9/12/2019

The Added Worker Effect

In South Africa

Supervisor: Vimal Ranchhod

THE AUTHOR WOULD LIKE TO THANK VIMAL RANCHHOD FOR HIS VALUABLE COMMENTS AND SUGGESTIONS

The Added Worker Effect in South Africa

Author: Morne Hoffman

University of Cape Town

ABSTRACT

The theory that married women's labour supply increases in response to their partners job loss is known as the added worker effect (addWE). This paper investigates how married women's labour force participation, probability of employment and average working hours respond to the recently unanticipated job loss of their partners in South Africa. It also considers the effect of partners job loss on married women's preference to work and the probability that they work more hours from the previous period. The paper finds that the probability of married women's participation, employment and average working hours rises (a positive effect) in response to their partners unanticipated job loss. However, these results are all statistically insignificant and its inconclusive evidence can be attributed primarily to limitations in the data. Alternatively, the labour supply responses are modelled to the static unemployment status of partners as a sensitivity check and find the probability of labour force participation of married women falls if their partners are unemployed. Albeit statistically significant, it is argued that this result is predominately due to the idea that people tend to get married to other people of similar socio-economic, religious and ethnic backgrounds (known as assortative mating) which masks the addWE. This approach is thus shown to be inappropriate for the analysis of the addWE.

ACKNOWLEDGEMENTS

The author would like to extend his utmost gratitude and sincerest appreciation to the two independent and anonymous referees for their time taken to read his paper. Moreover, the invaluable feedback and constructive recommendations received from these referees were found to be vastly insightful and unequivocally useful in the quest to further improve this paper.

TABLE OF CONTENTS

List of tables

List of Figures

The Added Worker Effect in South Africa

1. INTRODUCTION

Economic theory suggests that wives[1] would increase their own labour supply to compensate for the reduction in household income resulting from their partners[2] job loss. This phenomenon is known as the added worker effect (addWE). Its magnitude and existence have been a development of interest since the early 1940's (Woytinsky,1940). Although the existence of the addWE is unequivocally predicted by theoretical models, its empirical evidence is mixed. The size and empirical existence of the addWE is contingent on a range of interrelated factors such as the integrity of the data, methodology selection and time-period under consideration. More importantly, finding a significant addWE is highly dependent on contemporary market conditions, structural institutions and cultural norms and traditions specific to a country. This becomes a particularly interesting field of study in the context of a country like South Africa, where the prominent economic conditions and social norms may well mask an addWE. Therefore, this paper investigates the labour supply responses of married women to the recently[3] unanticipated[4] job loss of their partners in South Africa. Moreover, it seeks to explore whether an addWE can be uncovered for a country so complex in nature like South Africa.

Following the global financial crisis of 2008, South Africa's unemployment rate rose steadily and reached an all-time peak of 5.5 million unemployed workers by the first quarter of 2015 (Festus et al., 2016). Given such unfavourable economic conditions prevalent, wives of partners who have recently became unemployed may desire to work but could find it challenging to secure employment. In this event, one would expect a rise in the wife's labour force participation as they attempt to enter the labour market, with little effect on employment. In addition, the high poverty and inequality rates found in South Africa, compounded by generally low household income may motivate wives who are employed to work consistently through employment and unemployment spells of their partners. In this case, no compelling evidence of an addWE is expected. Further, to maintain the already low household income, the adverse effects of a partner's job loss may invoke wives who are employed to increase their working hours. In addition, this outcome may also be amplified by factors such as South Africa's meagre unemployment benefits scheme where income

[1] The terms: wife, wives, wives' and married women all refer to the women who are married or cohabitating in our sample and are used interchangeably throughout the paper.
[2] The terms: husband, husbands, spouse, partner and partners all refer to the partners of the married women and is used interchangeably throughout the paper.
[3] The term recently refers to whether the partner lost a job in the 12 months preceding the survey.
[4] The term unanticipated refers to the idea that the job loss experience was unforeseen by the couple.

derived from unemployment may be inadequate to supplement an adverse income shock. As a result, this could further compel employed wives to increase their average working hours. Therefore, a stronger[5] addWE is expected in terms of average hours.

Furthermore, this paper argues that South Africa can be characterized by a high degree of assortative mating[6], which may further confound the existence of an addWE. As shown below, wives of partners who are unemployed have a high probability of unemployment themselves. Therefore, if wives anticipate unemployment due to assortative mating, they may solicit other means of income, which alters their labour supply. Other factors such as income derived from state grants or income derived from a pension-eligible member in the household may have further mitigate the existence of an addWE. Further, as noted in Gruber and Cullen. (1996), the femininization of the labour force, increase in the probability of the divorce rate and a change in the traditional attitude of women toward family and work could all contribute to a less responsive labour supply function of married women to changes in their partners employment status.

So, does an addWE exist in a country such as South Africa? And if so, what is the magnitude of the response? Uncovering this question is key to developing an understanding of how households stabilize income over periods of adverse income shocks which may have direct welfare implications. These interesting questions are yet to be retorted as no analysis of the addWE has been carried out in the context of South Africa, which is the basis for the motivation of this paper.

The paper will investigate the existence of the addWE using panel data drawn from all 5 waves of the National Income Dynamics Study (NIDS), tested within the life-cycle labour supply model framework. The addWE is explored within the context of married women's labour supply activity in response to partners who became unemployed unexpectedly in the last 12 months- referred to as the partners recent job loss. The following variables will be used as measurements of wives' labour market activity: changes in the probability of labour market participation and full-time employment, changes in the probability of working more hours and preference of employment, as well as average working hours. Given the implicit bias that would result from heterogeneity between married women of unemployed partners and those of employed partners, a fixed effects regression technique is utilized.

[5] 'Stronger' in this sense means a larger and more significant estimate.

[6] Assortative mating refers to the idea that people tend to choose partners with similar characteristics to their own. See: Lichter, D.T. and Qian, Z., 2019. *The Study of Assortative Mating: Theory, Data, and Analysis*. In Analytical Family Demography (pp. 303-337). Springer, Cham

As a sensitivity check, the paper briefly presents and discusses the estimated coefficients of the partners static unemployment status on wives' labour market responses as an alternative model commonly used in earlier literature. The paper then provides substantial evidence why this model is inappropriate. Lastly, married women may desire to increase their labour supply (in the form of finding employment) immediately but may be unable to do so due to unfavourable economic conditions prevalent at the time of partners job loss experience. However, they may be able to find employment in a future period as stringent economic conditions subsides. The paper therefore models the probability of wives finding employment in the next period, given that their partner has lost a job in the current period. By so doing, it not only sheds light on a possible delayed addWE, but also illuminates any market conditions that may contribute to an insignificant finding of the addWE in the current period.

The following section surveys the relevant literature thus far undertaken. Section 3 provides a brief background to the economy of South Africa within the context of the addWE. In section 4 the paper presents some initial summary statistics and provides a motivation for the methodology used in this paper, followed by the methodology outlined in section 5. Regression analysis are presented in section 6 followed by a conclusion and brief recommendations for future research.

2. LITERATURE REVIEW

As mentioned, the theoretical models underpinning the addWE unequivocally predicts that one should expect a rise in the labour supply of individuals whose spouse experiences job loss. The family life-cycle labour supply model is one example of this. It can generally be understood within a family utility maximization framework, whereby a reduction in family income due to the loss of employment by a family member may be offset by a rise in the labour supply of others. This increase in labour supply is a way of smoothing income and consumption over the lifespan of a family unit. (Stephens, 2002).

Furthermore, the examination of the addWE in the context of the family life-cycle labour supply model indirectly provides an opportunity to understand how marriage functions as a risk-sharing mechanism (Gong, 2011). The degree to which it does is highly conditional on prevalent market conditions and societal institutions. For example, wives from more affluent countries with generous unemployment benefits would have less need to seek employment when their partner experiences job loss than those wives from less affluent countries. A plausible reason is that the higher unemployment benefits received would likely mitigate the reduction in household income. Consequently, this would lead to a smaller addWE.

Another example of a confounding factor to the addWE is the idea of assortative mating. The theory of assortative mating dictates that individuals are more likely to marry a partner with similar socioeconomic status, educational attainment, racial and ethnic backgrounds, and social inclinations (Lichter and Qian, 2019). Thus, if a woman is more likely to marry a partner who has a high probability of unemployment (perhaps through lower levels of education), the chances of her obtaining lower levels of education is high and therefore a higher probability of unemployment. In this case, she may anticipate lower levels of employment throughout her lifecycle and may find other ways of securing income, thereby never adjusting her labour supply. This would consequently lead to a smaller addWE.

Most empirical work were concerned with the consequences of the addWE on aggregate unemployment. A smaller subset focused its attention to the precise labour supply responses of wives to their unemployment and underemployment of their husband. The latter, albeit more realistic, faced some methodological difficulties. The first was the potential bias resulting from the unobserved differences between wives whose husbands became unemployed and those wives whose husbands did not. These differences can be attributed to different 'tastes' for work and can be amplified by assortative mating. Consequently, if this bias exists, it could confound the results of the addWE in a cross-section analysis. A second is the discouraged worker effect (DWE). That is, if the husband's unemployment stemmed from general adverse conditions of the economy, the wife's market wage might be below her reservation wage. Thus, making her less likely to work. Consequently, she becomes a 'discouraged work seeker'.

In light of the above challenges faced, extensive empirical analysis conducted over the years by various authors fail to find any consensus of the addWE. Heckman and McCurdy use a life-cycle model of labour supply, where they control for heterogeneity through a fixed effects method. Their initial 1980 paper finds no significant effect of wives' hours worked on husbands' unemployment. However, upon revision of this paper in 1982, they find a negative but insignificant effect of shocks to husbands' income on wives' labour supply. Furthermore, a positive and significant effect of husbands' underemployment on wives' labour supply is discovered.

A cross-sectional analysis for the UK was adopted by Layarn et al. (1980) which finds a decrease in wives' labour supply when their spouse is unemployed. However, the supposition here being that this may be due to the high tax on spousal labour supply during periods of husbands' unemployment. However, the result is attributed to the means-tested welfare entitlement program in the UK. Maloney (1987) follows a similar cross-section approach using data from the State of Michigan in the United States and finds no significant effect of husbands' unemployment on wives'

actual hours of work. However, he discovers a positive association of the husbands' underemployment to the wives' labour supply. Maloney (1991) finds no significant addWE among married couples in the United States when using a selection model to capture heterogeneity in tastes of work for the two different groups of women. However, he attributes this insignificant finding to potential unobserved variables which may obscure an addWE.

Lundberg (1985) uses a quasi-difference technique, modelling the wives' transition of participation, employment and unemployment as a function of the husband's employment status and finds a small but significantly positive addWE for white but not for black women. Bradbury (1995) studies unemployment patterns for men and women in Australia. He posits that the unemployment gap between women whose partners are unemployed and those who are not is purely a result of differences in characteristics of the two groups of women. He found that the addWE and DWE co-existed.

Lenten (2000) conducts his analysis on Australian data and attempts to measure the addWE by investigating the time series labour force participation rates of individuals who were partnered and unemployment rates. He finds that the higher the unemployment rate, the lower was the labour force participation rate and thus concluded the existence of the DWE and no evidence of the addWE. This result was criticized in Gong (2011) where it was argued that those individuals who experienced job loss was only a small subset of the population of partnered individuals. Thus, using time series analysis to disentangle the addWE and DWE yields ineffective results since the relationship between the participation rate of married individuals and the unemployment rate could be a result of many factors.

More recent studies use an approach motivated by the seminal work conducted in Stephens (2002). His strategy consisted of identifying when the job loss occurred and to estimate its long-run effects. He argues that earlier studies were susceptible to a host of methodological issues and may not identify the addWE effectively. His contention is that since these previous studies focused on labour force participation of wives with unemployed spouses, as opposed to modelling when the job loss of the partner occurred, is inappropriate since failing to distinguish between these two events may confound results. The reason offered is that wives of partners who are unemployed for a long time may not adjust their labour supply since the reduction in income would have been anticipated. Such anticipated decreases in income will not result in an addWE unless the household is credit constrained (Lundberg, 1985). Additionally, wives of partners who are unemployed for the long-term may equally have lower labour supply through the assortative mating phenomenon.

Thus, over-representing those partners who experience long-term unemployment may conceal the addWE.

Stephens (2002) measures and quantifies the labour supply of wives to their partners displacement based on US panel data from 1968 to 1992. His approach was to identify when the job loss occurred and to estimate its long-run effects. He finds a positive and significant addWE which additionally, is also persistent over a period of 5 years. Following the same logic, Morissette and Ostrovsky (2008) conducts a similar analysis for Canada where they estimate if the earnings of wives and teenagers increase in response to the displacement of the husband. They find no significant addWE for teenagers but do find positive and significant effects for wives living in households where there are no children of working age present. Gong (2011) estimates the addWE for Australia using 7 waves of panel data spanning 2001 to 2007. He estimates the labour market responses of wives before and after the unanticipated job loss of their spouse. He finds a significant addWE in terms of increase in full-time employment and working hours.

It is thus evident that the likelihood of uncovering an addWE resonates strongly with the choice of methodology utilized, existing economic conditions, cultural norms and structural institutions inherent to a country. The next section provides a brief background to the economy of South Africa, as well as a context within which the existence of the addWE can be examined.

3. BACKGROUND

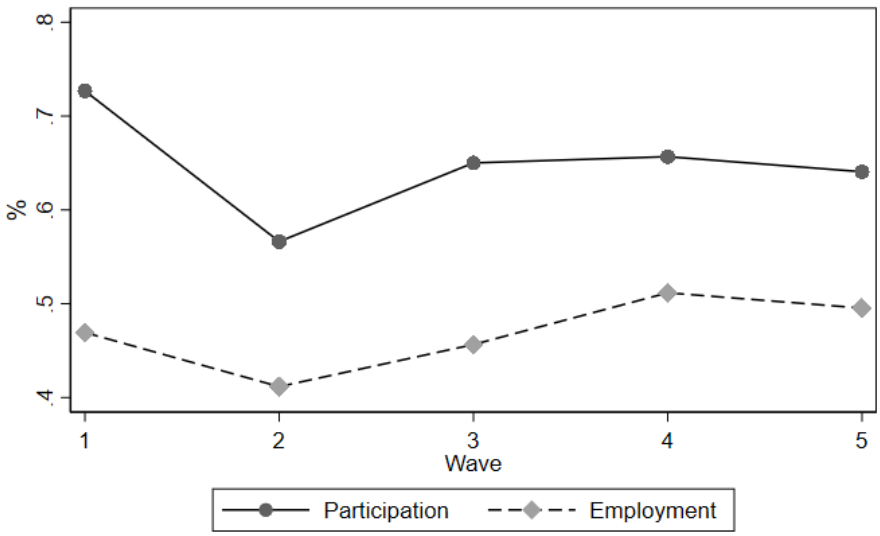
The labour market of South Africa, as well as the rest of the world, has become immensely feminised over the last 3 decades. Consequently, many factors have contributed to this rise in labour participation such as the rise in education levels of women, declining birth rates, and a decrease in discriminatory behaviour of employers (Ackermann and Velelo, 2013). Furthermore, in sub-Saharan Africa, the labour participation rates of women increased from 60.2% in 1990 to 65.2% in 2014 (Odowu and Owoeye, 2019). Although somewhat weaker, the labour force behaviour of married women follows a similar pattern. Figure 1 below shows the average participation and employment rates for married women using the national income dynamics survey (NIDS). The survey is conducted every 2 years between 2008 and 2017[7]. According to the data, more than 70% of married women were labour participants in 2008, the year the first survey was conducted. Participation plunged to below 60% in the period following the 2008 financial crisis, thereafter, rising steadily as the economy recovered. Less than 50% of married women were employed between 2008 and 2015. However, a general increase in employment rates can be

[7] NIDS is nationally representative survey in SA conducted every 2 years. The data is used for the empirical analysis of this paper and therefore elaborated in the data section.

identified over the period. The gap between the labour force participation and employment rates of married women can perhaps be attributed to the harsh economic conditions inherent in South Africa. It suggests that married women may desire to work but may find it hard to secure employment.

Evidence also shows that female labour supply has become less responsive to changes in their own wage and to the wages of their partners. Since more women has increased their full-time employment, their ability to increase their labour supply by entering the market or by increasing their hours has diminished. The severe increase in the risk of divorce, and a shift in women's attitude between family and work induced women to adopt labour supply responses which is roughly independent of their partners (Morissette and Ostrovsky, 2008).

Figure 1
Average Participation and Employment rates
for Married Women Across Waves



Therefore, given the high unemployment rates in South Africa, wives of husbands who have recently lost a job may desire to work, but could find it challenging to secure employment. This result can be attributed primarily to poor economic conditions. In this case, no compelling evidence of an addWE is expected for employment of wives. Contrary, high poverty and inequality[8] rates resulting in generally low average household income in South Africa may invoke wives who are employed to increase their working hours. In so doing, the increase in income because of an increase in working hours may compensate for the reduction in household income resulting from partners job loss. A stronger addWE is expected in terms of average hours.

[8] The Gini coefficient decreased slightly from 0.698 in 2008 to 0.678 in 2015 (Hino et. al., 2018). However, South Africa remains a country with one of the highest levels of income inequality in the world.

Conversely, wives who are employed may need to work consistently through employment and unemployment spells of the husband to maintain the already low household income. Therefore, no existence of the addWE in terms of employment may be realized.

Furthermore, previous research suggests that the addWE may be confounded by unemployment insurance. That is, the income derived from unemployment may provide a cushion against adverse household income shocks brought about by husband's unemployment. This supplementary income essentially crowds out the addWE since wives would have no urgency to adjust her labour supply. Although the unemployment scheme of South Africa is not as comprehensive as that in more developed economies, the way in which the addWE is modelled in this paper could still be confounded. For example, the UIF scheme implemented in South Africa allows for those who are unemployed to receive unemployment benefits if they have been working for more than 3 months. This benefit could easily compensate for the loss in income because of partners job loss and be adequate to not evoke any change in wives labour supply decisions in the short run.

Another potential arena of interest is the non-contributory, means-tested old age pension of South Africa which is considered one of the most generous pension systems in the developing world. Given the high unemployment rate, the pension plays a crucial role in poverty alleviation and is the cornerstone of many household incomes in South Africa[9]. The evidence of the effects of this pension on labour supply is mixed. Some evidence shows that the pension allows for out migration of prime aged females while leaving the children with the mother (Mammen and Miller, 2003). Contrary, as documented in Bertrand et al. (2003), the labour supply of prime-aged individuals living with a pension eligible individual significantly decreases. That is, income derived from sources such as pensions supplements part of the household income significantly enough to disincentive working-aged household members from employment. Moreover, the legacy of Apartheid resulted in large proportion of non-white South African's living in three generational households. Therefore, if these prime-aged individuals are married, then the existence of the pension could be expected to confound the addWE if household income is supplemented by the old age pension[10]. Other extensive grants such as the child support grant, foster care grant and

[9] Between 1993 and 2008, the main compositional change in household income came from an increase in household grants, especially for those in the lower income decile. The share of government grants in household income rose from 15% in 1993 to 73% in 2008 (Liebbrandt et al., 2012)

[10] Posel et al., (2006) show that the labour supply of women will increase if there is a pension-eligible individual in the household. This is primarily due to the opportunity for them to leave their children with their grandmother and out-migrate in search of employment. However, there is no clear distinction made between married and unmarried women.

disability grants may also play a pivotal role in confounding an addWE. Before 2010, 14 million people out of a population of 49 million were recipients (Woolard and Liebbrandt, 2010).

Furthermore, as previously discussed, high degrees of assortative mating may also confound an addWE. To illustrate the depth of assortative mating in South Africa, Table 1 and 2 presents statistics of race and educational attainment for married women and their partners.

Table 1
Assortative Mating in South Africa: By Race

	Partners Race				
Wives' race	African	Coloured	Indian	White	Total
African	98,78	1,00	0,13	0,10	7113
Coloured	7,25	91,85	0,16	0,74	2429
Indian	0,00	0,59	97,05	2,36	339
White	0,11	0,65	0,54	98,70	926
Total	7203	2310	347	947	10807

Source: Authors own calculations using NIDS wave 1-5

From table 1, more than 90% of women within each race category is married to a partner of the same racial group. For example, 98.78% of African women are married to African men, but only 7.25% are married to coloured men. Similarly, 98.7% of white women are married to white men whereas only 0.74% are married to, say coloured men. Furthermore, a similar picture emerges for educational attainment. From Table 2 it is evident that 46.67% of wives who obtained no education were married to men who obtained no education but only 13.57% were married to men who at least obtained a primary education.

Table 2
Assortative Mating in South Africa: By Education

	Partners Education				
Wives' Education	No schooling	Primary	Secondary	Tertiary	Total
No schooling	42,67	39,10	17,44	0,79	757
Primary	13,57	50,15	34,50	1,78	2307
Secondary	3,17	15,18	68,15	13,50	5712
Tertiary	0,32	2,76	47,00	49,92	1883
Total	823	2372	5706	1758	10659

Source: Authors own calculations using NIDS wave 1-5

Further, the likelihood of marriage diminishes exponentially as partners educational achievement rises. Conversely, 49.92% of women who obtained a university degree married partners who are university graduates themselves whereas only 0.32% of women with a university qualification had

a partner who obtained no education. It is then evident that South Africa is characterised by high degrees of assortative mating. Considering the above, it is hard to tell whether an addWE will be realised for South Africa given the host of distinct factors with theoretically opposing implications for an addWE. Therefore, the next section undertakes a preliminary analysis and presents a comprehensive picture of the labour market activity of married individuals in the data.

4. DATA and SUMMARY STATISTICS

The data that will be used for analysis of the addWE in South Africa will be drawn from all 5 waves[11] of the National Income Dynamics Survey (NIDS) spanning between 2008 to 2017. A nationally representative longitudinal survey, NIDS collects data through face to face interviews on a large sample of individuals (around 28 000) and households (around 7300) every 2 years. Data is collected on a broad range of themes, such as household composition, labour market participation, economic activity, fertility, demographic and biographic information and more. Each interview asks pertinent questions of past, current and future labour force activity. This allows us to construct variables for events that transpired while the survey did not take place, as well as events that had currently occurred.

The paper focuses on married women who are both legally married and cohabitating at every point across waves and therefore disregards those who became divorced[12]. A concern of endogeneity is detected between partners labour supply to the labour decisions made by the wife, such as joint retirement. To overcome this bias, the paper will restrict its sample to both wife and partner who is between ages 22 to 59 years in each wave. The paper will additionally restrict any observations who reported unable to work for an extended period due to long-term health reasons.

Due to the high degree of polygamy in South Africa, and to maintain the simplistic and fundamental nature of the paper, the sample is restricted to those women and men with only one partner. The high proportion of labour migration and possible data errors resulted in an inconsistency of marital status reported between couples. For example, wife X would have reported that she was married to partner X in the adult questionnaire, but partner X would have reported to be unmarried in the adult questionnaire. However, both wife X and partner X were reported to be married by the household roster. Thus, included in the sample are any inconsistencies reported in the adult questionnaire but

[11] A wave refers to the time when the survey occurred. For example, wave 1 refers to 2008, the year in which the first survey was conducted

[12] The paper drops those couples who were married in one wave and divorced in the next thereby only focusing on the labour market activities of married women. We therefore ignore any endogeneity between marital status and unemployment, a worthy topic for future analysis.

consistently married by the household roster. Further, all couples for which no valid partner identification variable was reported are excluded from the sample, as well as partners who are not living together. This was necessary to obtain a valid link between couples. The resulting sample consists of 10 809 observations with at least 1800 married women in each wave.

Furthermore, as noted in the literature, using the static labour force status of husbands is not appropriate for estimating the addWE. Ultimately, not all those who are unemployed have recently lost jobs and not all those who have recently lost jobs will be observed as unemployed. So, it is imperative to construct job loss variables which indicate the job loss experience of partners. This provides us with a scope of individuals considered to contribute toward the addWE. It is also important to note that by construction of the recent job loss variable, the paper assumes that this was an unforeseen event and it results in an unanticipated reduction in household income. The respondent was asked in all surveys when last they worked and the reasons for leaving this job. For example, if the respondent answered that he last worked less than 1 year ago, then they are considered as having recently lost their job. Moreover, to specify the 'involuntary'[13] job loss of partners, those who reported job loss for reasons such as 'lost job, laid off, business sold or closed down' would be considered for the 'recently unexpected job loss' variable constructed. In so doing, it overcomes the potential bias implicit in anticipated job loss mentioned above.

The resulting sample of partners who lost work involuntarily over the last 12 months within each wave amounted to 130 observations. The current measure is evidently an inaccurate measure of when job loss occurred. Consequently, by modelling the job loss period over 12 months may potentially result in a downward bias since the effects of job loss on wives' labour supply could have already been absorbed. Nonetheless, the measure would still provide a lower bound of the true effects.

Summary statistics of the sample is presented in table 3. In the first column, the means for all those in the sample are presented. The second and third column is divided into employment and unemployment status of the partner and finally in the last column, statistics for whether the partner has lost a job in the last 12 months are displayed.

From the table, on average, 47.2% of married women were employed whereas 52.8% were unemployed. Married women of partners who were employed were more likely to be employed (50.41%) and less likely to be employed when partners were unemployed (37.10%). However, of those women whose partners lost a job in the last 12 months, 61.79% of them were employed. The

[13] The terms involuntarily and unexpectedly are interchangeably used in this paper. Both refers to a partner who lost a job without unforeseen knowledge of the event occurring.

average labour participation rate for married women is 64.56%. The labour participation rate for wives whose partners were employed was 67.42% whereas only 56.18% for those whose partners were unemployed. However, the participation rate of wives increases to 72.36% if their partners lost their job unexpectedly in the last 12 months. According to the table, only 35.9% of married women had primary employment where they earned a regular wage. Wives of partners who were employed were more likely to have a form of primary employment (38.91%) whereas only 29.07% of wives whose partners were unemployed had primary employment. This figure rose slightly to 29.41% if their partner lost a job in the last 12 months.

Wives of employed husbands tend to work on average 1.35 hours more per week than those wives of unemployed husbands. On the other hand, wives of partners who became unemployed in the last 12 months work, on average, 0.7 more hours per week than those who have been unemployed for more than a year. However, this is still lower than those wives whose husbands are working. There is not much difference between wives of unemployed and employed partners who increased their working hours (by wave), but wives of partners who lost their job in the last 12 months were less likely to increase their working hours in the next wave.

Unemployed wives who reported as wanting to work but could not find employment could also give us an indication of the labour market conditions that prevails during the time under consideration. It is evident from the table that on average, 32.6% of married women would prefer to be employed. Of those whose partners are employed, 33.81% would have preferred a regular wage as opposed to only 29.8% of women whose partners are unemployed. Conversely, when using the recent job loss variable, this number is dramatically increased to 55.26%.

The analysis of the next few variables only serves to highlight the inherent heterogeneity between the two groups and thus lends plausibility to the fixed effects estimator chosen in the regression analysis. Wives of unemployed partners are older (46 years) and are less educated (7.8 years of schooling) than those of employed partners (42 years) with an average of 9.6 years of schooling. Furthermore, the average age of the wives whose partner recently lost work is 40 years of age with an average schooling of 9.4 years.

Overall, the average age of partners are 43.13 years in the sample. Partners who are employed are insignificantly younger, with an average age of 42 years and 9.2 years of education. By contrast, partners who are unemployed has an average age of 46 years with 7.2 years of education. Moreover, partners who became unemployed in the last 12 months are younger than those who are unemployed but has a higher level of educational attainment. Of all wives who are African, 69.97%

of their partners are employed and 30.03% are unemployed compared to 92.88% of partners who are married to white women are employed and 7.12% are unemployed.

Table 3:
Summary Statistics of Married Couples Labour Market Activities and Demographic Variables By Husband's Employment Status

Variables	Everyone (1)	Partner employed (2)	Partner unemployed (3)	Partner unexpected Job loss (4)
Wife employed (%)	47,20	50,41	37,31	61,79
Wife participation rate (%)	64,56	67,42	56,18	72,36
Wife unemployed (%)	52,80	49,95	62,69	38,21
Wives' Non-participation (%)	35,44	32,58	43,82	27,64
Wife prefers employment (%)	32,60	33,81	29,80	55,26
Wife doesn't prefer employment (%)	67,40	66,19	70,20	44,74
Wife has primary employment (%)	35,90	38,91	27,09	29,41
Wife doesn't have primary employment (%)	64,10	61,09	72,91	70,59
Wife's weekly hrs at primary employment	38,86	39,12	37,77	38,47
Increase in hours at primary employment (%)	63,52	63,65	62,95	45,45
Wife's age	39,53	38,60	42,20	37,50
Partner's age	43,13	42,13	46,13	40,00
Wife's years of education	9,13	9,60	7,80	9,40
Partner's years of education	9,00	9,60	7,20	9,20
Wife has secondary education (%)	53,40	54,54	49,94	65,38
Wife has tertiary education (%)	17,22	20,11	8,67	12,31
Partner has secondary education (%)	53,34	54,75	49,19	62,31
Partner has tertiary education (%)	16,21	19,86	5,39	10,77
Wife-African (%)	67,21	69,97	30,03	60,77
Wife-White (%)	7,61	92,88	7,12	3,85
Children age 0-5 years (%)	72,40	69,32	81,66	76,92
Children age 6-12 years (%)	79,87	76,28	90,52	66,15
Children age 13-15 years (%)	32,04	30,09	37,83	24,61
Children age 16-18 years (%)	30,12	27,86	36,83	27,69
Formal dwelling unit (%)	79,95	82,59	72,04	81,25
Informal dwelling unit (%)	20,05	17,41	27,93	18,75
Renting the house (%)	20,94	23,55	12,89	23,33
Paying the mortgage (%)	4,58	5,50	1,92	5,04
Observations	10809	7171	2416	130

Source: Authors calculations using NIDS wave 1-5

Further, of all partners who has lost a job in the last 12 months, 60.77% were married to African women and 3.85% were married to wives who were white.

Wives of partners who are employed are less likely to have young children in the household (69.32%) than wives of partners who are unemployed (81.66%). Even when considering those partners who has lost work in the last 12 months, 76.92% of those wives have children falling within this age category. This could negate the addWE as wives with younger children tend to be disincentivized from joining the labour market. A high proportion of the sample (79.95%) lives in formal settlements. Wives of partners who are employed are however more likely to live in a formal settlement than those with unemployed partners. A reason for this is the potential correlation between municipal rates related to formal dwellings and employment. It is more likely that an individual with a paying job can pay municipal rates such as water and electricity than an individual who is unemployed. To illustrate this further, paying a mortgage on the property and renting would also positively correlate to women's decision to supply labour. Wives of partners who are employed are more likely to be renting than those who are unemployed. 5.5% of wives whose husbands are employed are paying off a mortgage whereas only 1.92% of wives with unemployed partners are servicing a bond.

From the initial summary statistics, there seems to be evidence of a potential addWE. Evidently, there is a clear discrepancy in terms of age and educational attainment between those partners who are unemployed and those who have unexpectedly lost work in the last 12 months. As noted before, the static unemployment status of the partner is inappropriate for analysing the addWE as not all partners who are unemployed have recently lost a job. To illustrate the difference between the static unemployment status and the recent job loss of partners, the two variables are cross tabulated in table 4 below:

Table 4
Partners Labour Force Status versus Recent Job Loss (%)

	Labour Force status		
Recent unanticipated job loss	Employed	Unemployed	Non-Participation
No	100	0,00	0,00
Yes	0,00	78,29	21,71

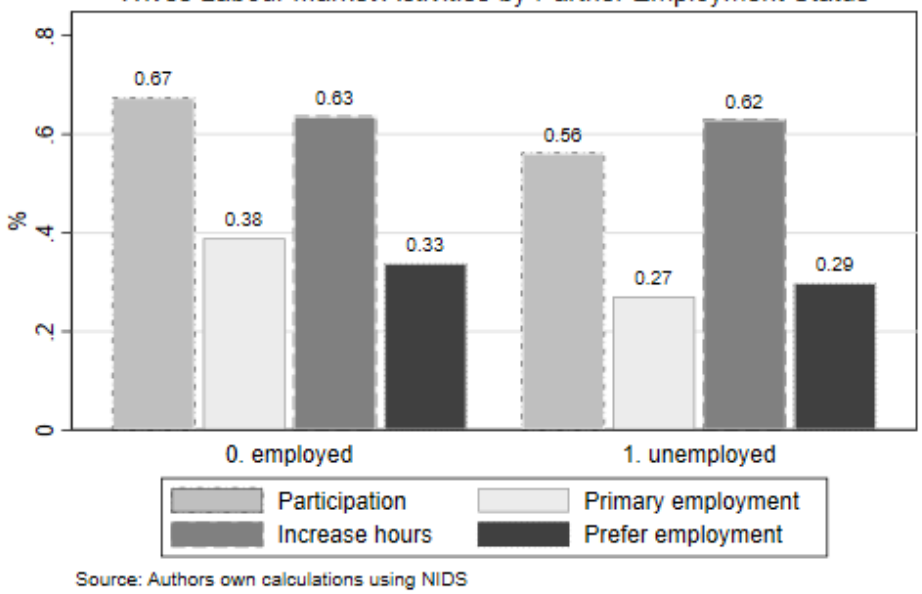
Source: Own calculations using NIDS

From the table, 21.71% of partners who were recorded as unemployed were in fact not participating in the labour market. Thus, the use of the raw unemployment status of the partner could potentially confound an addWE as many wives of partners who are not labour market participants could in fact have adjusted their labour force activities a long time ago.

As measures of labour force activity, the paper uses the labour force participation rate, the probability of having a regular wage (primary employment), increase in hours worked (from the previous wave), preference of employment and average working hours as measures of female labour market activity. By only using the labour force participation rate, the analysis is restricted to movements in and out of the labour market. The issue is addressed by including measures of employment and increase in hours worked. By including those wives who prefer employment, a conjecture can be made about the potential addWE and not just the realised addWE.

The consequence of using partners recent unanticipated job loss experience as opposed to their static labour force status can also be examined by a rough comparison of wives' labour market activities to the two alternate indicators of partners labour market experiences. This is shown in figures 2 and 3, where women's labour market activities conditioned on the static employment status of their partners are presented (figure 2), against the recent unanticipated job loss experience of the partner (figure 3).

Figure 2
Wives Labour Market Activities by Partner Employment Status



Source: Authors own calculations using NIDS

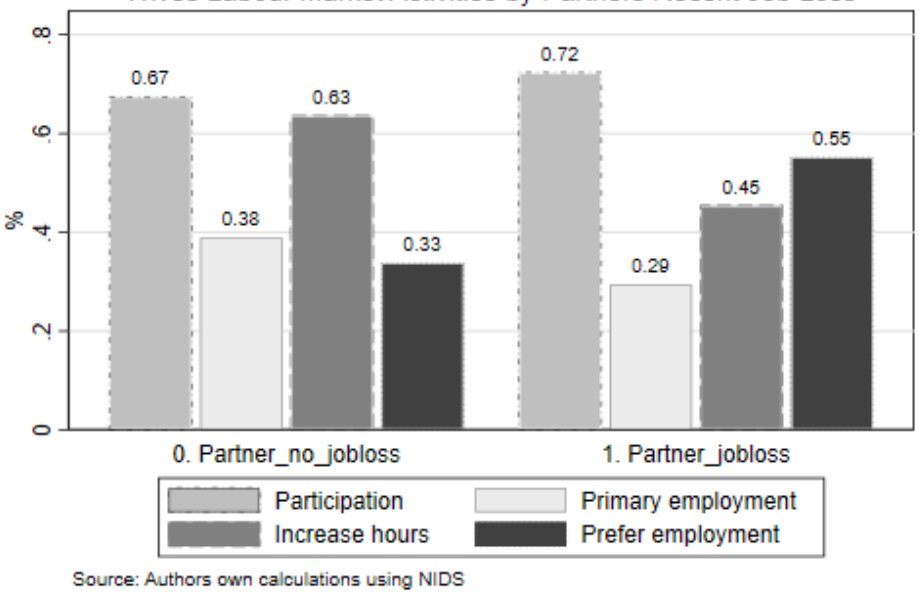
Through analysing figure 2, it is evident that the labour market activities of wives whose husbands are employed are stronger[14] than those of their unemployed counterparts. The labour force participation of those wives with employed partners were 10.63 percentage points higher than those women whose partners were unemployed. Further, the probability of women earning a

[14] The word 'stronger' in this sense refers to the frequency of observations that falls within a specific group. For example, if more women are employed when their partner is employed, then the employment of women with employed partners are stronger than those of unemployed partners.

regular wage was 11.80 percentage points higher than those whose husbands were unemployed. The proportion of wives working more hours from the previous wave was about the same for those with employed and unemployed partners. However, wives with employed partners were 4 percentage points more likely to prefer employment than those with unemployed partners. The differences are all statistically significant besides for increase in hours using a standard t-test. This serves as further evidence that the static employment status of partners may result in no detection of an addWE. In fact, the opposite effect may be found.

Figure 3 however provides the same analysis but with a focus on the recent unanticipated job loss experience of the partner.

Figure 3
Wives Labour Market Activities by Partners Recent Job Loss



Source: Authors own calculations using NIDS

Figure 3 shows that the labour force participation of those wives whose partners have unexpectedly lost a job over the last 12 months were 4.94 percentage points higher than those wives whose partners are employed. Furthermore, 21.45 percentage points more women preferred to be employed when their partners have lost a job in the last 12 months. However, the proportion of wives who had a regular income from their primary employment was 9.5 percentage points higher for those whose partners were employed. Further, 18.19 percentage point more women increased their hours of work if their partner were employed as opposed to those women whose partners lost a job unexpectedly in the last 12 months. The same t-test is used as in Figure 2. It shows that the differences in those who prefer employment and the probability of primary employment is significant at the 5% level whereas the other two measures are insignificant.

The increase in wives' labour participation and rise in their preference to work may suggest that women of partners who have unexpectedly lost work in the last 12 months may want to work but are unable to do so. However, of those women who already have primary employment, the proportion of them who maintain primary employment and increase their hours are higher when their partners are employed as opposed to those whose partners experienced recent job loss. This preliminary analysis may provide a rough indication of the correlations between the labour supply activities of wives and unemployment experiences of their partners. However, many factors need to be controlled for to obtain a robust estimate of the addWE. As seen above, there are vast differences between wives of employed partners and unemployed partners. As such, unobserved heterogeneity may play a pivotal role in the observed patterns. For example, unobserved characteristics of wives might be a reason they work more than others. In the next few sections a more rigorous analysis is undertaken.

5. METHODOLOGY

This section sets out the methodology used to empirically estimate a potential addWE. It will outline the theoretical model as a basis for the empirical analysis and provide a motivation for the regression technique utilized. Further, it will provide a description of the key independent variables.

The life-cycle labour supply model as outlined in MaCurdy (1985) follows that women's labour supply (H_{it}) is a function of the family unit's marginal utility of wealth (λ_{it}), leisure, (ω_{it}), her wage offer (lnw^f) and work 'tastes' (x_{it}) such that:

$$H_{it} = g(\lambda_{it}, \omega_i, lnw_{it}^f, x_{it}) \quad (1)$$

If we assume that (λ_{it}) is a function of the initial marginal utility, then the probabilities of labour force participation (Pr^p) and full-time employment (Pr^f), which are all arguments of equation 1 can be written as:

$$Pr^m = P(\alpha_{i0} + \beta_1 X_{it} + \beta_2 UNEM_{it} + \gamma lnw_{it} + \beta_3 \delta_{it} + \beta_4 \gamma_{it} + \varepsilon_{it}) \quad (2)$$

Where $m=p,f$ and α_{i0} is household specific effects which reflects the marginal utility of wealth, females leisure time and so forth. When the functional form of P is specified as linear, the model becomes a linear probability model and thus can be estimated through the usual fixed effects, random effects or pooled-ordinary least squares (OLS) regression techniques. The OLS and random effects model is expected be inconsistent since the time invariant household effects

reflects variables such as assets, interest rates and wages in all waves[15] which is correlated with other variables. As such, estimates for the random effects model is not presented but the results of the hausman test[16] are presented in the appendix. This test shows that the fixed effects estimator is indeed the more appropriate model. As a convincing tool of the assortative mating phenomenon claimed above, estimates for the OLS[17] model is presented. Robust standard errors are utilized as to overcome any potential serial correlation or correction of any outliers. Dummies for each wave is included in all regression analysis to isolate and control for any influence of time trends.

Furthermore, a fixed effects regression is estimated where the change in unemployment status for married women is constructed and used as the dependent variable. As such, a possible delayed addWE can be investigated. Furthermore, the variable takes on a value of 1 if wives were unemployed in $wave_t$ but became employed in $wave_{t+1}$. This is regressed on our partners job loss variable and all other covariates used in the main regression. By so doing, further insight into prevailing labour market and economic conditions arises which could prevent wives from finding employment in the current wave but may be successful in doing so after enough time has elapsed i.e. in the next wave.

The unit of observation is employment or unemployment status for each individual (i) at every point across waves (t). As previously mentioned, 5 measures of wives' labour market activity are used as dependent variables: labour force participation, employment, increase in working hours, preference of employment and the average hours worked. These are measures corresponding to the most recent literature by Gong (2011).

The key independent variable, $UNEM_{it}$, is a dummy for whether partners of wives unexpectedly lost a job during the last 12 months before the interview. To repeat, the unexpected job loss of a partner is defined as one where the partner lost a job through being laid off or whether he changed employers due to a change in residence. By so doing, the paper deviates from the static unemployment status which could confound the results of the addWE as previously shown. Focusing on those partners who became unemployed in the last 12 months will mitigate the risk of using a too long of a time frame when analysing the addWE. According to the NIDS

[15] As a reminder, a wave is referred to the time-period in which the survey was conduction. For example, the first wave or wave 1 would refer to the year 2008 when the first survey was conducted. Wave 2 will refer to 2010, when the second survey was conducted. Each wave is conducted every 2 years and the final wave, wave 5, was conducted in 2017.

[16] The Hausman test allows authors to test the appropriate model to be used between the random and fixed effects model.

[17] OLS assumes the observations are independent and does not hold fixed any unobserved heterogeneity. It is therefore appropriate to test empirically for the assortative mating since we assume no differences between wives of employed and unemployed partners.

questionnaire, respondents were asked how many months and years lapsed since their last work-related activity. The next option available to individuals who last worked more than 12 months ago was 1 to less than 3 years. Including individuals who fell into this category will confound the result of the addWE as wives may have adjusted their labour market activity long ago.

X is a set of demographic covariates: the age and level of educational attainment of the partner and the wife, the number of children in the household who fall between the age categories 0.-5, 6-12, 13-15 and 16-18 years. The wage is replaced by other variables such as experience and its square, education and whether the couple is rents or owns the house. Evidently, these variables are strong indicators of human capital and this specification is often used in the literature.

Lastly, controls for whether the couple lives in formal dwelling type (δ) and time dummies for each wave (γ) are also included. To estimate the increase in hours worked and whether wives prefer employment, the specification will be the same as that adopted in equation (2). However, the left-hand side probabilities will be replaced by the increase in hours worked and the preference of employment variables. This will also be estimated using fixed effects techniques.

6. REGRESSION ANALYSIS

The estimated coefficients of the partners job loss on the equations of the wives' labour force participation, employment, increase in hours, preference of employment and average working hours are reported in Table 5 below using the fixed effects model[18]. Note that some coefficients are omitted from the table for ease of reference[19]. The coefficients will be interpreted as the *ceteris parabis* marginal effects on the probability of the dependent variable using percentage points.

The sample sizes are similar between model 1 and model 2 in which married women's participation and employment is used as dependent variables. However, these sizes change drastically across model's 3 to 5 where the increase in hours conditional on employment, average weekly hours and preference of employment are modelled. A reason for the disparity in sample sizes is due to the missing values reported for these dependent variables. For example, only those who are employed would have reported a change in the hours worked. Likewise, only those who had some form of steady employment would have reported on their average working hours. However, this attrition is not expected to bias the coefficients since our interest in the increase in hours worked and average hours are only for those who are employed and not those who are unemployed.

[18] Appendix A1 shows the Hausman test conducted for the suitability of the fixed effects model over the random effects model. The P-value of 0.01 shows the fixed effects technique is indeed more appropriate.
[19] Table 5 presents the condensed version and the full model can be found in table A1 in the appendix.

Furthermore, those who reported missing values for these variables and who were employed would be considered missing at random since the probability of non-response is not assumed to be dependent on any other variables. The same is idea is applied to missing values of the other 3 dependent variables.

The first row of coefficients compares the labour force activity of wives whose partners experienced unanticipated job loss in the last 12 months, compared to those wives whose partners did not become unemployed in the last 12 months. Evidently, wives whose partners experienced job loss are 20.2 percentage points more likely to participate in the labour force. Further, wives whose partners experienced job loss are 5.82 percentage points more likely to have a form of primary employment (whether part-time or full time) where they earn a regular wage. Moreover, wives of partners who experienced job loss work on average 2.753 more hours per week. However, all 3 variables are statistically insignificant. Wives whose partners recently became unemployed are 34.7 percentage points less likely to work more hours from the previous wave but of those who increase their hours, work on average 2.753 more hours than the previous wave. Wives who are unemployed and whose partners became unemployed in the 12 months are 0.5 percentage points less likely to prefer a form of employment than those wives whose partners remained employed.

The lack of statistical significance may be attributed to the miniscule number of observations for the key dependent variable: partners recent job loss. This reflects a major limitation in the model since the fixed effects model relies heavily on within group action. Thus, a fair amount of variation of our key independent variable within groups are imperative. Therefore, while it seems as if an addWE could be detected, the effects are inconclusive. Previous studies have attempted to control for the discouraged worker effects by including several controls for labour market conditions. An attempt has been made to control for the wives' average hourly wage rate as a proxy for market conditions within the various waves, but this has resulted in no significant effect on the results.

A further possible explanation for this insignificant finding may be the lack of controls for other potential explanatory variables such as unemployment insurance, remittances or household grants[20]. Gruber and Cullen (1996) have found that increases in the generosity of unemployment insurance crowds out the addWE by providing an income that offsets the negative income shock of partners job loss, thereby decreasing the labour supply response of wives whose husbands are unemployed. A similar picture may appear for those households that receive any sort of state grant

[20] See Gruber and Cullen (1996) for an analysis of the addWE and the role of insurance unemployment in the US

or remittances. This is out of the scope of this paper and may be a topic of interest for future analysis.

Table 5
Estimated Coefficients of Partners Job Loss and Demographic Variables- Fixed Effects Model

VARIABLES	(1) Participation	(2) Primary Employment	(3) Increase in hours	(4) Total hours	(5) Prefer Employment
Partner recently lost job	0.020	0.058	-0.347*	2.753	-0.005
	(0.085)	(0.078)	(0.201)	(3.633)	(0.127)
Formal dwelling	0.052*	0.026	-0.132	1.485	0.072
	(0.030)	(0.024)	(0.095)	(1.851)	(0.051)
Number of children age 0-5	-0.030**	-0.020	0.001	0.643	-0.033
	(0.015)	(0.012)	(0.059)	(0.810)	(0.023)
Number of children age 6-12	-0.006	-0.015	-0.043	-0.788	0.003
	(0.014)	(0.012)	(0.051)	(0.854)	(0.023)
Number of children age 13-15	0.045**	0.000	-0.025	0.247	0.056*
	(0.017)	(0.013)	(0.058)	(0.840)	(0.031)
Number of children age 16-18	0.034**	0.013	0.024	0.871	0.051*
	(0.017)	(0.014)	(0.052)	(0.786)	(0.030)
Wife has no schooling	-0.018	-0.201*	-0.260	0.611	0.246
	(0.145)	(0.117)	(0.351)	(5.663)	(0.193)
Wife finished Primary school only	-0.077	-0.419***	-0.534	-2.592	0.400
	(0.193)	(0.155)	(0.570)	(8.231)	(0.280)
Wife finished Secondary School	0.010	-0.335*	-0.780	-3.921	0.554*
	(0.214)	(0.172)	(0.649)	(8.964)	(0.335)
Partner has no schooling	-0.145	-0.064	-0.640***	5.056	-0.102
	(0.115)	(0.096)	(0.228)	(5.472)	(0.137)
Partner finished Primary school only	-0.116	-0.107	-0.691**	11.840**	0.091
	(0.121)	(0.103)	(0.269)	(5.462)	(0.164)
Partner finished Secondary School only	-0.070	-0.098	-0.811***	11.140**	0.124
	(0.129)	(0.109)	(0.286)	(5.654)	(0.183)
Constant	2.419***	1.613***	4.008*	37.710	1.455
	(0.615)	(0.521)	(2.218)	(35.000)	(1.015)
Observations	5,918	5,929	1,042	2,281	2,988
R-squared	0.027	0.017	0.041	0.070	0.049
Number of Married women	3,348	3,350	619	1,430	2,042

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Own calculations using NIDS wave 1-5

The remainder of the variables are generally in line with the labour supply literature. When the value of home production rises, so does the elasticity of women's labour supply (Gruber and Cullen,1996). Thus, an increase in the number of young children will increase the value of home production for wives. In Table 5, it is evident that an additional child in a household aged 0-5 years will decrease wives' labour supply by 3.07 percentage points and decrease their probability of obtaining employment by 2.05 percentage points. However, an opposite effect arises for the labour market activity of wives with older children in the household.

Wives with lower levels of schooling are less likely to be in the labour force and earn a regular wage than those who have obtained some sort of tertiary qualification. Accordingly, wives with no schooling are 20.10 percentage points less likely to be employed than those with a tertiary qualification. Likewise, wives with primary and secondary education are 41.90 percentage points and 33.5 percentage points less likely to be formally employed than those with tertiary education, respectively. The results are significant at least by the 10% level. Additionally, wives of partners with lower levels of education are less likely to be working more hours in the next wave but overall, works more hours on average than those wives of partners who has higher levels of education. A possible reason for this is that wives of partners who have lower levels of education work in occupations where they receive a lower average wage compared to those wives of husbands with higher education. Table 6 presents the proportion and average wages for wives of husbands with tertiary education and of those with no education, primary or secondary education by wives' occupation.

Table 6

Wives' Occupation by Partners' Education Level: Proportion and Average Hourly Wage

Occupation of wife	Husbands level of education				
	Non-tertiary Education		Tertiary education		
	%	ave wage	%	ave wage	Total
Armed forces	0,17	79,79	0	0	0,14
Managers	3,28	97,69	10,17	83,11	4,77
Professionals	15,22	61,71	43,58	80,5	21,34
Technicians	4,19	46,22	8,89	68,04	5,20
clerical support	7,40	36,94	15,12	64,93	9,07
Service and sales	16,86	21,52	13,21	35,43	16,08
Agriculture	0,52	8,93	0,51	12,70	0,52
Craft and trade	3,84	17,09	2,29	44,45	3,51
Plant machinery operators	2,44	16,80	0,38	32,63	2,00
Elementary occupations	46,05	13,97	5,84	18,04	37,39
Total	100	27,83	100	66,19	100

Source: Authors own calculations using NIDS wave 1-5

From the table it shows that wives with partners who obtained a tertiary education earn on average R38.36 more per hour than wives with partners who have no tertiary education. Expectedly, 43.58% of wives with partners who have a tertiary education work as managers, earning an average hourly wage of R83.18. Contrary, 46.05% of wives with partners who does not have a tertiary education work in elementary occupations, earning an average hourly wage of R13.97. Thus, wives earning a lower wage might be subdued to work longer and more rigid hours than wives earning a higher wage.

Looking at the coefficients of the full model in table A1 in the appendix, it is incorrect to interpret the coefficient of age in isolation due to its squared term. However, given the concave nature of the age variable, wives' labour force participation decreases with partners age to a certain turning point and thereafter increases. A possible reason for this peculiar result could stem from the positive correlation found between partners age and their unemployment probability. Table 7 below shows the correlation between wives' age and labour participation to that of their partner:

Table 7

Correlation matrix between Partners Age and Unemployment Status

	Partner Unemployment	Partner Age	Women Participation	Women Age
Partner Unemployment	1			
Partner Age	0,18	1		
Women Participation	-0,10	-10,63	1	
Women Age	0,16	0,83	-0,09	1

Number of observations: 9252

It is evident from the table that older partners are more likely to be unemployed. Furthermore, wives of unemployed partners are less likely to be labour force participants. This result could once again lend credibility to the high degree of assortative mating in South Africa.

Further, from table A1 in the appendix, wives with more experience are less likely to be in the labour force, and less likely to have a regular paying job. This result is peculiar, given the theory that labour force participation and employment is expected to rise as one becomes more experienced. However, given the method with which potential experience is described (age-eduation-6), the correlation matrix suggests that wives' labour participation decreases with their age. However, these results are statistically insignificant.

Lastly, although statistically insignificant, wives who pay rent or a mortgage are more likely to be participating in the labour force than those who do not. Wives who are likely to pay a mortgage work 2.71 less hours than those who do not pay a mortgage. This result is statistically significant at the 10% level. A likely explanation for this is that wives who owns their house are more likely to earn a higher income and as previously shown, higher income earners are more likely to work less hours than lower income married women.

As a sensitivity check, the same model as before is specified but shifting the focus to those wives whose partners are unemployed by the static labour force status. All results are likewise insignificant besides for the wives' labour force participation. Table 8 presents the condensed version of the regression[21].

Table 8

Estimated Coefficients of Partners' Static Unemployment Status: Fixed Effects Model (Condensed Version)

	(1) Participation	(2) Primary Employment	(3) Increase in hours	(4) Total hours	(5) Prefer Employment
VARIABLES					
Partner Unemployed	-0.040*	0.002	0.016	1.306	0.008
	(0.021)	(0.017)	(0.085)	(1.476)	(0.031)
Formal dwelling	0.016	0.010	-0.050	1.249	0.049
	(0.024)	(0.018)	(0.095)	(1.546)	(0.034)
Number of children age 0-5	-0.037***	-0.021**	-0.006	0.046	-0.026*
	(0.011)	(0.009)	(0.056)	(0.708)	(0.014)
Number of children age 6-12	-0.009	-0.012	-0.014	-0.847	-0.004
	(0.011)	(0.009)	(0.044)	(0.798)	(0.015)
Number of children age 13-15	0.031**	0.007	0.002	-1.020	0.020
	(0.014)	(0.010)	(0.052)	(0.844)	(0.021)
Number of children age 16-18	0.027*	0.014	0.041	-0.366	0.024
	(0.014)	(0.010)	(0.047)	(0.728)	(0.021)
Constant	1.920***	1.424***	5.091***	35.380	1.334
	(0.489)	(0.422)	(1.825)	(28.270)	(0.839)
Observations	7,773	7,789	1,270	2,799	4,151
R-squared	0.026	0.018	0.030	0.052	0.052
Number of Married women	4,036	4,040	724	1,691	2,615

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Own calculations using NIDS wave 1-5

[21] The full model is presented in table A3 in the appendix

From Table 8 it is evident that wives of partners who are unemployed are 4.05 percentage points less likely to be labour force participants than those wives whose partners are employed. This result is statistically significant at the 10 percent level of significance. This could potentially reflect the assortative mating phenomena described above as these women could have married partners who are unemployed for the long-term and have lower probabilities of finding work, thereby resulting in a lower work force participation. To consolidate this idea, an OLS regression of wives' labour participation and employment is regressed on their partners unemployment experiences[22]. The results are presented in the simplified version in Table 9 below[23].

Table 9
OLS Estimates for Wives' Participation and Employment Status by Partners Unemployment Status

	Partner recently lost job		Partners static unemployment status	
VARIABLES	(1) Wife Participation	(2) Wife Employment	(3) Wife Participation	(4) Wife Employment
Partner recently lost job	0.036	-0.060		
	(0.050)	(0.048)		
Partner's Unemployed			-0.025*	-0.042***
			(0.014)	(0.014)
Constant	0.492***	0.244	0.477***	0.071
	(0.156)	(0.164)	(0.136)	(0.142)
Observations	5,918	5,929	7,773	7,789
R-squared	0.078	0.100	0.093	0.104

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Own calculations using NIDS wave 1-5

As expected, wives of partners who are unemployed regardless of when unemployment occurred[24] are 2.58 percentage points less likely to be a labour market participant than those wives of employed partners. Likewise, wives of partners who are unemployed regardless of when

[22] As before, the recently unemployed variable indicates that the partner has become unemployed in the last 12 months. The static unemployment includes all partners who are unemployed regardless of when unemployment occurred.
[23] The full OLS regression model can be found in table A3 in the appendix
[24] Static unemployment status includes partners who have been unemployed for as long as 5 years or more.

unemployment occurred are 4.25 percentage points less likely to have a form of employment where she is paid a regular wage. Both results are statistically significant.

A further noteworthy insight emerging from the family lifecycle labour supply model is the idea that the household is expected to maximise utility from both partners leisure and total consumption at every point over their lifetime. This utility is updated with any new information since the previous wave (Stephens, 2002). Thus, the wages of both partners and marginal utility of wealth is expected to affect the wives' labour supply. Consequently, both former experience (like job loss) and expected values of future income (like the probability of future wages) affects the change in the wives' future labour supply (Gong 2011).

Therefore, the addWE is expected to operate through two channels. The one is through the decrease in future income which increases the marginal utility of wealth in all periods. As a result, wives are expected to work more in all future periods. The second is the cross-wage effect which is the effect of one partner's wage on the other partner's labour supply. For this reason, an opportunity emerges to test the possibility that wives may want to increase their labour supply in response to their partners job loss but may not be able to do so immediately.

Table 10 below presents the condensed version[25] of the change in wives' unemployment status (by wave) on partners recently unanticipated job loss and identical covariates used in our main regression. From the table it is evident that on condition that the partner became unemployed in $wave_t$, the probability that the wife is employed in $wave_{t+1}$ decrease by 1.07 percentage points. This result is nevertheless statistically insignificant. Two possible reasons for this result arises. Firstly, according to Stephens (2002), the direction of the cross-wage effect depends on whether the couple's leisure time are compliments or substitutes. Given the high degree of assortative mating in South Africa, it is highly likely that couples leisure are compliments and that a decrease in one's labour supply would motivate the other to decrease their own labour supply too. Secondly, it depends on how sudden the job loss is. If it is well anticipated, wives may have adjusted their leisure a long time ago, if at all. Given the time-period between waves (2 years), it is highly likely that wives may have adjusted their labour supply long before the survey was conducted. Therefore, due to data constraints, it may be harder to get an accurate measure of future significant changes in wives labour supply.

[25] The full model can be found in table A4 in the appendix

Table 10

Estimated Coefficients for Changes in Wives' Unemployment Status by Waves (Condensed Version)

VARIABLES	(1) change in unemployment status
Partner recently lost job	-0.010
	(0.058)
Formal dwelling	0.020
	(0.021)
Number of children age 0-5	0.009
	(0.010)
Number of children age 6-12	0.010
	(0.010)
Wife has no schooling	-0.164*
	(0.085)
Wife finished Secondary School	-0.258*
	(0.146)
Partner has no schooling	-0.011
	(0.098)
Partner finished Primary school only	-0.046
	(0.102)
Partner finished Secondary School only	-0.052
	(0.107)
Constant	0.458
	(0.388)
Observations	5,932
Number of Married Women	3,351
R-squared	0.066

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Own calculations using NIDS wave 1-5

7. CONCLUSION

Using all 5 waves of the NIDS survey, the paper investigated the addWE by examining married women's labour supply responses to their partners recent and unanticipated job loss within a family life-cycle labour supply model. According to the preliminary analysis conducted, vast differences between wives of husbands who are unemployed and those who are employed emerges. For this

reason, a fixed effects model is utilized when conducting the empirical analysis to account for observed, as well as unobserved heterogeneity.

The paper follows a similar contention made in Gong (2011) where it argues and shows that using the partners static unemployment status is inappropriate for an examination of the addWE. In so doing, one would over-weight the number of partners who were unemployed for extensive periods of time. The wives of these partners may have adjusted their labour supply a long time ago or may not adjust it at all. When modelling the addWE by the static unemployment status of partners, the results are as expected: wives of partners who are unemployed are less likely to participate in the labour market than wives of partners who are unemployed. However, this is ascribed to the high degree of assortative mating found to exist in South Africa whereby women with partners who were unemployed for a long time are most likely to be unemployment and non-labour force participants themselves.

When modelling married women's labour supply responses to the recent and unanticipated job loss of their partners, a positive but insignificant effect is found on women's labour participation rate, employment and hours worked. It is the contention of this paper that these inconclusive results could largely be due to the limitations in the data. Given the relatively low number of observations of those partners who have recently lost a job unexpectedly in the last 12 months (only 130 observations), there was seemingly very low variability across wives whose partners lost a job and those who did not.

Moreover, the paper pursued to establish whether a delayed addWE might be present. It argues that wives of husbands who suddenly became unemployed may want to secure employment immediately, but incapable of doing so due to the stringent economic conditions faced by South Africa. However, employment opportunities may arise as these economic conditions subsides. In so doing, the paper finds no significant evidence of a delayed addWE one period later. In fact, albeit statistically significant, the probability of a wives being employed one period later, given that their partner lost a job in the current period, is lower than wives whose partners have not lost a job. A possible reason for this result is the 2-year gap between the current period and the next period. Therefore, by the next period, wives may have already adjusted their labour supply a while ago or become discouraged workers if harsh labour markets conditions do not improve.

Thus, it is imperative for the undertaking of future research to consider additional avenues that may contribute to a confounding addWE, which is out of the scope of this paper. The effect of unemployment insurance and state grants could mitigate a significant addWE by absorbing the negative income shock due to the partners sudden job loss. For example, Gruber and Cullen (1996)

finds that unemployment insurance crowds out the addWE by providing an income stream which counteracts the adverse household income shock resulting from the husband's unemployment. By controlling for any additional household income streams that may alter the labour supply response functions of wives, a more robust addWE may be found. Additionally, using a more appropriate dataset (not currently available for South Africa) is crucial for the betterment of the models utilized and accuracy of estimates of an addWE.

8. REFERENCES

Ackerman, L. and Velelo, N., 2013. '*The Position of Women in The South African Labour Force: An Overview*', Pula: Botswana Journal of African Studies Vol.27, No. 1,2013. Issue #48.

Bertrand, Marianne, Sendhil Mullainathan, and Douglas Miller. 2003. "*Public Policy and Extended Families: Evidence from Pensions in South Africa.*" The World Bank Economic Review 17(1): 27 – 50.

Bradbury, B. (1995), '*Added, Subtracted or Just Different: Why do the Wives of Unemployed Men have Such Low Employment Rates*?', Australian Bulletin of Labour, 21, 48–70.

Brophy, T., Branson, N., Daniels, R.C., Leibbrandt, M., Mlatsheni, C., & Woolard, I., 2018. *National Income Dynamics Study panel user manual*. Release 2018. Version 1. Cape Town: Southern Africa Labour and Development Research Unit.

Festus, L., Kasongo, A., Moses, M. and Yu, D., 2016. *The South African labour market, 1995–2015*. Development Southern Africa, 33(5), pp.579-599.

Gruber, J. and Cullen, J. (1996), *'Spousal Labor Supply as Insurance: Does Unemployment Insurance Crowd Out the Added Worker Effect?*', National Bureau of Economic Research Working Paper No. 5608, NBER, Cambridge, MA.

Heckman, J. and MaCurdy, T. (1982), *'Corrigendum on a Life Cycle Model of Female Labour Supply*', Review of Economic Studies, 49, 659–60.

Hino, H., Leibbrandt, M., Machema, R., Shifa, M., Soudien, C. (2018). *Identity, inequality and social contestation in the Post-Apartheid South Africa. Cape Town*: SALDRU, UCT. (SALDRU Working Paper No. 233)

Kristin Mammen, and Douglas Miller. 2003. "*Rearranging the Family? Income Support and Elderly Living Arrangements in a Low Income Country.*" Discussion paper, Dartmouth College.

Kotlikoff, L.J. and Spivak, A., 1981. *The family as an incomplete annuities market*. Journal of political economy, 89(2), pp.372-391.

Layard, R., Barton, M. and Zabalza, A. (1980), '*Married Women's Participation and Hours',* Economica, 47, 51–72.

Lefebvre, P. and Merrigan, P., 2008. *Child-care policy and the labor supply of mothers with young children: A natural experiment from Canada.* Journal of Labor Economics, 26(3), pp.519-548.

Lenten, L. (2000), *'The Profile of Labour Force Discouragement in Australia'*, Australian Journal of Labour Economics, 4, 3–17.

Leibbrandt, M., Finn, A. and Woolard, I., 2012. *Describing and decomposing post-apartheid income inequality in South Africa*. Development Southern Africa, 29(1), pp.19-34.

Lichter, D.T. and Qian, Z., 2019. *The Study of Assortative Mating: Theory, Data, and Analysis*. In Analytical Family Demography (pp. 303-337). Springer, Cham

Lundberg, S. (1985), '*The Added Worker Effect'*, Journal of Labor Economics, 3, 11–37.

MaCurdy, T. (1985), '*Interpreting Empirical Models of Labor Supply in an Intertemporal Framework with Uncertainty*', in Heckman, J. and Singer, B. (eds), Longitudinal Analysis of Labor Market Data. Cambridge University Press, Cambridge; 111–55.

Maloney, T. (1987), '*Employment Constraints and the Labour Supply of Married Women: A Reexamination of the Added Worker Effect'*, Journal of Human Resources, 22, 51–61.

Mincer, J. (1962), '*Labor Force Participation of Married Women: A Study of Labor Supply'*, in Lewis, H.G. (ed.), Aspects of Labor Economics. National Bureau of Economic Research, Princeton University Press, Princeton, NJ; 63–97

Morissette, R. and Ostrovsky, Y. (2008), '*How do Families and Unattached Individuals Respond to Layoffs? Evidence from Canada*', Analytical Studies Branch Research Paper Series, Catalogue No. 11F0019MIE – No. 304, Statistics Canada, Ottawa, Canada

Idowu, O.O. and Owoeye, T., 2019. *The supply of female labour force participation in selected African countries*. Business & Social Sciences Journal, 4(1), pp.14-30

Spletzer, J. (1997), '*Reexaming the Added Worker Effect'*, Economic Inquiry, 35, 417–27.

Stephens, M. (2002), *'Worker Displacement and the Added Worker Effect'*, Journal of Labor Economics, 20, 504–37.

Vandenberg, S.G., 1972. *Assortative mating, or who marries whom?*. Behavior genetics, 2(2-3), pp.127-157.

Woolard, I., & Leibbrandt, M. (2010). *The evolution and impact of unconditional cash transfers in South Africa*. Southern Africa Labour and Development Research Unit, University of Cape Town. Working Paper Series No. 51

Woolard, I., & Leibbrandt, M. (2010). *The evolution and impact of unconditional cash transfers in South Africa*. Southern Africa Labour and Development Research Unit, University of Cape Town. Working Paper Series No. 51

Woytinsky, W. (1940), '*Additional Workers on the Labor Market in Depressions*: A Reply to Mr. Humprey', Journal of Political Economy, 48, 735–40.

9. APPENDICES

Appendix A1

Estimated Coefficients of Partners Job Loss and Demographic Variables- Fixed Effects Full Model

VARIABLES	(1) Participation	(2) Primary Employment	(3) Increase in hours	(4) Total hours	(5) Prefer Employment
Partner recently lost job	0.020	0.058	-0.347*	2.753	-0.005
	(0.085)	(0.078)	(0.201)	(3.633)	(0.127)
Formal dwelling	0.052*	0.026	-0.132	1.485	0.072
	(0.030)	(0.024)	(0.095)	(1.851)	(0.051)
Number of children age 0-5	-0.030**	-0.020	0.001	0.643	-0.033
	(0.015)	(0.012)	(0.059)	(0.810)	(0.023)
Number of children age 6-12	-0.006	-0.015	-0.043	-0.788	0.003
	(0.014)	(0.012)	(0.051)	(0.854)	(0.023)
Number of children age 13-15	0.045**	0.000	-0.025	0.247	0.056*
	(0.017)	(0.013)	(0.058)	(0.840)	(0.031)
Number of children age 16-18	0.034**	0.013	0.024	0.871	0.051*
	(0.017)	(0.014)	(0.052)	(0.786)	(0.030)
Wife has no schooling	-0.018	-0.201*	-0.260	0.611	0.246
	(0.145)	(0.117)	(0.351)	(5.663)	(0.193)
Wife finished Primary school only	-0.077	-0.419***	-0.534	-2.592	0.400
	(0.193)	(0.155)	(0.570)	(8.231)	(0.280)
Wife finished Secondary School	0.010	-0.335*	-0.780	-3.921	0.554*
	(0.214)	(0.172)	(0.649)	(8.964)	(0.335)
Partner has no schooling	-0.145	-0.064	-0.640***	5.056	-0.102
	(0.115)	(0.096)	(0.228)	(5.472)	(0.137)
Partner finished Primary school only	-0.116	-0.107	-0.691**	11.840**	0.091
	(0.121)	(0.103)	(0.269)	(5.462)	(0.164)
Partner finished Secondary School only	-0.070	-0.098	-0.811***	11.140**	0.124
	(0.129)	(0.109)	(0.286)	(5.654)	(0.183)
Partner Age	-0.041*	-0.022	0.041	0.630	-0.0305
	(0.0231)	(0.0197)	(0.0741)	(1.501)	(0.0410)
Partner Age- Squared	0.000	0.000	-0.000	-0.008	-0.000
	(0.000)	(0.000)	(0.000)	(0.017)	(0.000)
Potential Experience	-0.010	-0.013	-0.097*	-1.342	-0.013
	(0.018)	(0.015)	(0.056)	(0.882)	(0.035)
Potential Experience-Squared	-0.000*	-0.000**	0.000	0.010	-0.000
	(0.000)	(0.000)	(0.000)	(0.012)	(0.000)
Pays Rent	0.029	-0.001	0.082	0.672	0.032
	(0.024)	(0.022)	(0.088)	(1.241)	(0.041)
Pays a Mortgage	0.039	0.025	0.061	-2.744*	0.049
	(0.036)	(0.039)	(0.108)	(1.419)	(0.123)
Constant	2.419***	1.613***	4.008*	37.710	1.455

	(0.615)	(0.521)	(2.218)	(35.000)	(1.015)
Observations	5,918	5,929	1,042	2,281	2,988
R-squared	0.027	0.017	0.041	0.070	0.049
Number of Married women	3,348	3,350	619	1,430	2,042

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Own calculations using NIDS wave 1-5

Appendix A2

Estimated Coefficients of Partners Static Unemployment Status and Demographic Variables- Fixed Effects Full Model

	(1) Participation	(2) Primary Employment	(3) Increase in hours	(4) Total hours	(5) Prefer Employment
VARIABLES					
Partner Unemployed	-0.040*	0.002	0.016	1.306	0.008
	(0.021)	(0.017)	(0.085)	(1.476)	(0.031)
Formal dwelling	0.016	0.010	-0.050	1.249	0.049
	(0.024)	(0.018)	(0.095)	(1.546)	(0.034)
Number of children age 0-5	-0.037***	-0.021**	-0.006	0.046	-0.026*
	(0.011)	(0.009)	(0.056)	(0.708)	(0.014)
Number of children age 6-12	-0.009	-0.012	-0.014	-0.847	-0.004
	(0.011)	(0.009)	(0.044)	(0.798)	(0.015)
Number of children age 13-15	0.031**	0.007	0.002	-1.020	0.020
	(0.014)	(0.010)	(0.052)	(0.844)	(0.021)
Number of children age 16-18	0.027*	0.014	0.041	-0.366	0.024
	(0.014)	(0.010)	(0.047)	(0.728)	(0.021)
Wife has no schooling	-0.044	-0.155*	-0.262	1.650	0.172
	(0.114)	(0.085)	(0.316)	(5.578)	(0.143)
Wife finished Primary school only	-0.047	-0.325***	-0.548	0.007	0.378*
	(0.156)	(0.121)	(0.533)	(7.681)	(0.220)
Wife finished Secondary School	0.064	-0.257*	-0.778	-0.985	0.604**
	(0.175)	(0.137)	(0.601)	(8.327)	(0.265)
Partner has no schooling	-0.065	-0.053	-0.616**	6.283	-0.014
	(0.083)	(0.057)	(0.263)	(5.185)	(0.083)
Partner finished Primary school only	-0.015	-0.065	-0.712**	11.600**	0.180*
	(0.088)	(0.067)	(0.298)	(5.034)	(0.107)
Partner finished Secondary School only	-0.018	-0.092	-0.808**	10.150*	0.197
	(0.097)	(0.076)	(0.313)	(5.225)	(0.128)
Partner Age	-0.031*	-0.016	-0.004	0.102	-0.043
	(0.018)	(0.016)	(0.059)	(1.237)	(0.0321)
Partner Age- Squared	0.000	0.000	-0.000	-0.001	0.000
	(0.000)	(0.000)	(0.000)	(0.014)	(0.000)

Potential Experience	-0.005	-0.013	-0.081	-0.620	0.006
	(0.015)	(0.013)	(0.050)	(0.796)	(0.029)
Potential Experience-Squared	-0.000**	-0.000**	0.000	0.005	-0.000
	(0.000)	(0.000)	(0.000)	(0.011)	(0.000)
Pays Rent	0.021	-0.008	0.103	0.036	0.003
	(0.021)	(0.018)	(0.078)	(1.203)	(0.035)
Pays a Mortgage	0.020	0.003	0.022	-2.151*	-0.000
Constant	1.920***	1.424***	5.091***	35.380	1.334
	(0.489)	(0.422)	(1.825)	(28.27)	(0.839)
Observations	7,773	7,789	1,270	2,799	4,151
R-squared	0.026	0.018	0.030	0.052	0.052
Number of Married women	4,036	4,040	724	1,691	2,615

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Own calculations using NIDS wave 1-5

Appendix A3

OLS Estimates for Wives' Participation and Employment Status by Partners Unemployment Experience

	Partner recently lost job		Partners static unemployment status	
VARIABLES	(1) Wife Participation	(2) Wife Employment	(3) Wife Participation	(4) Wife Employment
Partner recently lost job	0.036	-0.060		
	(0.050)	(0.048)		
Formal dwelling	-0.001	0.041**	0.021	0.042***
	(0.018)	(0.018)	(0.015)	(0.015)
Number of children age 0-5	-0.055***	-0.056***	-0.053***	-0.052***
	(0.008)	(0.008)	(0.006)	(0.006)
Number of children age 6-12	-0.016**	-0.019***	-0.015**	-0.016***
	(0.007)	(0.007)	(0.006)	(0.006)
Number of children age 13-15	0.017	-0.007	0.009	-0.006
	(0.011)	(0.011)	(0.010)	(0.009)
Number of children age 16-18	0.015	0.012	0.006	0.001
	(0.012)	(0.012)	(0.010)	(0.010)
Wife has no schooling	0.010	-0.025	0.020	0.012
	(0.041)	(0.042)	(0.033)	(0.032)
Wife finished Primary school only	0.067	0.010	0.077**	0.055
	(0.045)	(0.047)	(0.037)	(0.037)
Wife finished Secondary School	0.271***	0.312***	0.285***	0.346***
	(0.049)	(0.053)	(0.040)	(0.042)
Partner has no schooling	-0.063*	-0.058	-0.019	-0.001

	(0.036)	(0.040)	(0.028)	(0.028)
Partner finished Primary school only	-0.105***	-0.112***	-0.041	-0.040
	(0.036)	(0.040)	(0.028)	(0.029)
Partner finished Secondary School only	-0.122***	-0.129***	-0.077**	-0.060*
	(0.040)	(0.044)	(0.033)	(0.035)
Partner Age	0.013*	0.002	0.010	0.006
	(0.007)	(0.008)	(0.006)	(0.007)
Partner Age- Squared	-0.000**	-0.000	-0.000**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Potential Experience	0.014***	0.019***	0.014***	0.016***
	(0.003)	(0.003)	(0.003)	(0.003)
Potential Experience-Squared	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Pays Rent	0.016	0.029*	0.018	0.032**
	(0.015)	(0.017)	(0.014)	(0.015)
Pays a Mortgage	0.115***	0.179***	0.110***	0.189***
	(0.022)	(0.032)	(0.021)	(0.030)
Partner Unemployed			-0.025*	-0.042***
			(0.014)	(0.014)
Constant	0.492***	0.244	0.477***	0.071
	(0.156)	(0.164)	(0.136)	(0.142)
Observations	5,918	5,929	7,773	7,789
R-squared	0.078	0.100	0.093	0.104

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Own calculations using NIDS wave 1-5

Appendix A4
Estimated Coefficients for Changes in Wives' Unemployment Status by Wave- Full Model

VARIABLES	(1) change in unemployment status
Partner recently lost job	-0.010
	(0.058)
Formal dwelling	0.020
	(0.022)
Number of children age 0-5	0.009
	(0.010)
Number of children age 6-12	0.010
	(0.010)
Number of children age 13-15	-0.011

	(0.012)
Number of children age 16-18	-0.011
	(0.012)
Wife has no schooling	-0.164*
	(0.085)
Wife finished Primary school only	-0.173
	(0.131)
Wife finished Secondary School	-0.258*
	(0.146)
Partner has no schooling	-0.011
	(0.098)
Partner finished Primary school only	-0.046
	(0.102)
Partner finished Secondary School only	-0.052
	(0.107)
Partner Age	-0.001
	(0.015)
Partner Age- Squared	0.000
	(0.000)
Potential Experience	-0.003
	(0.013)
Potential Experience-Squared	-0.000
	(0.000)
Pays Rent	-0.0212
	(0.019)
Pays a Mortgage	-0.071**
	(0.113)
Constant	0.458
	(0.388)
Observations	5,932
Number of Married Women	3,351
R-squared	0.066

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Own calculations using NIDS wave 1-5

Appendix A5

Hausman Test for Fixed Effects vs Random Effects

```
                    b = consistent under Ho and Ha; obtained from xtreg
     B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test:  Ho:  difference in coefficients not systematic

           chi2(21) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                    =       38.77
         Prob>chi2 =      0.0104
```