0.189)
Contract	= 1 for contract employment agreement; = 0 otherwise	0.068 (0.252)
Seasonal	= 1 for seasonal employment agreement; = 0 otherwise	0.012 (0.111)
Casual	= 1 for casual employment agreement; = 0 otherwise	0.056 (0.231)
Physical Health limiting	Question: During the past four weeks, how much of the time were you limited in the kind of work or other regular daily activities you do as a result of your physical health? Categorical variable: 1 = none of the time; 2 = a little of the time; 3 = some of the time; 4 = most of the time; and 5 = all of the time.	1.416 (0.852)
Pain	Question: During the past four weeks, how much did pain interfere with your normal work including both work outside the home and housework? Categorical variable: 1 = not at all; 2 = a little bit; 3 = moderately; 4 = quite a bit; 5 = extremely.	1.661 (1.073)
Energy	Question: How much of the time during the past four weeks did you have a lot of energy? Categorical variable: 1 = all of the time; ...; 5 = none of the time.	2.350 (0.860)
Depressed	Question: How much of the time during the past four weeks have you felt downhearted and depressed? Categorical variable: 1 = none of the time; ...; 5 = all of the time.	1.609 (0.853)
Health social	Question: During the past four weeks, how much time has your physical health or emotional problems interfered with your social activities, such as visiting friends, relatives, etc. Categorical variable: 1 = none of the time; ...; 5 = all of the time.	1.401 (0.817)
Health accomplishing	Question: During the past four weeks, how much of the time have you accomplished less than you would like as a result of any emotional problems, such as feeling depressed or anxious? Categorical variable: 1 = none of the time; ...; 5 = all of the time.	1.455 (0.799)
Maori	Dummy variable: 1 = Maori; 0 otherwise	0.111 (0.314)
Pacific Islanders	Dummy variable: 1 = Pacific Islander; 0 otherwise	0.044 (0.206)
Male	Dummy variable: 1 = Male; 0 = Female	0.503 (0.500)
Partnered	Dummy variable: 1 = partnered; 0 = non-partnered	0.632 (0.482)
Children	Dummy variable: 1 = presence of children in household; 0 otherwise	0.405 (0.491)
Qual Cert	Dummy variable: 1 = highest educational qualification is a school certificate; 0 otherwise	0.460 (0.498)
Qual Diploma	Dummy variable: 1 = highest educational qualification is a post-school Diploma; 0 otherwise	0.145 (0.352)
Qual Degree plus	Dummy variable: 1 = highest educational qualification is at least a degree; 0 otherwise	0.093 (0.291)
Calm	Dummy variable: 1 = if the respondent has felt calm and peaceful in the last four weeks some, most or all of the time; 0 = otherwise	0.668 (0.471)

Note: apart from the mean and standard deviation provided for the 1st variable of *employed*, all other descriptive statistics are provided for the employed group. $N = 6738$.

Table 2: Means and standard deviations of health-related variables by employment type

Variable	Employed	Not Employed	Full Time	Part time	Permanent	Fixed Term	Contractor	Seasonal	Casual
Health limiting	1.416 (0.852)	1.881 (1.217)	1.375 (0.805)	1.538 (0.956)	1.388 (0.822)	1.423 (0.825)	1.418 (0.861)	1.492 (0.921)	1.569 (0.923)
Pain	1.661 (1.073)	1.963 (1.296)	1.627 (1.049)	1.766 (1.122)	1.634 (1.062)	1.691 (1.095)	1.657 (1.001)	1.769 (1.115)	1.851 (1.161)
Energy	2.350 (0.860)	2.634 (1.041)	2.316 (0.852)	2.463 (0.862)	2.341 (0.850)	2.356 (0.877)	2.362 (0.860)	2.108 (0.812)	2.410 (0.852)
Depressed	1.609 (0.853)	1.923 (1.013)	1.589 (0.839)	1.661 (0.880)	1.590 (0.836)	1.639 (0.848)	1.596 (0.833)	1.677 (0.920)	1.736 (0.949)
Health social	1.401 (0.817)	1.782 (1.146)	1.371 (0.792)	1.494 (0.880)	1.378 (0.797)	1.428 (0.880)	1.409 (0.827)	1.508 (0.850)	1.564 (0.881)
Health accomplishing	1.455 (0.799)	1.835 (1.088)	1.430 (0.783)	1.525 (0.825)	1.439 (0.786)	1.443 (0.748)	1.398 (0.736)	1.478 (0.812)	1.605 (0.877)

Notes: Standard errors are in parentheses. $N = 6738$.

Table 3: Bivariate probit regression results

Variable	Employed	Full-time	Employed	Permanent	Employed	Fixed Term	Employed	Contract	Employed	Seasonal	Employed	Casual
Maori	-0.220** (0.051)	-0.153** (0.049)	-0.216** (0.051)	-0.214** (0.048)	-0.234** (0.052)	0.060 (0.095)	-0.228** (0.052)	-0.115 (0.088)	-0.235** (0.052)	0.507** (0.113)	-0.225** (0.052)	-0.055 (0.081)
Pacific Islander	-0.234** (0.077)	-0.078 (0.075)	-0.273** (0.075)	-0.210** (0.072)	-0.275** (0.077)	0.164 (0.133)	-0.271** (0.077)	-0.058 (0.128)	-0.267** (0.077)	-0.050 (0.227)	-0.231** (0.077)	0.021 (0.116)
Male	0.448** (0.039)	0.733** (0.035)	0.397** (0.038)	0.189** (0.033)	0.417** (0.038)	0.017 (0.065)	0.418** (0.038)	0.348** (0.054)	0.417** (0.038)	0.256* (0.102)	0.401** (0.038)	-0.215** (0.058)
Partnered	0.285** (0.041)	0.197** (0.038)	0.301** (0.041)	0.228** (0.036)	0.315** (0.041)	-0.066 (0.071)	0.317** (0.041)	0.095 (0.061)	0.317** (0.041)	-0.145 (0.109)	0.320** (0.041)	-0.101 (0.064)
Children	-0.507** (0.046)	-0.580** (0.041)	-0.436** (0.044)	-0.331** (0.038)	-0.469** (0.045)	-0.142 (0.076)	-0.477** (0.045)	-0.031 (0.063)	-0.477** (0.045)	-0.095 (0.117)	-0.473** (0.044)	0.068 (0.066)
Age:	-0.631** (0.086)	-1.183** (0.090)	-0.607** (0.085)	-0.738** (0.083)	-0.591** (0.086)	-0.106 (0.161)	-0.594** (0.086)	-0.754** (0.225)	-0.589** (0.087)	-0.205 (0.279)	-0.562** (0.086)	0.557** (0.124)
15-19 years	-0.130 (0.089)	-0.284** (0.083)	-0.096 (0.088)	-0.189* (0.080)	-0.101 (0.090)	0.209 (0.136)	-0.107 (0.090)	-0.294 (0.154)	-0.106 (0.090)	0.281 (0.228)	-0.090 (0.089)	0.217 (0.133)
20-24 years	-0.056 (0.083)	-0.064 (0.078)	-0.022 (0.081)	-0.028 (0.074)	-0.051 (0.083)	-0.058 (0.137)	-0.055 (0.083)	-0.034 (0.124)	-0.053 (0.084)	0.087 (0.239)	-0.051 (0.083)	-0.054 (0.137)
25-29 years	0.236** (0.078)	0.156* (0.071)	0.241** (0.076)	0.136* (0.067)	0.278** (0.078)	-0.177 (0.130)	0.287** (0.078)	0.189 (0.104)	0.285** (0.078)	0.117 (0.223)	0.282** (0.078)	-0.106 (0.126)
35-39 years	0.310** (0.080)	0.132 (0.071)	0.322** (0.078)	0.227** (0.068)	0.346** (0.080)	-0.189 (0.132)	0.345** (0.080)	-0.010 (0.111)	0.347** (0.080)	0.114 (0.225)	0.347** (0.080)	0.036 (0.121)
40-44 years	0.302** (0.080)	0.225** (0.073)	0.296** (0.079)	0.181** (0.068)	0.319** (0.081)	-0.264 (0.136)	0.324** (0.081)	0.077 (0.109)	0.321** (0.081)	0.082 (0.223)	0.316** (0.081)	-0.052 (0.125)
45-49 years	0.090 (0.084)	-0.076 (0.075)	0.112 (0.082)	-0.023 (0.071)	0.135 (0.084)	-0.148 (0.134)	0.133 (0.084)	0.153 (0.110)	0.138 (0.084)	0.325 (0.214)	0.136 (0.084)	-0.085 (0.132)
50-54 years	-0.151 (0.087)	-0.302** (0.079)	-0.121 (0.086)	-0.125 (0.075)	-0.094 (0.087)	-0.324* (0.152)	-0.098 (0.087)	0.010 (0.121)	-0.099 (0.087)	-0.167 (0.274)	-0.094 (0.087)	-0.030 (0.137)
55-59 years	-0.536** (0.083)	-0.627** (0.077)	-0.473** (0.082)	-0.470** (0.074)	-0.481** (0.083)	-0.222 (0.144)	-0.491** (0.083)	0.116 (0.117)	-0.490** (0.083)	0.108 (0.240)	-0.478** (0.082)	0.080 (0.131)
60-64 years	0.205** (0.041)	0.127** (0.038)	0.197** (0.040)	0.141** (0.037)	0.209** (0.041)	-0.102 (0.078)	0.213** (0.041)	0.012 (0.062)	0.211** (0.041)	-0.166 (0.107)	0.213** (0.041)	0.046 (0.063)
Qual Cert	0.397** (0.062)	0.299** (0.055)	0.358** (0.062)	0.143** (0.052)	0.386** (0.063)	0.226* (0.097)	0.390** (0.063)	0.175* (0.081)	0.393** (0.063)	-0.206 (0.169)	0.395** (0.063)	0.029 (0.093)
Qual Diploma												

Qual Degree Plus	0.424** (0.081)	0.408** (0.070)	0.409** (0.081)	0.111 (0.064)	0.430** (0.082)	0.499** (0.102)	0.429** (0.082)	0.243** (0.092)	0.433** (0.082)	-0.380 (0.253)	0.443** (0.082)	-0.113 (0.126)
Physical Health limiting Pain	-0.179** (0.022)	-0.181** (0.021)	-0.179** (0.022)	-0.149** (0.021)	-0.186** (0.022)	-0.045 (0.043)	-0.186** (0.022)	-0.034 (0.036)	-0.188** (0.022)	-0.015 (0.065)	-0.181** (0.022)	-0.015 (0.035)
Energy	-0.024 (0.018)	-0.046** (0.017)	-0.022 (0.018)	-0.026 (0.016)	-0.019 (0.018)	0.006 (0.032)	-0.020 (0.018)	-0.014 (0.027)	-0.020 (0.018)	0.024 (0.048)	-0.021 (0.018)	0.050* (0.026)
Depressed	-0.022 (0.022)	-0.034 (0.021)	-0.022 (0.022)	-0.001 (0.020)	-0.021 (0.023)	-0.001 (0.041)	-0.018 (0.023)	0.010 (0.034)	-0.019 (0.023)	-0.183** (0.066)	-0.020 (0.023)	-0.027 (0.035)
Health social	-0.045 (0.025)	-0.032 (0.024)	-0.047 (0.025)	-0.054* (0.023)	-0.052* (0.026)	0.016 (0.045)	-0.052* (0.026)	0.000 (0.038)	-0.052* (0.026)	0.024 (0.068)	-0.050* (0.026)	0.015 (0.038)
Health accomplishing	-0.049* (0.025)	-0.051* (0.024)	-0.052* (0.025)	-0.055* (0.023)	-0.050* (0.025)	0.015 (0.047)	-0.049* (0.025)	0.038 (0.039)	-0.048 (0.025)	0.057 (0.069)	-0.044 (0.025)	0.026 (0.038)
Constant	-0.100** (0.026)	-0.092** (0.025)	-0.091** (0.026)	-0.055* (0.024)	-0.096** (0.026)	-0.066 (0.050)	-0.099** (0.026)	-0.090* (0.043)	-0.097** (0.026)	-0.041 (0.076)	-0.101** (0.026)	0.008 (0.041)
Wald χ^2 (32)	1.272** (0.095)	0.902** (0.087)	1.227** (0.093)	0.702** (0.083)	1.228** (0.094)	-1.650** (0.161)	1.227** (0.094)	-1.785** (0.138)	1.228** (0.095)	-2.122** (0.256)	1.209** (0.094)	-1.759** (0.146)
χ^2 (1)	1664.10		1127.25		1062.39		1069.81		1048.67		1270.32	
Rho	2767.41**		2660.11**		94.203**		132.587**		35.479**		233.955**	
	0.994 (0.006)		0.999 (0.052)		0.864 (0.249)		0.912 (0.583)		0.877 (0.655)		0.870 (0.058)	

Notes: Standard errors are in parentheses; * and ** indicate statistical significance at the 5 percent and 1 percent levels, respectively. $N = 6738$.

Table 4: Marginal effects after bivariate probit

Variable	Fulltime	Permanent	Fixed	Contract	Seasonal	Casual
Health limiting	-0.037**	-0.028**	-0.001	-0.001	0.000	0.001
Pain	-0.015*	-0.007	0.001	-0.001	0.001	0.005*
Energy	-0.010	0.005	0.000	0.002	-0.004**	-0.002
Depressed	-0.003	-0.014	0.002	0.001	0.001	0.002
Health social	-0.011	-0.014	0.002	0.005	0.001	0.003
Health accomplishing	-0.016	-0.004	-0.004	-0.009	-0.001	0.002

Note: * and ** indicate statistical significance at the 5 percent and 1 percent level respectively. $N = 6738$.

Table 5: Wald exogeneity tests

	Chi ² (Prob.)
Full time	1.29 (0.256)
Permanent	4.74 (0.029)*
Fixed term	1.12 (0.291)
Contractor	1.50 (0.220)
Seasonal	2.80 (0.094)
Casual	0.99 (0.319)

Note: * indicates statistical significance at the 5 percent level. $N = 6738$.

Figure 1: Summary of associations investigated in this paper

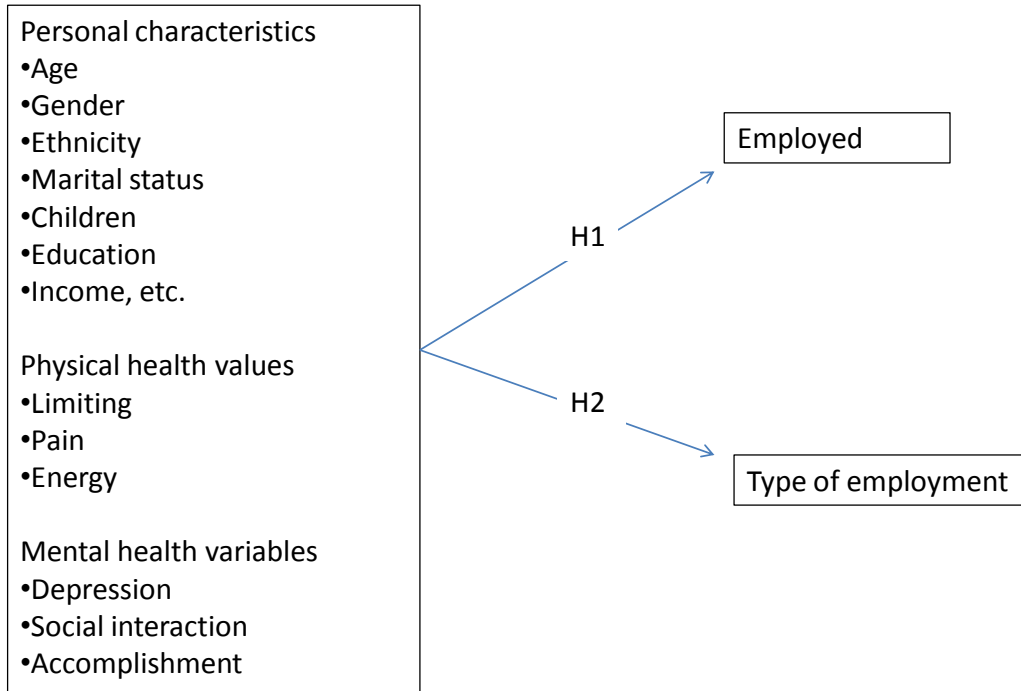
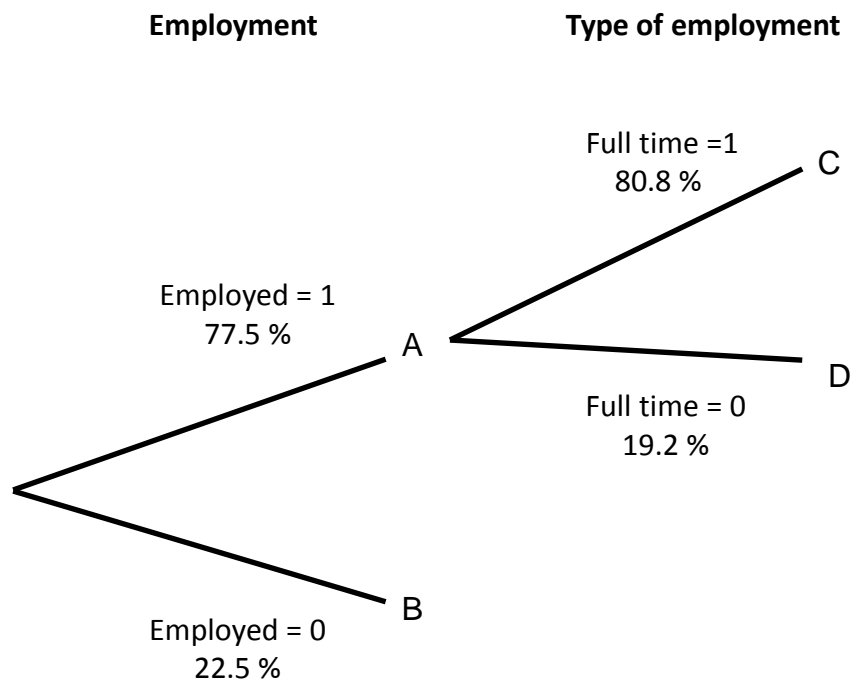


Figure 2: Tree diagram



Technical appendix:

We adopt the formal model for estimating the probabilities according to Greene (2003). Let y_{1i} be a latent variable that denotes the probability that an individual is employed, which is dependent on a range of contributory factors, X_{1i} . Also let X_{2i} be a latent variable that denotes the probability that the worker is in full-time employment, where this is also dependent upon a range of factors, X_{2i} . The model is represented as follows:

$$y_{1i} = \beta_1 X_{1i} + \varepsilon_{1i}$$

$$y_{2i} = \beta_2 X_{2i} + \varepsilon_{2i}$$

where the values for y_{1i} are observable and related to the following binary dependent variables, on the basis of the following conditions:

$$FT_i = 1, \text{ if } y_{1i} > 0 \qquad FT_i = 0, \text{ if } y_{1i} \leq 0$$

and

$$Employed_i = 1, \text{ if } y_{2i} > 0 \qquad Employed_i = 0, \text{ if } y_{2i} \leq 0$$

where $Employed_i = 1$ denotes that the worker is employed, and $FT_i = 1$ denotes that the worker is employed full-time. The errors $(\varepsilon_{1i}, \varepsilon_{2i})$ are assumed to have the standard bivariate normal distribution, with $V(\varepsilon_{1i}) = 1 = V(\varepsilon_{2i})$ and $Cov(\varepsilon_{1i}, \varepsilon_{2i}) = \rho$. Thus the worker's full-time employment probability can be written as:

$$P(FT) = P(FT_i = 1, Employed_i = 1)$$

$$= P(X_{1i} < x_{1i}, X_{2i} < x_{2i})$$

$$= \int_{-\infty}^{x_{2i}} \int_{-\infty}^{x_{1i}} \phi_2(z_{1i}, z_{2i}; \rho) dz_{1i} dz_{2i}$$

$$= F(\beta_1 X_{1i}, \beta_2 X_{2i}; \rho)$$

where F denotes the bivariate standard normal distribution function with correlation coefficient ρ .⁸

The bivariate probit model has full observability if FT_i and $Employed_i$ are both observed in terms of all their four possible combinations [i) ' $FT_i = 1, Employed_i = 1$ ', ii) ' $FT_i = 1,$

$Employed_i = 0$ ', iii) ' $FT_i = 0, Employed_i = 1$ ', and iv) ' $FT_i = 0, Employed_i = 0$ ']. Category

(ii) will always be equal to zero and category (iv) can be simplified to ' $Employed_i = 0$ '.

Nevertheless, we have a naturally constrained complete set of observations and therefore full observability in our data, and it is known that full observability leads to the most efficient estimates (Ashford and Sowden, 1970; Zellner and Lee, 1965).

⁸ Greene (2003) shows that the density function is given by: $\phi_2 = e^{-\frac{1}{2}(X_{1i}^2 + X_{2i}^2 - 2\rho X_{1i} X_{2i}) / (1 - \rho^2)} / 2\pi(1 - \rho^2)^{1/2}$.