Fertility in Australia: The Role of Policy and the Labour Market

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Declaration of Original Work

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

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Abstract

Demographic composition contributes to the development and economic stability of a country. Research into demographic issues allows policymakers to address potential economic and social challenges in both the intermediate, and long run. One of the most urgent issues under the banner of population or demographic studies is population stability, which is closely linked to fertility. This thesis explores recent developments in the fertility literature in the context of Australia. Specifically, this thesis focuses on individual preferences for child bearing, the determinants of the fertility decision and the effectiveness of policies implemented by the government aimed at improving total fertility. The first study highlights the impact of monetary incentives on the decision to bear children in light of the differential responses across the native and immigrant population. The second study analyses the role of unemployment and job stability on the fertility choice of mothers. The final study examines whether the quality-quantity trade-off exists for Australian families and explores the impact of siblings on the outcomes of children across the distribution of heterogeneous child ability. This thesis applies various methodologies that to address the issues of endogeneity that occur within the relationships we examine.

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Abbreviations

ABS – Australian Bureau of Statistics
AAI – Abadie, Angrist and Imbens
ATE – Average Treatment Effect
ATT – Average Treatment on the Treated
BMI – Body Mass Index
CDC – Centers for Disease Control and Prevention
DID – Difference-in-Difference
FE – Fixed Effects
HILDA – Household Income and Labour Dynamic Survey Australia
IV – Instrumental Variables
IV-QR – Instrumental Variables Quantile Regression
LSAC – Longitudinal Survey of Australian Children
NILF – Not In the Labour Force
OLS – Ordinary Least Squares
PPVT – Peabody Picture Vocabulary Test
QR – Quantile Regression
RE – Random Effects
RQ – Research Question
SC – Study Child
TFR – Total Fertility Rate
TUD – Time Use Data
WAI – 'Who Am I?' Test

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This thesis uses unit record data from Growing Up in Australia, the *Longitudinal Study of Australian Children.* The study is conducted in partnership between the Department of Social Services (DSS), the Australian Institute of Family Studies (AIFS) and the Australian Bureau of Statistics (ABS). The findings and views reported in this paper are those of the author and should not be attributed to DSS, AIFS or the ABS.

Chapter 1 Introduction

Population stability is central to sustainable long run economic growth. A sustainable increase in the labour force can improve human capital, drive innovation, and enhance productivity.[1] On the other hand, an ageing population is a key concern for policymakers and researchers and is subsequently at the forefront of research worldwide, as it poses a serious challenge to long-term economic stability. To address falling replacement rates, fertility levels have become the focus of population policies in many developed countries with declining populations.

Fertility issues have become a centrepiece in the discussion of Australia's future. The total fertility rate (TFR) has declined to a point significantly below the required replacement levels needed to sustain the economy in the long run. The replacement rate is the number of births per woman needed to maintain the current population level. If the TFR falls below the replacement rate, long-term population instability may occur if appropriate policy is not enacted to counteract the effects of an ageing population. This thesis explores the issues surrounding fertility levels and the fertility decision in Australia, by focussing on individual preferences for child bearing, the determinants of the fertility decision and the effectiveness of policies implemented by the government aimed at improving total fertility. The findings in this thesis can be used to provide guidance for policymakers responding to the issues of an ageing population, and may be useful for other developed countries experiencing similar problems.

1.1 Background

Since the 1980's, literature on fertility decisions has been expanding. From the determinants of those who bear children, to how to encourage families to have more or less children, the decision is not taken lightly. Each country faces its own challenges

[1] This is one aspect of long run growth. Investment in the current population's human capital also drives innovation and productivity.

surrounding the fertility decision. This thesis investigates three aspects of fertility economics yet to be explored in the context of Australia. This thesis begins by exploring the response of women to monetary incentives aimed at increasing the total fertility rate. This study consists of a natural experiment, which allows for the analysis of revealed preferences. The study analyses the overall effectiveness of policies implemented by governments to increase a countrys fertility rate. The second study specifically focuses on unemployment and job stability and their respective impacts on the fertility decision. The focus of this study is on low labour market participation rates for women with children and identifies the key labour market determinants that drive the fertility decision. The last study provides evidence of the quality-quantity trade-off. The quality-quantity trade-off is the main theory economists use to explain the observed decreasing fertility rates across developed nations. However, there is limited empirical evidence regarding how the trade-off plays out in Australia, particularly with respect to the fertility decision. The three studies are strongly interrelated and together can inform policymaking on population issues.

This thesis also contributes to the literature through the application of selected econometric methodologies that address endogeneity issues which are problematic in the fertility literature. We apply methods from public policy and labour economics such as difference-in-difference analysis, propensity score matching and quantile treatment effects to help further research in the fertility literature.

1.2 Key Research Questions

Study 1

The first study focuses on the implementation of the 'baby bonus' provided by the Australian government. There has been a significant amount of discussion in academia and the political arena on the effectiveness of pro-natal policies and their ability to increase fertility rates. Whilst many countries use a system of ongoing financial or social incentives to encourage child-bearing, only a few have employed pro-natalist policies like the baby bonus which provides a once off payment for having a child. The first research question relates to whether the bonus achieved its main aim: an increase in the fertility rate. Our analysis specifically looks at the effects before and after the introduction of the baby bonus by the Australian government.

RQ1: Does the use of family payments increase fertility rates?

This analysis raises the question: which groups within the population are likely to respond to monetary incentives for child bearing? Given that Australia has a significant immigrant population, it is important to examine whether the response to monetary incentives for immigrant and Australian born (native) women may be different.

RQ1a: Which group is most likely to respond to the implementation of monetary incentives aimed at increasing fertility?

RQ1b: Do immigrants and natives react differently to such payments?

RQ1c: If such a difference exists, how can we explain the different reactions?

We develop a theoretical model to express these differences, which are driven by fertility norms an individual may be exposed to. This thesis also explores the outlined research question using an empirical framework.

Study 2

The second study investigates the effect of job instability on the fertility decision. The role of unemployment in the fertility decision has been found to have a both a negative and positive effect on individual and total fertility levels, leading to inconsistencies in the literature. This issue should therefore be examined on a case-by-case basis, as the social and economic conditions in each nation may be different. These economic and social differences can have a diverse implication on the fertility decisions occurring within a nation, at both the individual and national level. This thesis investigates the role of employment stability on the decision to have children in the context of Australia. This analysis will add to the relevant literature on the role of employment stability, which has yet to be investigated within the Australian economy. The main research question of this study is:

RQ2: What is the effect of employment instability on the fertility decisions of Australian mothers?

Study 3

The third study explores the quality-quantity trade-off in Australia. The quality-quantity trade-off refers to the decision to have more children, or invest in current children to improve their 'quality', which is measured through child outcomes. This study focuses on analysing the impact of family size on child quality through an analysis of this trade-off. There is a distinct lack of consistent empirical evidence to support the quality-quantity trade-off theory. Most of the existing literature focuses on the 'average' effect of family size on the outcomes of a child or the level of investment in quality, which may explain the inconsistent results. This thesis addresses this problem by conducting a distributional analysis across child outcomes. Therefore, the principal research question for this study is:

RQ3: **What is the distributional effect of family size on child quality measured through child outcomes?**

This analysis is followed by two additional research questions, based on existing themes within the quality-quantity trade-off literature:

RQ3a: **How does an increase in the number of children in a household affect child outcomes?**

RQ3b: **Does the number of children in a household affect the probability of private schooling or parental time investment?**

1.3 Thesis Outline

The rest of this thesis is structured in the following manner. The second chapter reviews the relevant literature. The third chapter highlights the impact of monetary incentives on the decision to bear children in light of the differential responses across the native and immigrant population. The fourth chapter analyses the role of unemployment and job stability on the fertility choice of women. The fifth chapter examines whether the quality-quantity trade-off exists for Australian families and explores the impact of siblings on the outcomes of children across the distribution of heterogeneous child ability. The final chapter discusses the results of the three studies contained in this thesis and outlines overall conclusions and limitations, with recommendations for future research.

Chapter 2 Literature Review

2.1 Introduction

Fertility has become an increasingly important topic with respect to both population policy and labour economics. Total fertility rates (TFR) have decreased significantly in developed countries over the past two decades (Adsera, 2011; Kreyenfeld, 2005). As a result, most developed countries are experiencing the strain of an ageing population on the stability of the economy (Adsera, 2004).

Australia is not exempt from the decline in the total fertility rate (see *Table 2.1*); although Australia has been overlooked in many academic economic analyses due to being a smaller nation in terms of population.[2] As seen in *Table 2.1*, the total fertility rate reached a minimum in Australia in 2003, and has been steadily increasing. However, the TFR has still not reached the optimal level. The increasing TFR observed over the past decade is likely due to the Australian government actively implementing pro-natal policies aimed at improving the TFR. It may be suggested that without such policies, the TFR may have continued to decline. This thesis aims to explore the issues surrounding fertility in the context of Australia and analyse the effectiveness of policies implemented by the Australian government to address the decline in fertility.

[2] There have been numerous studies conducted by the Australian Productivity Commission; however, there is a strong focus on the ageing population issue and a less significant focus on fertility.

Table 2.1: Total Fertility Rate (TFR) for OECD Nations 1970-2010

	1970	**1980**	**1990**	**2000**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Australia	2.86	1.89	1.90	1.76	1.76	1.75	1.76	1.79	1.82	1.92	1.96	1.90	1.89
Austria	2.29	1.65	1.46	1.36	1.39	1.38	1.42	1.41	1.41	1.38	1.41	1.39	1.44
Belgium	2.25	1.68	1.62	1.67	1.65	1.67	1.72	1.76	1.80	1.82	1.85	1.86	1.87
Canada	2.33	1.68	1.71	1.49	1.50	1.53	1.53	1.54	1.59	1.66	1.68	1.67	..
Chile	3.95	2.72	2.59	2.05	1.94	1.89	1.85	1.84	1.83	1.88	1.92	1.94	..
Czech Republic	1.91	2.10	1.89	1.14	1.17	1.18	1.23	1.28	1.33	1.44	1.50	1.49	1.49
Denmark	1.95	1.55	1.67	1.77	1.72	1.76	1.78	1.80	1.85	1.85	1.89	1.84	1.88
Estonia	..	2.02	2.05	1.39	1.37	1.37	1.47	1.50	1.55	1.63	1.65	1.62	1.63
Finland	1.83	1.63	1.79	1.73	1.72	1.76	1.80	1.80	1.84	1.83	1.85	1.86	1.87
France	2.48	1.95	1.78	1.87	1.86	1.87	1.90	1.92	1.98	1.96	1.99	1.99	1.99
Germany	2.03	1.56	1.45	1.38	1.34	1.34	1.36	1.34	1.33	1.37	1.38	1.36	1.39
Greece	2.40	2.23	1.40	1.26	1.27	1.28	1.30	1.33	1.40	1.41	1.51	1.52	1.51
Hungary	1.97	1.92	1.84	1.33	1.31	1.28	1.28	1.32	1.35	1.32	1.35	1.33	1.26
Iceland	2.81	2.48	2.31	2.08	1.93	1.99	2.03	2.05	2.07	2.09	2.14	2.22	2.20
Ireland	3.87	3.23	2.12	1.90	1.98	1.98	1.95	1.88	1.90	2.03	2.10	2.07	2.07
Israel	..	3.14	3.02	2.95	2.89	2.95	2.90	2.84	2.88	2.90	2.96	2.96	3.03
Italy	2.43	1.68	1.36	1.26	1.27	1.29	1.33	1.32	1.35	1.37	1.42	1.41	1.41
Japan	2.13	1.75	1.54	1.36	1.32	1.29	1.29	1.26	1.32	1.34	1.37	1.37	1.39
Korea	4.53	2.82	1.57	1.47	1.17	1.18	1.15	1.08	1.12	1.25	1.19	1.15	1.23
Luxembourg	1.98	1.50	1.62	1.78	1.63	1.62	1.66	1.62	1.64	1.61	1.60	1.59	1.63
Mexico	6.77	4.97	3.43	2.77	2.46	2.34	2.25	2.20	2.17	2.13	2.10	2.08	2.05
Netherlands	2.57	1.60	1.62	1.72	1.73	1.75	1.73	1.71	1.72	1.72	1.77	1.79	1.80
New Zealand	3.17	2.03	2.18	1.98	1.89	1.93	1.98	1.97	2.01	2.17	2.18	2.12	2.15
Norway	2.50	1.72	1.93	1.85	1.75	1.80	1.83	1.84	1.90	1.90	1.96	1.98	1.95
Poland	2.20	2.28	1.99	1.37	1.25	1.22	1.23	1.24	1.27	1.31	1.39	1.40	1.38
Portugal	2.83	2.18	1.56	1.56	1.47	1.44	1.40	1.41	1.36	1.33	1.37	1.32	1.37
Slovak Republic	2.40	2.31	2.09	1.29	1.19	1.20	1.24	1.25	1.24	1.25	1.32	1.41	1.40
Slovenia	2.21	2.11	1.46	1.26	1.21	1.20	1.25	1.26	1.31	1.31	1.53	1.53	1.57
Spain	2.90	2.22	1.36	1.23	1.26	1.31	1.32	1.34	1.38	1.39	1.46	1.39	1.38
Sweden	1.94	1.68	2.14	1.55	1.65	1.72	1.75	1.77	1.85	1.88	1.91	1.94	1.98
Switzerland	2.10	1.55	1.59	1.50	1.39	1.39	1.42	1.42	1.44	1.46	1.48	1.50	1.54
Turkey	5.00	4.63	3.07	2.27	2.17	2.09	2.11	2.12	2.12	2.15	2.15	2.07	2.03
United Kingdom	2.43	1.90	1.83	1.64	1.64	1.71	1.77	1.79	1.84	1.90	1.96	1.94	1.98
United States	2.48	1.84	2.08	2.06	2.01	2.04	2.05	2.05	2.10	2.12	2.08	2.00	1.93
OECD Average	2.76	2.18	1.91	1.68	1.63	1.63	1.65	1.65	1.68	1.71	1.75	1.74	1.74

Source: OECD (2013)

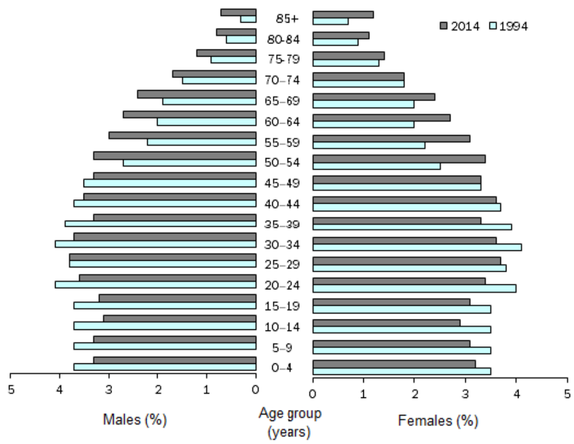


Figure 2.1: Australian Population Distribution by Age and Sex

Source: Australian Bureau of Statistics (2014)

Population ageing and decreasing fertility rates are interrelated. Like most developed countries, Australia's population is ageing as a result of sustained low fertility and increasing life expectancy (Australian Bureau of Statistics, 2014). *Figure 2.1* shows the process of an ageing population through a comparison of the distribution by age and sex in 1994 against the distribution in 2014. The percentage of people in working ages (below 50 was higher in 1994 than that in 2014 while the opposite is true for older age groups (above 50). This implies there is an increasing dependency on healthcare, and social welfare systems, which is a serious concern for policymakers.

An ageing population can have a significant impact on many aspects of government policy and planning including; healthcare, the working-age population, the provision of housing and demand for skilled labour (Australian Bureau of Statistics, 2014). Addressing issues surrounding decreasing fertility rates may help alleviate some of the implications of an ageing population. However, increasing the TFR is not the only method of addressing the ageing population issue, others being immigration, increasing human capital and encouraging innovation and productivity.

This chapter discusses the literature relevant to fertility. This area of population economics is wide and encompasses many subcategories of population and demographic literature. Therefore, this chapter will give a brief overview of fertility issues and focus predominantly on the literature for the three key focus areas; (1) fertility and monetary incentives, (2) the role of unemployment and job stability, and (3) the quality-quantity trade-off.

2.2 Fertility

Empirical evidence suggests that many industrialised countries have been experiencing persistent low fertility rates, with no exact or definitive underlying explanation.[3] For example, the total fertility rate in the US was 2.1, whereas in Japan it was 1.39 in 2012 (World Bank, 2012). However, the literature has reached a consensus suggesting that the persistent low fertility rates may be due to the dynamic transition of fertility, driven by changes in higher educational attainment, decreasing infant mortality, increased investment in child quality and increased labour force participation of women in the workplace (Caldwell & Schindlmayr, 2003). While many studies take these factors into account, the dynamic aspects of fertility are difficult to capture and empirical evidence is mixed, suggesting there is scope for further investigation.

One of the key determinants of fertility is educational attainment. Several studies have found strong links between education and the postponement of fertility. Women who have achieved a higher level of education tend to postpone childbearing due to increased opportunity costs and human capital depreciation (Klesment & Puur, 2010; Billingsley, 2011). Similarly, Preston & Hartnett (2008) found that in America, educational attainment resulted in postponement of childbearing. However, the TFR in the US is greater than many other developed countries; these studies suggest higher education may be contributing to falling fertility rates in many other countries. Overall, the literature suggests educational attainment contributes significantly to the fertility choices of individuals.

Educational attainment is highly correlated with female labour force participa-

[3] See *Table 2.1* for OECD total fertility rates.

tion. The literature has shown that labour force participation is a key determinant in the fertility decision (Gronau, 1973; Rosenzweig & Wolpin, 1980; Schultz, 1990; Angrist & Evans, 1998). However, there is an endogenous aspect that links the fertility decision and the labour market choice. In many instances, having a child usually requires at least a brief exit from the labour market, and an exit from the labour market can lead to an increase in fertility intentions. This results in an issue of causation between the two decisions as they may not be mutually exclusive. Studies that have explored this endogenous relationship have shown that an increase in fertility leads to a decline in mothers' labour force participation and an increase in unpaid work (see for example Angrist & Evans, 1998; Frenette, 2011a).

Literature shows that fertility is important for the long-term growth and sustainability of an economy (McDonald, 2006). A sustainable population is a key element in promoting long term economic growth, and has been a key initiative of the Australian government and many other governments around the world (Parliament of Australia, 2013). Many governments have employed policies that target replacement rates and incentivise the population to have children. The replacement rate is the average number of children each woman needs to have to maintain the current population. In Australia, the government implemented a 'baby bonus' as an incentive to improve the total fertility rate (Risse, 2010). As this thesis focuses on fertility and the role of policy, this baby bonus can be used to examine the role of incentives on fertility.

2.3 Fertility and Welfare Payments

The 'baby bonus' is the first Australian government policy specifically targeting the fertility rate at a national level, through *direct* cash payments. A significant amount of taxpayer dollars were committed to incentivise families to have children, by reducing the direct cost of having a child (Drago et al., 2011). The goal was to support the Australian economy in the long run through the alleviation of problems associated with an ageing population. The use of monetary incentives to motivate individual behaviours is not new to economics. The implementation of monetary incentives by policymakers to motivate families in the long term rearing of their children has been prevalent within the fertility literature in recent times and is driven by the need to address the ageing population (Gauthier & Hatzius, 1997). As a result, economists have been attempting to determine whether the implementation of such programs encourages higher levels of fertility, or whether they are an inefficient use of government resources.

There are a significant number of studies that compare and contrast alternative government support systems and their effects on fertility decisions (Gauthier & Hatzius, 1997; Milligan, 2005). More recent studies have become highly focused on the financial incentives enacted by governments. Laroque & Salani (2008) examined financial incentives in France, employed through the use of tax benefits on both the fertility decision and labour market outcomes. They found that the response of potential parents relied significantly on the age of the parent and the age of existing children. Milligan (2005) also explored the effects of tax reforms on parity specific fertility rates including first, second, third, and higher order births of children, finding a strong positive effect of tax reforms on the fertility decision.[4] Overall these studies found that monetary incentives had a statistically significant effect on the fertility decision.

Empirical evidence suggests that individuals who have one child may be more likely to have a second or third child after the introduction of monetary or financial incentives. Families who are deciding whether or not to have their first child may respond differently to financial incentives or welfare reforms than those having additional children. Therefore, there is an issue of parity based on the number of children in existence before the implementation of fertility policies. Studies such as Azmat & Gonzlez (2010) and Duclos et al. (2001) analysed the effects of financial or

[4]Parity refers to the order in which children are born. The parity specific fertility rate is the number of births of specified birth order (first child, second child, etc.) to the number of women who have borne one child less than the number indicated by the specified birth order. See Kippen & others (2003) for more detail of parity specific birth rates in Australia.

monetary incentives on the fertility rate in the form of tax-transfer benefits. Such studies have provided evidence that the implementation of taxation policies results in both increased overall fertility, increased second order births and increased labour force participation, across the board.

Within the context of Australia, a number of studies have focused on the determinants of fertility, bargaining power, and childbearing intentions of Australian women (see Yu, 2006; Risse, 2010; Fan & Maitra, 2010; Sinclair et al., 2012). Monetary payments have been found to increase the bargaining power of women in childbearing decisions, and as a result of positive fertility intentions, there may be an increase in realised fertility. Although educational attainment has been shown to result in a postponement of fertility, the expectations of fertility or future fertility intentions are higher for those with a higher level of education (Risse, 2010). Furthermore, Gans & Leigh (2009) found parents postponed births where possible in order to receive the bonus, with the number of births dipping sharply before the policy commenced. However, monetary incentives may not be sufficient for working women to change their labour market decision in preference of childbearing (Drago et al., 2011). Therefore, there is evidence that suggests fertility intentions increase with the implementation of the baby bonus; however, no analysis has been undertaken regarding the impact on realised fertility at the individual level.

Our first study aims to expand this literature on monetary incentives by explaining differentials between fertility rates for the purpose of policy analysis and future policy implementation. The study also aims to extend the literature with respect to the immigrant and native populations in Australia, in an attempt to consolidate the literature on welfare benefits and immigrant-native fertility discrepancies. This analysis will result in important policy implications for Australia. Immigrants and native women have been found to have different responses to monetary incentives within the welfare literature (see for example Borjas, 1999; Kaestner & Kaushal, 2005; Dustmann et al., 2005). The next section discusses the literatre relating to fertility and immigration.

2.3.1 Fertility and Immigration

Immigration is known to be a key driver of economic and population growth in many developed countries. Immigration can be used to address issues revolving around an ageing population (Gauthier & Hatzius, 1997). With 28 per cent of the Australian population born overseas, immigration plays an important role in the decisions made by policymakers and has widespread implications (Australian Bureau of Statistics, 2012). As an ageing population leads to a reduced labour force, many countries rely on immigration to provide additional labour in the economy. Overall, immigration can be used to increase labour force participation levels and/or change the composition of a country's labour market (Dustmann et al., 2005).

Research investigating the impact of immigration on the host country's economy has strongly focused on the labour market outcomes (see Borjas, 2003; Dustmann et al., 2005). Recently research has branched out to incorporate the impact of immigration beyond the scope of the labour market; including the use of production, technological processes (Lewis, 2005; Ottaviano et al., 2010), capital accumulation and productivity (Ortega & Peri, 2009), and social welfare (Dustmann et al., 2005). Furthermore, studies suggest that immigration assists job creation and increases demand in an economy (Borjas, 2003). Consequently, immigration can be considered an important factor that impacts on productivity and technological processes leading to economic growth in the long run (Friedberg & Hunt, 1995).

Immigrants can be fundamentally different from native individuals in the context of many potential outcomes, including employment and fertility (Borjas, 1999; Mayer & Riphahn, 2000; Andersson, 2004; Camarota, 2005; Fernández & Fogli, 2006; Livingston & Cohn, 2012). Furthermore, social norms of immigrants differ significantly from natives, and are important in the decision to have children. Consequently, social norms can result in an excess or lack of fertility that can be exploited for policy purposes. That is, if fertility is higher (or lower) for specific immigrant groups than the level of fertility seen in the native population, monetary incentives can be used to change their behaviour. This excess or lack of fertility may be used to a country's advantage and add to the total fertility rate allowing a nation to effectively achieve replacement rates (Mayer & Riphahn, 2000; Woldemicael & Beaujot, 2012). The aim of such policies is to either promote or suppress fertility assimilation of immigrants.[5] In Australia, there is evidence that shows immigrants assimilate differently depending on factors including, but not limited to, country of origin, and religion (Abbasi-Shavazi & McDonald, 2000). Therefore, fertility assimilation of immigrants is an important factor policymakers must consider when implementing social programs to modify individual fertility behaviour.

Dustmann et al. (2005) suggested that immigrants might be more dependent on public services, such as welfare payments in the short term. However, in the case of pro-natal policies such as the 'baby bonus', this may be beneficial. Therefore policymakers can use the selection process for immigration into Australia to their advantage by incentivising those immigrants who have high levels of fertility to retain their norms and encourage those with low fertility norms to have more children through the use of pro-natal policies such as the baby bonus. Employing a policy that constructively uses such characteristics may lead to an increase in the total fertility rate, moving towards the replacement levels which are important for long run economic growth.

Kaestner & Kaushal (2005) explored the effect of welfare reform in the United States and employment decisions of immigrants and natives. The study used a difference-in-difference (DID) method, exploiting the fact that the reforms were specifically aimed at low-educated immigrant and native, married and unmarried women. This particular reform was aimed at reducing welfare dependency, an important issue facing high welfare nations, including Australia. The study found that immigrant women made different decisions to native women in response to welfare reforms. Additionally, Borjas & Hilton (1995) and Borjas (1999) also found that immigrants responded differently to welfare reforms than native individuals, specifically

[5] Fertility assimilation refers to the adjustment of immigrant fertility choices to reflect or assimilate to the fertility levels observed in the host country.

with respect to welfare magnets.[6] These studies provide an important foundation for our study and motivate our expectation that immigrants and natives have differing responses to the introduction of a baby bonus. The first study addresses this research gap by determining whether immigrants are driving the increase in fertility levels seen after the introduction of the 'baby bonus'.

In this section we explored the literature with respect to fertility, monetary incentives and immigration. There is a dearth of literature that combines all three of aspects this literature together. In general, we find that monetary incentives directed at increasing fertility could be effective in increasing the level of fertility at both the individual and aggregate level. However, there is a distinct lack of evidence in Australia over the direct impact of the 'baby bonus' as a monetary incentive for improving fertility. We therefore explore the implementation of the baby bonus to determine the impact at the individual level. The literature regarding immigration and social welfare payments shows a positive effect of monetary payments on the decisions of immigrants compared to those of natives, in terms of employment and relocation decisions. However, the differences in these two subpopulations have not been analysed in the context of the fertility decisions. This thesis specifically links these aspects of immigrant-native fertility and public policy together to determine the effects of the implementation of the baby bonus on the individual level of fertility for Australian families.

2.4 Fertility, Unemployment and Stability

This section discusses the literature which relates fertility to labour market participation, which is the focus of the second study in this thesis. Economic and social conditions are known to impact on the decision to bear children, but the exact relationship is still indeterminate due to the complexity of the fertility decision. Classical economic theory suggests a counter-cyclical relationship between fertility

[6] A welfare magnet is used to describe the geographical relocation of low-income individuals to secure higher welfare benefits.

and unemployment rates should be expected. That is, during times of high (low) unemployment, women should have more children as opportunity costs are low (high) (see Engelhardt & Prskawetz, 2004; Adsera & Menendez, 2009; Sobotka et al., 2011; Del Bono et al., 2011). However, more recent studies over the past decade from Europe, have refuted this hypothesis, suggesting a negative relationship between unemployment and earnings, with fertility of individuals (Schmitt, 2008; Kogel, 2004; Adsera, 2004). That is, when more people are employed, women are more likely to have children. Whilst the pro-cyclical relationship between fertility and unemployment is observed in Australia at the aggregate level, very little work has been done on the individual level of unemployment and the effects on the fertility decision.

Recent studies mainly focus on the effect of employment uncertainty on the decision to bear children. Studies have not adequately developed a reason for the reversal of the relationship between unemployment and fertility observed in many developed countries (Castles, 2003; Kogel, 2004). However, it has been suggested that it is not unemployment that plays the central role, but economic instability and uncertainty about the future (Santarelli, 2011; Vignoli et al., 2012). Although a few key papers have explored this relationship between stability and fertility, it has not been investigated in the context of the Australian economy. Furthermore, most studies that link unemployment to the fertility decision in an Australian context use hazard ratio models (see for example Fan & Maitra, 2010). However, these models do not consider the endogenous connection of fertility and unemployment derived from the underlying economic theory we wish to test. This thesis contributes to the literature through the analysis of the endogenous relationship between fertility and employment, and argues that it is not the level of employment that matters in the childbearing decision, but the stability of a woman's job or her employability.

Empirical studies of preferences and fertility have investigated both the level of desire for children and the impact of unemployment and income on the decision to bear children (Pailhe & Solaz, 2012). Studies have shown that if the female's level of desire for children is high, there is an increased chance of fertility (Fan & Maitra, 2010). Additionally, the literature suggests that whilst the woman's job stability and income will have an impact on the level of fertility, it is the male partner's economic uncertainty, income and job stability that plays a central role in the decision (Pailhe & Solaz, 2012; Vignoli et al., 2012; Schmitt, 2012). The economic stability of a potential mother plays a lesser role in the fertility choices of families. Overall, male economic uncertainty is the only factor for which there is a clear consensus of the impact of employment outcomes of men on the level of fertility (Vignoli et al., 2012).

Schmitt (2012) suggested that when experiencing unemployment or unstable employment, the labour market outcomes of men hindered the fertility decision of a family significantly. This was consistent for men in the UK and Germany. Such results were reiterated by Kravdal (2002); Berninger et al. (2010) and Vignoli et al. (2012). Furthermore, these studies suggest that male earnings and job stability have a strong effect on the decision. This is especially the case if the employment of the male is a temporary contract or casual employment. That is to say, if the potential father is in a fairly stable labour market position, there is an increase in the probability of the female partner's childbearing.

Research suggests that when unemployment is low and job stability is high, fertility levels tend to centre near the replacement rates required for a sustainable population, in favour of the pro-cyclical fertility theory. This is exhibited in most Northern European countries (Schmidt, 2008; Hondroyiannis, 2010; Kreyenfeld et al., 2012). Whereas if unemployment is relatively high or employment consists predominantly of temporary contract jobs, fertility rates are substantially low and the opposite result is found (Adsera, 2004; Kreyenfeld et al., 2012; Santarelli, 2011). Therefore, the stability of a potential parent's employment plays a significant role in the fertility decision.

Del Bono et al. (2011), showed that the reduction in fertility was not due to the income loss generated by unemployment, but arose due to displaced workers undergoing a career interruption, resulting in a significant loss of firm specific human capital. They suggested that the birth of a child also reduced the accumulation of firm specific human capital. Therefore, the fertility decision is strongly tied to the impression of career interruption or job stability, such that it creates a disincentive for women with high education or qualifications to have children.

As discussed above, the current literature suggests that a change in the level of fertility is associated with changes in the labour market outcomes of potential mothers. The second study in this thesis aims to explore the issue of employment stability and job displacement on the fertility decision of Australian women using the Household, Income and Labour Dynamics in Australia (HILDA) Survey. At present, the literature has not developed a clear and adequate explanation for why there has been a shift towards the pro-cyclical theory of fertility. This thesis aims to provide empirical evidence in support of the pro-cyclical fertility theory in the Australian context and explore the relationship between fertility and job security. We postulate that employment stability plays the key role in the fertility decision. Due to the endogenous nature of fertility, we use instrumental variables and propensity score matching.

2.5 The Quality-Quantity Trade-Off

In economic theory there is a model that explains the shift in fertility preferences, known as the quality-quantity trade-off. The quality-quantity trade-off theory describes the decision of families to have additional children, or to increase expenditure on current children to improve child 'quality'. Improved child quality refers to enhanced child outcomes which parents invest to provide a potentially better future for the child. Improved outcomes include, but are not limited to educational and labour market outcomes. Many developed economies have experienced a shift from 'quantity' to 'quality' resulting in the deterioration of total fertility rates, as the number of births decreased (see Becker, 1992; Becker & Tomes, 1976; Becker et al., 1960). It has been postulated that this change is a consequence of post-World War II increases in relative income that have allowed for an increase in investment in child quality (Becker, 1992). There are many ways the outcomes of each child can be improved by the decision of a family to invest in the quality of a child. The investment in each individual child can range from spending on education through private schooling or tutoring, to providing a child with extra curricula activities or individual space. Although a 'higher quality' child is not necessarily superior, higher quality children tend to have improved educational and labour market outcomes. However within the relevant literature, empirical evidence is inconclusive on the nature of this trade-off, leaving scope for further inquiry.

Literature suggests that, coupled with decreasing mortality rates, there has been a reduction in the need for larger families, increasing the endowment bestowed to each child (Becker & Barro, 1988; Kalemli-Ozcan, 2002; Soares, 2005; Doepke, 2005). However, the actual return on the increase in child quality through investment is not clear within this literature, as it tends towards using anecdotal evidence and achieves somewhat erratic results, which strongly depend on birth order effects and the economic environment in the country of analysis. Furthermore, the inconsistency in the empirical evidence for the quality-quantity trade-off is a consequence of the inability to measure the impact of inputs on child outcomes. The child quality resulting from the investment decision is treated like a production function in which the parents allocate inputs, such as educational investment and parenting time, to improve child quality. However, child outcomes prove difficult to measure due to the endogeneity involved in the decision to have additional children or invest in current children. Moreover, it is difficult to determine which inputs affect which outputs as there are numerous factors involved in influencing child outcomes, creating further empirical inconsistencies in the literature.

There are two core areas on which the quality-quantity trade-off literature is focused; (1) the expected negative association between family size and investment in children, and (2) the effect of additional births on the cognitive development or schooling outcomes of children in the family. Frenette (2011b) found that an unexpected increase in family size, which is associated with the presence of multiple births, reduced the probability of attending a private or non- religious school. Angrist et al. (2010) found that when using multiple instruments, instrumental variable (IV) estimation showed no evidence of a negative association of family size on child outcomes. Millimet & Wang (2011) who also investigated the impact of household size on the entire distribution of child outcomes, found no evidence of a quality-quantity trade-off across the distribution or on the average, with the exception lying on the tails of the distribution of health indicators of child outcomes. These studies did not find significant evidence of a quality-quantity trade-off, but they did find some information in the extremes. Therefore additional investment in a child may simply exert little or no influence on the measured child output or child outcomes, or there is an issue of disentangling the causal relationship. This problem of causality arises from the difficulty in determining the specific inputs used to improve child quality, as well as the associated outputs from investment in child quality.

In addition to measurement issues, the relationship between family size and child investment is highly endogenous. An increase in family size should reduce parental investment per child, and result in a decrease in child quality; but parental investment may decrease due to the decision to increase in the number of children (Angrist et al., 2010). Many studies use IV and other such econometric methods of estimation to adjust for this bias or endogeneity in the quality quantity trade-off (for example Angrist et al., 2010; Glick et al., 2007; Black et al., 2005; Angrist & Evans, 1998). Given that these methods focus on the average result for all children within the sample, the distribution of outcomes may be skewed.

The final study in this thesis explores the issue of this quality-quantity trade-off in the context of Australia, specifically focusing on educational outcomes and policy implications. We focus on the distributional effect of additional children in a household on child quality. This is the main contribution of this study, as there is an expectation that additional children may have a diverse impact on existing children due to heterogeneity in child ability. The measures of ability used in this theses are those currently used in the literature: health and educational outcomes. Using a distributional analysis we will be able to provide a clearer result than the existing studies which primarily focus on the effects on the average child.

2.6 Conclusion

This section explored the literature relevant to the three aspects of fertility we investigate in the context of this thesis. Firstly, the literature in relation to fertility, immigration and monetary incentives was discussed. A research gap was identified in the literature with respect to how fertility incentives can be used to incentivise immigrant and native behaviour. This research gap will be incorporated into the analysis of the 'baby bonus' provided by the Australian government.

Secondly, we discussed the roles of labour market participation, unemployment and job stability in the fertility decision. The literature shows that female unemployment has little impact on the fertility decision of women. Few studies have suggested that female job and employment stability plays a more important role than female unemployment. The second study contributes to the literature through the analysis of unemployment, employment and perceived job security in the context of Australia.

Finally, the main theory used to explain the decrease in total fertility rates; the quality-quantity trade-off was discussed. We identified key methodology limitations in the literature resulting from its focus on the average effect of an increase in family size on child quality, measured by child outcomes. The final study in this thesis contributes to the literature through an analysis of the distributional effects of additional children on a child's outcomes.

Chapter 3 Study 1: The Impact of the Baby Bonus: An Immigrant vs Native Perspective

3.1 Introduction

Overall, the rapid decrease in fertility rates has caught the attention of policymakers around the world due to issues surrounding population decline (Adsera, 2011). The lack of consensus with respect to microeconomic theory and empirical findings in the area of monetary incentives and fertility makes it a prime area of study for both developments of economic theory and policy implications. Furthermore, there is a dearth of literature that specifically targets Australia's fertility issues. This study aims to explore incentive payments and fertility interactions in an Australian context. Additionally, the study examines perceived fertility differences between natives and immigrants which has not been considered in any significant manner in the last decade. This analysis is critical for Australia due to the high level of immigration into the country. As both immigration and fertility are dynamic processes that affect the demographic composition of a nation, there may be an important unexplored relationship between the two mechanisms.

This chapter develops a model to explain fertility differentials between immigrants and natives, followed by an empirical investigation. In particular, we evaluate the differences in the responses to the incentive between immigrants and natives using theoretical and empirical models. The chapter concludes with a discussion of the relevant policy implications.

3.2 Theoretical Model

In this section we develop a simple theoretical model of fertility to explain why responses to fertility incentives may differ significantly among natives and immigrants. The aim is to highlight the role of cultural norms in shaping the fertility preferences of natives and immigrants, and characterise the optimal responses to fertility incentives, such as a 'baby bonus', across these groups.

The literature reviewed in *Section 2.3.1* provides evidence that suggests immigrants and natives differ with respect to many decisions and preferences. Moreover, research shows immigrants respond more to monetary incentives compared to natives with similar demographics (see for example Borjas, 1999; Brewer et al., 2011). Many studies have highlighted the differences in observed fertility between natives and immigrants (see for example Mayer & Riphahn, 2000; Andersson, 2004; Camarota, 2005; Fernández & Fogli, 2006; Livingston & Cohn, 2012). Within this literature, it has been established that cultural norms influence the fertility decision of immigrants (Fernández & Fogli, 2006). Similarly, studies suggest immigrant childbearing norms in the home country are a key determinant in the higher fertility of immigrants in the host country and explain a significant proportion of the differentials seen between immigrant and native fertility (Cygan-Rehm, 2011).[7] Therefore, host country cultural norms for fertility may be considered a key driver of the observed fertility differences between the immigrant and native populations (Cygan-Rehm, 2011).

Three hypotheses explain the fertility behaviour of immigrants; socialisation, selection, and adaptation.[8] The model developed in this study focuses on the socialisation and adaptation hypotheses.[9] The adaptation hypothesis focuses on the impact

[7] The home country is the immigrants country of origin, whereas the host country is where they reside.

[8] Two additional hypotheses, known as the interrelation and disruption hypotheses, can also be used to describe the fertility choice of immigrants. These hypotheses focus on the decision to postpone fertility, which is not part of the decision process this study investigates. Further detail can be found in Schmid & Kohls (2009).

[9] The selection hypothesis is not the focus of this model as the selection hypothesis suggests immigrants self-select into countries that have similar underlying fertility preferences to the immigrant.

of the host country on fertility norms as the predominant force on immigrant fertility decisions through observed social interactions (Schmid & Kohls, 2009; Kahn, 1994). The socialisation hypothesis suggests that migration does not affect fertility as the cultural norms in the home country dominate in reproductive behaviour (Schmid & Kohls, 2009). Given the outlined hypotheses, this model incorporates both social and cultural norms into the development of the theoretical model.

We define social norms as the norms observed in a social frame of reference. Cultural norms are norms embedded in preferences from experience in the home country. Social and cultural norms do not differ for natives. For immigrants, the social norm represents the norm prevailing in the host country whereas the cultural norm is the norm experienced from their experience in the home country.

We argue that the impacts of social and cultural norms on fertility decisions are heterogeneous in nature. Following this, different immigrant groups are expected to have diverse cultural norms, given their country of birth. For example, immigrants from high fertility countries such as North and Central Africa tend to exhibit higher fertility norms than those from East Asia where families tend to be smaller on average (Fernández & Fogli, 2006). Assuming people are conformist by nature, potential parents evaluate both the economic and social impacts of their fertility decision when choosing their optimal family size (Bhattacharya & Chakraborty, 2011). For each group, the deviation from the host country's social norm may impact negatively on the derived utility from having children. In addition, potential parents attempt to minimise this psychological cost associated with deviating from the social fertility norms in the host country whilst partially retaining the norms from the home country. Therefore, potential parents attempt to minimise the social distance between the host country norm and the optimal fertility choice taking into account the home country fertility norm (Akerlof, 1997).

Potential parents make a net fertility decision based on the trade-off between observing the dual fertility norms. The fertility decision minimises the social distance from others as the deviation from the observed fertility norms may impose a psychological cost on an individual (Akerlof, 1997). Consequently, an individual's utility, which depends on consumption, inputs required in child rearing and the social distance between fertility norms, expressed as:

$$U = ln(c) + \beta ln(nQ) - D(n, n_s, n_s^*) \tag{1}$$

where c is household consumption, n is the number of children, Q is the quality of the child,[10] and $\beta < 1$ is the discount factor. In addition to children, parents derive utility from overall child quality. Parents suffer a utility loss arising from the asynchrony between realised fertility and the social fertility norms in the host country. The utility loss does not vary for natives as they face a single set of fertility norms; however, the loss differs across immigrant parents according to their country-specific cultural fertility norms. D is the metric that represents this fertility heterogeneity in our model, measuring the social distance of fertility norms. n_s is the fertility norm in the host country and n_s^* is the fertility norm in the home country if the parent is an immigrant. Note that all variables are measured at the individual level. However, we do not incorporate individual identifiers to avoid notational clutter.

Child quality Q is determined by time spent on child-rearing, q, as well as explicit investment in child quality, X. For simplicity we choose a simple Cobb-Douglas form to express child quality:

$$Q = Mq^{\alpha}X^{\mu} \tag{2}$$

where $M > 0$, q represents the level of effort used in raising children, chosen by the parents. Child quality exhibits diminishing returns such that $0 < \alpha < 1$ and $0 < \mu < 1$. Therefore, time spent on child-rearing and explicit investment in child quality decreases as the number of children increases (see for example Becker & Lewis, 1974; Becker & Tomes, 1976; Angrist et al., 2010, more recently).

We incorporate a utility loss for deviating from social norms similar to that used in Bhattacharya & Chakraborty (2011). Potential parents attempts to minimise the

[10] Child quality refers to child outcomes, further explored in Chapter *5*. Child outcomes are an indirect measure of quality.

distance between the number of children and the prevalent social fertility norm in the country of residence. Where this study differs from previous studies is through the introduction of the importance of the cultural norms regarding fertility, inherited by the immigrants from their home countries. We take the absolute value of distance between the fertility in the host country and the individuals observed level of fertility, as in Bhattacharya & Chakraborty (2011). However, we also adjust net fertility to incorporate the difference in fertility norms in the home and host country if the parent is an immigrant. A parent faces:

$$D(n, n_s, n_s^*) = \frac{\gamma}{1+\gamma}\left|(1+\gamma)n_s - n\left(1+\gamma\frac{n_s}{n_s^*}\right)\right| \tag{3}$$

where $\gamma > 0$. This equation suggests that the deviation from the social norm has a heterogeneous effect on utility which depends on the values of n, n_s and n_s^*. For natives, $n_s = n_s^*$ therefore $D = \gamma|n_s - n|$. This corresponds to the utility loss function in Bhattacharya & Chakraborty (2011), which is nested as a special case in our model. To observe the effect of equation (3) on the utility of a parent, we consider two situations for the outcome of the absolute value given in equation (3) as detailed below.

Case I: $(1+\gamma)n_s > n(1+\gamma\frac{n_s}{n_s^*})$:
Consider three possible scenarios for n_s relative to n_s^* and the utility cost represented by D in equation (3):

Suppose	$n_s > n_s^*$:	If $n > n_s > n_s^*$ the utility cost, D is higher than when $n_s > n > n_s^*$.[11]	(A)
Suppose	$n_s = n_s^*$:	Then $n < n_s = n_s^*$, the utility cost D depends on the difference between n and n_s.	
Suppose	$n_s < n_s^*$:	If $n < n_s < n_s^*$, the utility cost D is higher than when $n_s < n < n_s^*$.	

[11] This argument does not necessarily hold if $n \gg n_s$. However, the socialisation, selection and adaption hypotheses provide evidence to suggest that this assumption is not extreme as the host country fertility level is also crucial in the fertility decision. See Schmid & Kohls (2009).

Case II: $(1+\gamma)n_s < n(1+\gamma\frac{n_s}{n_s^*})$:

Again consider three possible scenarios for n_s relative to n_s^* and the associated utility cost represented by D.

Suppose	$n_s > n_s^*$:	If $n > n_s > n_s^*$ the utility cost, D is higher than when $n_s > n > n_s^*$.	(B)
Suppose	$n_s = n_s^*$:	Then $n < n_s = n_s^*$, the utility cost D depends on the difference between n and n_s.	
Suppose	$n_s < n_s^*$:	If $n_s < n_s^* < n$, the utility cost of D is higher than when $n_s < n < n_s^*$.[12]	

Subcases (A) and (B) suggest D is higher if actual fertility is larger or smaller than both the cultural (home country) and social (host country) norms; and D is lower if fertility is in between the two norms.

Finally, the budget constraint faced by potential parents can be expressed as:

$$c = wh(1-qn) - Xn + Bn \tag{4}$$

As the amount of time available to an individual is normalised to one, parents can spend q amount of time raising children. Therefore, $wh(1-qn)$ represents net earnings. X is the real explicit investment in child quality and Xn is the total explicit investment for all children the individual has. All parents receive lump-sum payment of B per child.

Substituting (3) into (1), we obtain:

$$U = ln(c) + \beta ln(nQ) - \frac{\gamma}{1+\gamma}\left|(1+\gamma)n_s - n\left(1+\gamma\frac{n_s}{n_s^*}\right)\right| \tag{5}$$

As in Bhattacharya & Chakraborty (2011), we study a static model. For the sake of simplicity the partial equilibrium is analysed, although the fertility decisions may be affected by general equilibrium effects, to the extent that the immigrants'

[12]Again, if $n \ll n_s$, this argument does not necessarily hold. However, this is not an overly restrictive limitation.

fertility behaviour may alter the social norm in the host country. This, however, is not the focus of this study. Our model differs from Bhattacharya & Chakraborty (2011) through the incorporation of human capital investment. As fertility choice depends on education, analysing the role of human capital investment is a significant contribution of this model to the literature. We begin our analysis by focusing on Case I.

Case I: $(1+\gamma)n_s > n(1+\gamma\frac{n_s}{n_s^*})$

This inequality implies $n_s > n$ for natives, but not necessarily for immigrants, as it depends on the ratio n_s/n_s^* being greater or less than one. The utility loss is highest when $n < n_s < n_s^*$, and lowest when fertility lies between the two norms.

A parent maximises:

$$\max_{n,X} U = log(c) + \beta log(nQ) - \frac{\gamma}{1+\gamma}\left\{(1+\gamma)n_s - n\left(1+\gamma\frac{n_s}{n_s^*}\right)\right\} \tag{6}$$

Equation (6) suggests that if the actual fertility is smaller than both the cultural and social fertility norms, the impact on utility is larger, whereas the impact on utility will be smaller if actual fertility lies between the two norms.

We substitute (4) and (2) into (6) and derive the first order conditions. The first order condition for n is given as:

$$\frac{\partial U}{\partial n} = \frac{-whq - X + B}{wh(1-qn) - n(X-B)} + \frac{\beta}{n} + \Omega = 0 \tag{7}$$

where Ω represents the distance between social and cultural fertility norms:

$$\Omega = \frac{\gamma}{1+\gamma}\left(1+\gamma\frac{n_s}{n_s^*}\right)$$

The first order condition with respect to X is:

$$\frac{\partial U}{\partial X} = \frac{-n}{wh(1-qn) - n(X-B)} + \frac{\beta\mu}{X} = 0 \tag{8}$$

Rearranging equation (8) to solve for X gives:

$$X = \kappa \left[\frac{wh(1-qn)+Bn}{n} \right] \tag{9}$$

where $\kappa = \frac{\beta\mu}{(1+\beta\mu)}$
Equation (9), implies that $\frac{\partial X}{\partial n} < 0$ and $\frac{\partial X}{\partial B} > 0$ unambiguously. Therefore, as the number of children increases, explicit investment per child decreases and as the bonus increases, explicit investment per child increases.

We substitute (9) into (7) to get

$$\frac{(1-\kappa)Bn-(1+\kappa)wh(1-qn)}{(1-\kappa)(wh(1-qn)+Bn)} + \beta + \Omega n = 0 \tag{10}$$

We note that equation (10) does not yield an explicit solution for n. However, the optimal number of children, n_{opt}, can be expressed as:

$$n_{opt} = n(h, B, \Omega) \tag{11}$$

which depends on parental human capital, the amount of baby bonus and an indicator of the difference in fertility norms in the home and host country if the parent is an immigrant, given by Ω.

Ceteris paribus fertility response to baby bonus (B) payment.

For the purpose of this study we explore the effects of monetary incentives on fertility choices. To determine the effect of the baby bonus on the equilibrium number of children, we take the total differential of equation (10) with respect to n and B to get the following:

$$\frac{\partial n}{\partial B} = \frac{n(1+\beta+\Omega n)}{B(1-\beta+2\Omega n)-wh[(1-\beta)q+\Omega(1-2nq)]} \tag{12}$$

Equation (12) captures the heterogeneity in changes in fertility behaviour across the natives and immigrants in response to changes in the baby bonus. The right hand side of the expression shows that the magnitude and direction of fertility response depends on the magnitude of Ω which in turn depends on the ratio of host and home country fertility norms. For the natives, $\Omega = \gamma$ and the heterogeneity of fertility response within this group depends on the heterogeneity in human capital. Since the home country norms differ across immigrants' country of origin, Ω differs not only across immigrants but between natives and immigrants.

The sign of this partial depends on the sign of the denominator. For a given n and Ω, the denominator is positive if:

$$B > \frac{wh[(1-\beta)q + \Omega(1-2nq)]}{(1-\beta+2\Omega n)} \equiv \bar{B}_{\mathrm{I}} \tag{13}$$

A sufficient condition for the numerator of the right hand side to be positive is $1 - 2nq > 0$ i.e. $nq < 1/2$. We impose this upper bound on child rearing time following De La Croix & Doepke (2003). This assumption is not overly restrictive to this model. Given this restriction, the numerator of equation (13) is strictly positive. Therefore an individual will have a positive fertility response to the baby bonus if the bonus B is greater than the threshold level of $\bar{B}_{\mathrm{I}}$ for a given γ and n. However, this threshold $\bar{B}_{\mathrm{I}}$ is determined by the difference in fertility norms in the home and host country, Ω and the fertility choice n and will therefore be a heterogeneous threshold value. For natives $\Omega = \gamma$, therefore the response will be positive if the bonus is above the required minimum for natives for a given γ and n.

It is useful to take the second derivative of (13) to determine how a change in the bonus impacts the optimal fertility decision

$$\frac{\partial}{\partial B}\left(\frac{\partial n}{\partial B}\right) = \frac{-n(1-\beta+2\Omega n)(1+\beta+\Omega n)}{\{B(1-\beta+2\Omega n) - wh[(1-\beta)q + \Omega(1-2nq)]\}^2} \tag{14}$$

Equation (14) implies that $\frac{\partial}{\partial B}\left(\frac{\partial n}{\partial B}\right) < 0$. This implies that as the bonus increases, the response is smaller for a given n, Ω and h. This is true for natives as well, as

$\Omega = \gamma$.

Ceteris paribus response of social and cultural norms to the baby bonus (B) payment.

For a given number of children n amount of bonus B, we find from (12) there will be a positive response to the bonus if:

$$\Omega < \frac{(1-\beta)(whq - B)}{2Bn - wh(1-2nq)} \equiv \bar{\Omega}_{\mathrm{I}} \tag{15}$$

The sign of the right hand side of equation (15) is ambiguous. However, we know that $\Omega > 0$ which implies that $\bar{\Omega}_{\mathrm{I}}$ is the upper bound. Therefore, as Ω has to be positive, the response of immigrants to the bonus should be positive; however this also implies that the fertility response in equation (12) cannot be positive. Again, taking the second derivative of (12) with respect to Ω, we find an ambiguous result for $\frac{\partial}{\partial \Omega}\left(\frac{\partial n}{\partial B}\right)$ this suggests the response to the bonus depends on the ratio of social norms for a given n, h and B.

Ceteris paribus response of human capital to the baby bonus (B) payment.

The empirical literature shows that human capital contributes significantly to the fertility decision (see for example Preston & Hartnett, 2008; Klesment & Puur, 2010; Billingsley, 2011). Therefore, we extend the analysis in this study to investigate the relationship between human capital and the baby bonus. Equation (12) suggests the response to the bonus will be positive if the denominator is positive. We can express this requirement in terms of human capital, to find the threshold:

$$h < \frac{B(1-\beta+2\Omega n)}{w[(1-\beta)q + \Omega(1-2nq)]} \equiv \bar{h}_{\mathrm{I}} \tag{16}$$

A parent will have a positive response if their level of human capital is below the threshold level $\bar{h}_{\mathrm{I}}$ for a given value of Ω and n.

Finally, for Case I, wish to examine how the response to fertility incentives differs with human capital level of parents. Therefore we need to look at the second derivative of equation (12) with respect to h. The result is:

$$\frac{\partial}{\partial h}\left(\frac{\partial n}{\partial B}\right) = \frac{wn(1+\beta+\Omega n)[(1-\beta)q+\Omega(1-2nq)]}{\{B(1-\beta+2\Omega n)-wh[(1-\beta)q+\Omega(1-2nq)]\}^2} \tag{17}$$

The numerator in (17) is unambiguously positive. This result suggests that as human capital increases, the likelihood of a positive response to the baby bonus increases.

Similarly, for natives the response will also be unambiguously positive as $\Omega = \gamma$. Therefore natives experience a positive response to the baby bonus as human capital increases if $n_s > n$, differing to immigrants only in magnitude.

Case II $(1+\gamma)n_s < n(1+\gamma\frac{n_s}{n_s^*})$

This inequality implies $n_s < n$ for natives, but not necessarily for immigrants, and it depends on the ratio n_s/n_s^* being greater or less than one. The utility loss is highest when $n > n_s > n_s^*$, and lowest when fertility lies between the two norms. Parents maximise:

$$\max_{n,X} U = log(c) + \beta log(nQ) - \frac{\gamma}{1+\gamma}\left\{n\left(1+\gamma\frac{n_s}{n_s^*}\right) - (1+\gamma)n_s\right\} \tag{18}$$

Equation (18) suggests if actual fertility is larger than both the cultural and social fertility norms, the impact on utility is larger. If actual fertility is between the two norms the impact on utility is smaller.

The first order condition for X remains the same as specified in (8), however the resulting first order condition for n becomes:

$$\frac{\partial U}{\partial n} = \frac{-whq - X + B}{wh(1-qn) - n(X-B)} + \frac{\beta}{n} - \Omega = 0 \tag{19}$$

Equation (19) differs from the previous case with Ω changing sign from positive to negative. Substituting X from (9) into equation (19) gives the following result:

$$\frac{(1-\kappa)Bn-(1+\kappa)wh(1-qn)}{(1-\kappa)(wh(1-qn)+Bn)}+\beta-\Omega n=0 \tag{20}$$

Again, equation (20) yields no explicit solution. However, the optimal number of children, n_{opt} can be expressed as:

$$n_{opt}=n(h,B,\Omega) \tag{21}$$

which depends in parental human capital, the amount of the bonus and the ratio of fertility norms from the host and home countries, represented by Ω.

Ceteris paribus fertility response to the baby bonus (B) payment.

To examine the effect of the bonus payment on the number of children, we take the total differential with respect to n and B in equation (20) to derive the following results:

$$\frac{\partial n}{\partial B}=\frac{n(1+\beta-\Omega n)}{B(1-\beta+2\Omega n)-wh[(1-\beta)q-\Omega(1-2nq)]} \tag{22}$$

In this case the sign is ambiguous. For the response to be positive, it requires the numerator and denominator to have the same sign. The numerator will be positive if $\Omega<(1+\beta)/n$, moreover the denominator will be positive if $wh(1-\beta)q>\Omega(1-2nq)$. If both conditions hold, the overall impact of the baby bonus will be positive. However, the response to the baby bonus can also be negative if Ω is large enough, suggesting no clear result in this scenario.

The threshold value of the bonus for equation (22) which will result in a positive response given by:

$$B>\frac{wh[(1-\beta)q-\Omega(1-2nq)]}{(1-\beta+2\Omega n)}\equiv\bar{B}_{\mathrm{II}} \tag{23}$$

The numerator is more likely to be positive if $n_s/n_s^*<1$, for a given Ω and n.

If we take the second derivative of (22) to determine how a change in the bonus impacts the optimal fertility decision, we find:

$$\frac{\partial}{\partial B}\left(\frac{\partial n}{\partial B}\right)=\frac{-n(1-\beta+2\Omega n)(1+\beta-\Omega n)}{\{B(1-\beta+2\Omega n)-wh[(1-\beta)q-\Omega(1-2nq)]\}^{2}} \tag{24}$$

This suggests an ambiguous sign for $\frac{\partial}{\partial B}\left(\frac{\partial n}{\partial B}\right)$, which depends on the magnitude of Ω. Equation (24) implies the fertility response to the bonus is inversely related to the value of the bonus. Therefore as the bonus increases, the response is smaller for a given n, h and Ω. This is true for natives as well, as $\Omega = \gamma$.

Ceteris paribus response of social and cultural norms to the baby bonus (B) payment.

For a given amount of B and n, equation (22) implies there will be a positive response to the baby bonus if:

$$\Omega < \frac{(1-\beta)(whq-B)}{2Bn+wh(1-2nq)} \equiv \bar{\Omega}_{\text{II}} \tag{25}$$

Again this result is ambiguous and depends on the size of B for a given n. For the response to be positive, it requires $B > whq$. However, we know that $\Omega > 0$ which implies that $\bar{\Omega}_{\text{II}}$ is the upper bound. As Ω has to be positive, the response of immigrants to the bonus should be positive; however this also implies that the fertility response in equation (22) cannot be positive. Furthermore, we find from the second derivative, $\frac{\partial}{\partial \Omega}\left(\frac{\partial n}{\partial B}\right)$ is negative and the response to the bonus depends on the ratio of social norms for a given n, h and B.

Ceteris paribus response of human capital norms to the baby bonus (B) payment.

Equation (22) suggests the response to the bonus will be positive if the denominator is positive. Thus we can express this result in terms of human capital:

$$h < \frac{B(1-\beta+2\Omega n)}{w[(1-\beta)q-\Omega(1-2nq)]} \equiv \bar{h}_{\text{II}} \tag{26}$$

Hence there will be a positive response for a parent if the parent's level of human capital is below the threshold level $\bar{h}_{\text{II}}$ for a given value of Ω and n.

In this case, taking the second derivative of $\partial/\partial h\,(\partial n/\partial B)$ with respect to h gives following:

$$\frac{\partial}{\partial h}\left(\frac{\partial n}{\partial B}\right) = \frac{wn(1+\beta-\Omega n)[(1-\beta)q+\Omega(1-2nq)]}{\{B(1-\beta-2\Omega n)-wh[(1-\beta)q-\Omega(1-2nq)]\}^2} \tag{27}$$

The denominator of equation (27) is always positive; however, the sign of the numerator depends on the magnitude of Ω. Therefore, the impact of human capital on the response to the baby bonus is ambiguous in this case. For natives, $\Omega = \gamma$ and therefore this result only differs in magnitude.

3.2.1 Conclusion

This section developed a theoretical model to highlight the difference between native and immigrant fertility. The main contribution of this model is in the incorporation of both social and cultural norms for immigrant and native groups. In both the native and immigrant scenario, social norms play an important role in the fertility decision. The distinction between the two groups is the magnitude of the utility loss. Immigrants face two social norms, which impact on a parent's fertility decision, whereas natives face a single set of norms which influence their decision.

In this study we explored whether the baby bonus increased or decreased fertility, measured by the number of children. We investigated the fertility response of immigrant and natives to determine if response to the baby bonus is different between the two groups. We find the expected response was the same, differing only in magnitude. The magnitude of the utility loss is can be larger or smaller for immigrants as the immigrant fertility depends on the ratio of norms in the host country compared to the home country. We find an positive response of immigrants and natives in both instances as long as the bonus is above the reserve threshold for the bonus ($\bar{B}$), however the response decreases as the bonus increases. Therefore, the introduction of the bonus should increase overall fertility. The scenario for natives is similar, except the magnitude of the effect depends on γ. With respect to the relationship between human capital and the baby bonus, we found an ambiguous result. This motivates the empirical analysis conducted in the following section.

3.3 Empirical Analysis

3.3.1 Introduction

This study examines the impact of monetary incentives on individual fertility decisions. Specifically, we explore the dynamics of the 'baby bonus' on native and non-native women in Australia. We analyse the response to this policy using the *Household Income and Labour Dynamics in Australia (HILDA) survey*. We estimate the relationship between child bearing and monetary incentive using the introduction of this policy in the setting of a natural experiment. In particular, we evaluate the differences in the responses to the incentive between immigrants and natives using both difference-in-difference and semiparametric models.

Our study aims to expand the relevant literature by evaluating differentials between fertility rates for the purpose of policy analysis and future policy implementation for governments seeking to improve fertility rates. The relevant literature shows immigrant and native women have differing responses to monetary incentives within the welfare literature (see for example Borjas, 1999; Kaestner & Kaushal, 2005; Dustmann et al., 2005). However, the role of fertility incentives and pro-natal policies, such as the baby bonus, has not been explored in the context of these subpopulations. Additionally, a contribution of this study is the consolidation of the literature on welfare benefits and immigrant-native fertility discrepancies. This analysis may therefore result in important policy implications for Australia and other countries with significant immigrant populations.

The results of this study indicate that the implementation of the bonus led to higher fertility for immigrant women than a comparable native born woman. Evidence provided by this study suggests the policy initiative may have failed in obtaining a response from its intended targets, although the policy was successful in achieving an overall increase in the nation's reproductive goal.

3.3.2 Background to the Baby Bonus

In an attempt to increase the fertility rate across the nation, the Australian Government introduced a one off payment as an incentive for having children. The scheme initially offered a singular payment of $3000 to all women having a baby on or after July 2004. The program replaced a means-tested maternity tax offset of up to $2500 that women could previously claim as a rebate over a five-year period. However, unlike the maternity tax offset, the baby bonus offered an immediate non-means tested cash incentive. The baby bonus payment has since undergone a series of alterations from its implementation in 2004, to the dissolution of the program in 2014. The payment was raised to $4000 and again to $5000 in July 2006 and July 2008, respectively. During the interim, the payment was indexed to rise alongside the national consumer price index (see *Table 7.1* in the appendix for exact values).

In 2012 the baby bonus program became means tested, with families earning over $75,000 per annum unable to receive the bonus. Furthermore, the most recent changes stipulate that the bonus payment cannot be obtained if the mother has access to paid parental leave. More recently the government has reduced the payment amount to $3000 and staggered the payments across 12 weeks in the 2013-2014 financial year.[13] As of May 2014, there will no longer be family payments in the form of once off bonus payments. The policy will revert to a means tested maternity tax offset, with compulsory implementation of paid parental leave.[14] This tax offset is only available to working mothers, making the payments an incentive for those who are actively employed. Overall, abolishing the baby bonus is expected to reduce the strain of those who are welfare dependent on the government's budget (Parliament of Australia, 2013).

[13]These values were as of July 2013

[14]At the time of writing, Australia had a change in government. These numbers are therefore subject to consideration and review by the current government.

3.3.3 Data

The data set used in this analysis is the *Household, Income and Labour Dynamics in Australia* (HILDA) *Survey*, which began in 2001. The HILDA survey consists of a sample of the Australian population, representative of private households. All individuals in the household, over the age of 15 were interviewed for the purpose of the survey. We specifically consider data from 2003-2007, which incorporates the period of introduction and initial revisions of the baby bonus, prior to the recent shift to a paid maternity leave program funded by the government. Using 2003 as a reference year, this study aims to determine the effect of the bonus on the childbearing decision. In the literature, most studies show a postponement effect of incentives on fertility. In the case of the HILDA there may not be a postponement effect exhibited in the data, due to the nature of fertility, survey collection timing and the timing of the announcement for the bonus.[15]

The analysis in this study focuses on immigrant and native-born individuals. An immigrant is defined as an individual who has a country of birth other than Australia. It is important to note that the sample of immigrants in the HILDA is not representative of the population over time due to the dynamics of immigration. This is because there is no resampling over the time period of interest; as a result we cannot analyse migration dynamics in Australia. However, within this analysis we are not specifically interested in looking at immigration into the country, but rather the characteristics of those who are having children within the native and immigrant cohorts in the HILDA. Furthermore, the baby bonus is only available to those individuals who are permanent residents or are de-facto to a permanent resident. This implies the immigrant cohort will have at least 2 years of assimilation to local conditions, which is the minimum stay for residency. Fertility, our dependent variable is measured as a binary indicator for having a child in a given year. The

[15]We do not expect the data to show any form of short run announcement or timing effects because the HILDA data collection is undertaken in August, which is too soon to reflect any changes resulting from the introduction of the baby bonus. However, there may be long term changes in child bearing preferences.

sample we use is focused on both women of child bearing age (18-45) and those with completed fertility (45-60). Women with completed fertility are included in the analysis for robustness in the selected difference-in-difference methodology.

For this analysis we select the control covariates from the existing fertility literature which are known to impact on the decision to bear children. These include age, marital status, number of children, labour force status, education, partners education, partner's labour force status and religion. We drop all responses where data is missing for these variables. After trimming the data to those we have information available on, we obtain 22,565 observations; 17,992 being Australian Born and 4,573 immigrants, pooled across 2003-2007. A description of the variables used in this analysis can be found in *Table 3.1*.

Table 3.1: Variable Description

Variable	**Type**	**Description**
Fertility	Binary	Had a baby that year. (0) No (reference), (1) Yes.
Age	Continuous	Age of the mother.
Age Squared	Continuous	Age of the mother squared.
Marriage	Binary	Married or Defacto (0) No (reference) (1) Yes.
No. Children	Continuous	Number of children the woman already has.
Employment Status	Dummy	Employment (1) Employed (reference) (2) Unemployed & (3) Not in labour force.
Education	Dummy	Education level. Three categories (1) $<$ High School (reference) (2) = High School & (3) $>$ High School.
Partners Emp Status	Dummy	Employment (1) Employed (reference) (2) Unemployed & (3) Not in labour force.
Partners Education	Dummy	(1) Postgrad, (2) Grad Diploma/Certificate, (3) Bachelor or honours, (4) Diploma, (5) Cert III or IV, (6) Cert I or II (7) Cert Other (8) Year 12 (reference) (9) Year 11 and below, (10) No Partner Info
Religion	Dummy	Religion of mother. (1) Judeo-Christian (reference) (2) Buddhism (3) Hinduism (4) Islam (5) Judaism (6) Other Religion (7) No Religion
Immigrant	Binary	Immigrant status by country of birth (0) Native, (1) Immigrant.

3.3.4 Descriptive Statistics

Descriptive statistics for the variables of interest can be found in *Table 3.2* and *Table 3.3*. We conducted t-tests on the native and immigrant subsamples to test whether there is a significant difference in the covariates included in the regression analysis. In this case, we find a significant difference in the means across almost all variables. There are 2 cases where there is no significant difference: the Advanced Diploma qualification and unemployment indicator. The unconditional probability of having a child in a given year lies at around 5 per cent pooled across the sample. Furthermore *Table 3.2* also shows that on average, the probability of having child in a given year is higher for those in the native category. This is attributed to the pooling of the data across all years and the number of natives is substantially higher than immigrants, and therefore there is a higher probability of a positive response to the baby bonus by native individuals. Additionally, the data indicates that immigrants have on average 1.69 children compared to 1.58 children per native, a significant difference, indicating the opposite of the fertility probability indicator. This suggests immigrant women tend to have higher number of children on average compared to natives. We also find that the average age of an individual in this dataset is approximately 39 for the entire sample. However, when broken down into the immigrant and native subpopulations, the average age is almost four years higher for those in the immigrant category.

Table 3.2: Descriptive Statistics

Variable	All	Native	Immigrant	Mean Difference
Fertility	0.048	0.049	0.041	0.008*
	(0.213)	(0.216)	(0.199)	(0.004)
Immigrant	0.203	0	1	-
	(0.4020)	(0.000)	(0.000)	-
Age	39.013	38.157	42.381	-4.224***
	(11.905)	(11.977)	(10.988)	(0.195)
No. Children	1.602	1.581	1.686	-0.105***
	(1.461)	(1.471)	(1.417)	(0.024)
Married/ Defacto	0.664	0.648	0.724	-0.076***
	(0.472)	(0.477)	(0.447)	(0.008)
Labour Force Status				
Employed (reference)	0.721	0.730	0.683	0.047***
	(0.447)	(0.444)	(0.465)	(0.007)
Unemployed	0.032	0.032	0.033	-0.001
	(0.177)	(0.176)	(0.178)	(0.003)
Not in LF	0.247	0.237	0.284	-0.046***
	(0.431)	(0.426)	(0.451)	(0.007)
Qualifications				
Postgraduate	0.031	0.026	0.052	-0.026***
	(0.173)	(0.159)	(0.222)	(0.003)
Grad Diploma, Grad Cert	0.067	0.064	0.079	-0.015***
	(0.250)	(0.245)	(0.269)	(0.004)
Bachelor or Honours	0.160	0.151	0.195	-0.044***
	(0.367)	(0.358)	(0.396)	(0.006)
Adv Diploma, Diploma	0.095	0.093	0.102	-0.010*
	(0.293)	(0.290)	(0.303)	(0.005)
Cert III or IV	0.143	0.146	0.132	0.014*
	(0.350)	(0.353)	(0.338)	(0.006)
Cert I or II	0.018	0.020	0.012	0.007***
	(0.133)	(0.138)	(0.110)	(0.002)
Cert not defined	0.006	0.006	0.008	-0.003*
	(0.078)	(0.074)	(0.091)	(0.001)
High School (reference)	0.187	0.183	0.200	-0.0168***
	(0.390)	(0.387)	(0.400)	(0.006)
Year 11 and Below	0.294	0.313	0.220	0.093***
	(0.455)	(0.464)	(0.414)	(0.008)
No Obs	22565	17992	4573	22565

Standard deviations are reported in parentheses for variable means whereas standard errors are reported for means differences.
* p<0.1, ** p<0.05 and ***p<0.01 respectively.

Table 3.3: Partner's Descriptive Statistics

Variable	**All**	**Native**	**Immigrant**	**Mean Difference**
No Partner Info Reported	0.396	0.407	0.353	0.054***
	(0.489)	(0.491)	(0.478)	(0.008)
Qualifications				
Postgraduate	0.032	0.026	0.056	-0.030***
	(0.177)	(0.160)	(0.230)	(0.003)
Grad Diploma, Grad Cert	0.034	0.032	0.041	-0.009**
	(0.181)	(0.176)	(0.199)	(0.003)
Bachelor or Honours	0.087	0.080	0.113	-0.033***
	(0.281)	(0.271)	(0.317)	-0.005
Adv Diploma, Diploma	0.058	0.052	0.080	-0.027***
	(0.234)	(0.223)	(0.271)	(0.003)
Cert III or IV	0.186	0.192	0.162	0.030***
	(0.389)	(0.394)	(0.369)	(0.006)
Cert I or II	0.007	0.008	0.003	0.005***
	(0.085)	(0.091)	(0.053)	(0.001)
Cert not defined	0.002	0.002	0.000	0.002***
	(0.040)	(0.045)	(0.000)	(0.001)
High School (reference)	0.065	0.063	0.071	-0.008*
	(0.246)	(0.243)	(0.257)	(0.004)
Year 11 and Below	0.529	0.544	0.473	0.0703***
	(0.499)	(0.498)	(0.499)	(0.003)
Labour Force Status				
Employed (reference)	0.879	0.887	0.850	-0.0239**
	(0.326)	(0.316)	(0.357)	(0.007)
Unemployed	0.020	0.019	0.023	-0.004*
	(0.139)	(0.136)	(0.151)	(0.003)
Not in LF	0.061	0.056	0.082	-0.0261***
	(0.239)	(0.229)	(0.274)	(0.006)
Observations	22565	17992	4573	22565

Standard deviations are reported in parentheses for variable means whereas standard errors are reported for means differences.
* p<0.1, ** p<0.05 and ***p<0.01 respectively.

The descriptive statistics also show that employment is lower for those in the immigrant category with a difference in means of more than a five per cent, significant at a one per cent level. This is consistent with the literature on immigrant employment outcomes. Furthermore, immigrant women are also less likely to participate in the labour force relative to native women. Regardless of immigrant status an individual from the sample is likely to be unemployed 3.2% of the time. These descriptive statistics also show that immigrants are more likely to have a higher level of education. We attribute this to the positive selection immigration policy for obtaining residency imposed by the Australian government.

Table 3.3 shows the descriptive statistics for the partners characteristics, which may impact on the fertility decision. We observe a significant difference between both the immigrant and native women across all partner characteristics. We also find that the labour force participation rate is high, above 85% for both the pooled sample and the two sub populations. However, labour force participation is higher among the native category.

These observed differences between immigrants and natives add to the motivation behind the use of propensity score matching and semiparametric estimation. Overall the descriptive statistics indicate that there are significant differences between immigrant and native women, especially in the area of fertility. This finding solidifies the analysis presented in *Section 3.2*.

As there are significant heterogeneous characteristics between people from different countries, the mean fertility response based on region of origin was also examined, as shown in *Table 3.4*. Australian born women have a 4.9% probability of having a child. This is in stark comparison to immigrants from North East Asia, the Americas and Sub Saharan Africa, who have a higher probability of having a child (around 6%). We note that those individuals from North Africa and Middle East have a relatively low probability of childbearing, which is counter-intuitive to the assessment given the data from the ABS where on average these immigrant individuals have on average 3 children in comparison to an Australian who has 1.95 children (Australian

Table 3.4: Fertility by Region of Birth

Country	Obs	Mean	Std. Dev.
Australia	17986	0.0493	0.2164
Other Oceanic	570	0.0491	0.2163
North West Europe	1588	0.0277	0.1642
Southern and Eastern Europe	504	0.0298	0.1701
North Africa and Middle East	152	0.0395	0.1954
South East Asia	686	0.0496	0.2172
North East Asia	305	0.0590	0.2360
Southern and Central Asia	224	0.0446	0.2070
Americas	291	0.0619	0.2413
Sub Saharan Africa	254	0.0591	0.2362

Bureau of Statistics, 2012). This may be due to the small representation of immigrants in the HILDA. Finally, it can be seen that immigrants from Europe exhibit much lower fertility probabilities than other regions of the world.

The descriptive and unconditional fertility statistics indicate that there are significant differences between immigrant and native women, especially in the area of fertility. This supports the hypothesis outlined in *Section 3.2*, and motivates us to further investigate the issue.

3.3.5 Methodology

In this section we outline and motivate the methods used in this analysis. We use a difference-in-difference (DID) estimation technique to examine the variations in the responses of native and immigrants to the 'baby bonus'. This method has wide applications in the literature to evaluate the implementation of public policy. Difference-in-difference allows for the analysis of changes in the fertility response induced by a treatment or event, in this case, the baby bonus. Using this method, the effect on those women exposed to the treatment and those not exposed to the treatment (the control) over two periods in time can be separated out, in order to isolate the effects of the policy or intervention.

The use of a control group in the analysis makes it possible to difference out factors that may bias the analysis and decompose the treatment effect and magnitude of the treatment. In this study, we examine the effects of the bonus on the individual fertility decision in a natural experiment setting. This exposes the revealed preferences for child bearing for Australian women. Given that the baby bonus is available to all Australian women; it is difficult to determine if women are having children due to the existence of the bonus or whether other factors are driving their decision such as marital status, religion and employment status. Additionally the widespread availability of the bonus to all women does not allow for accurate use of the bonus as a treatment in this analysis. The causal effect of the bonus on fertility would be unidentifiable by using the baby bonus directly in this analysis, due to this non-excludability of the payment.[16] We therefore develop our own treatments groups for the DID estimation, focusing on those women who are most likely to respond to the implementation of the baby bonus. We also develop various control categories for comparison and robustness checks. This analysis uses the *Household Income and Labour Dynamics in Australia* (HILDA) *Survey* data acquired using Panelwhiz (see Haisken-DeNew & Hahn, 2010) in conjunction with Stata 12.[17]

Difference-in-Difference Setup

To begin this analysis we estimate the linear probability model expressed in equation (1) to determine whether there is a difference in the fertility outcomes of those women in the treatment group over time:

$$F_{i,t} = \alpha_0 + \alpha_1 \mathbf{X}_{i,t} + \beta_1 \tau_{i,t} + \beta_2 T_{i,t} + \beta_3 (\tau_{i,t} \times T_{i,t}) + \epsilon \tag{1}$$

where $F_{i,t}$ represents fertility, taking a value of 1 if an individual has a child in a given year and 0 otherwise. $\mathbf{X}_{i,t}$ is a vector of individual level characteristics, $\tau_{i,t}$ is

[16] As a result the baby bonus cannot be used as a treatment in the application of DID.

[17] Panelwhiz is a data management and extrapolation tool for larger data sets such as the HILDA, GSOEP, and BHS, that allows for quick retrieval of variables of interest.

an indicator variable for treatment status and $T_{i,t}$ is a vector of time dummies for the period of 2003-2007. We interpret coefficient β_3 as the difference-in-difference (DID), which represents the fertility gap between the treated and untreated individuals over time. The vector of individual characteristics controls for age, age squared, marital status, religion, number of children, employment status, partner's education and partner's labour force status as covariates in the regression. As education is used to segregate the treatment and control groups, it cannot be included directly as control in the regression. A summary of these demographics can be found in *Table 3.1.* These variables contribute significantly to the fertility decision within the literature, as seen in chapter 2. Immigrant and religious status are included to incorporate heterogeneous social norms into the model.

Specifically the research question aims to investigate whether immigrants and natives reacted differently to the baby bonus, given their level of human capital. Hence, we extend the model specified in equation (1) to include a three- way interaction between immigrant status ($I_{i,t}$), treatment group representation ($\tau_{i,t}$), and time ($T_{i,t}$):

$$\begin{aligned} F_{i,t} = \alpha_0 + \alpha_1 \mathbf{X}_{i,t} + \beta_1 I_{i,t} + \beta_2 \tau_{i,t} + \beta_3 T_{i,t} + \beta_4 (I_{i,t} \times \tau_{i,t}) + \\ \beta_5 (I_{i,t} \times T_{i,t}) + \beta_6 (T_{i,t} \times \tau_{i,t}) + \gamma_1 (I_{i,t} \times \tau_{i,t} \times T_{i,t}) + \epsilon \end{aligned} \tag{2}$$

This equation will allow for the empirical analysis of the response of immigrant women to the baby bonus is significantly different from their native counterparts. The resulting coefficient of γ_1 shows the response of immigrant women relative to native women in the treatment group, accounting for the change in means for the immigrants in the control group and natives in the treatment group. [18]

[18] See derivation of interpretation in the appendix for further detail.

3.3.6 Semiparametric Difference-in-Difference

Finally, we estimate the propensity scores and use these scores to conduct a semi-parametric difference-in-difference analysis. This analysis is necessary due to the strong assumptions used in DID. That is, prior to the implementation of the bonus, both the treatment and control groups follow the same trajectory over time. In this case, when implementing DID, we are making the assumption that this common trend holds true, conditional on the covariates when evaluating the effect of the baby bonus on fertility. This assumption may be violated as the selection for treatment may depend on individual transitory or dynamic shocks not accounted for in DID estimation. Using semi-parametric techniques as outlined in Abadie (2005), we take into account any deviations from the common trend that is driven by observed characteristics for the treated and untreated groups.[19]

In DID we assume that all factors affecting the outcomes of individuals, other than the treatment, are observable. These factors are assumed to be the same for the treated and untreated groups, which may not always be the case.[20] Furthermore, the application semi-parametric DID method is particularly useful as we cannot determine if the assumption of a pre-treatment common trend assumption holds due to a limited pre-treatment period. Hence, the application of semi-parametric DID will be relevant given the data available in the HILDA, where many of the groups follow similar, but not exact paths pre-treatment.

Using the fitted values from the propensity scores for the immigrant and native subsamples, we weight the average treatment effect, given the unconditional probability of belonging to the treatment group.[21] We match on the same demographics in

[19]The problem with non-parallel outcomes is that they violate the common trend assumption, which underpins the use of a difference-in-difference estimation technique.

[20]The covariates are assumed to be similar for those in the treated and untreated groups suggesting that there are no unobservable factors that may affect the treatment or control group alone.

[21]This is equation (10) in Abadie (2005), reported here in equation (3) using the HILDA data over the time period 2003-2007, with period one being 2003 and period 2 being 2007. Therefore the results will show the overall change in fertility in response to the treatment, but will not show the dynamic change over time.

the DID methodology. Additionally we match on age and education when possible.[22] We estimate the following equation from Abadie (2005):

$$E\left[F^1(1) - F^0(1)|\tau = 1\right] = E\left[\frac{F(1) - F(0)}{P(\tau = 1)} \times \frac{\tau - P(\tau = 1|X)}{1 - P(\tau = 1|X)}\right] \quad (3)$$

where F^1 and F^0 are the outcomes if the individual is exposed to treatment or not, respectively. Therefore, $F^1(1) - F^0(1)$ shows the treatment on the treated. $F(0)$ is the level of fertility in 2003, the pre baby bonus which will be a value of 0 if no children are born in 2003 and 1 if the individual has a child in 2003. $F(1)$ is the count of children post baby bonus levels up until 2007. τ is a dummy for belonging in the treatment group, $P(\tau = 1)$ gives the probability of being in the treatment group and $P(\tau = 1|X)$ is the propensity score conditional on the specified matching covariates. This weights the observations such that the distributions of covariates for the treated and untreated are the same (Abadie, 2005).

3.3.7 Treatment Selection

To implement this difference-in-difference methodology, we need to identify the relevant treatment and control groups. This section examines trends in the fertility of various subsamples to develop valid treatment and control groups for the analysis. Following a similar method as used by Kaestner & Kaushal (2005) we begin by identifying individuals who fall in the treatment group as those who are expected to respond to the implementation of the baby bonus. The relevant literature on welfare payments suggests that women who have a low level of education are more likely to respond significantly to monetary incentives (see Kaestner & Kaushal, 2005; Martin et al., 2012). Furthermore, studies show that women who have a preference for child-bearing are less likely to pursue higher education and women with higher levels of education, are significantly more attached to the labour market; therefore, less likely

[22] We match on age or education when it varies between the treatment and controls given the nature of the alternative controls. This allows for the propensity scores to be more precise for matching.

to have children (Rosenzweig, 1999; Milligan, 2005; Andersson, 2004). Additionally, low levels of education are highly correlated with participation in the social welfare system (Kaestner & Kaushal, 2005). Therefore, we identify women with a low level of human capital, as the target group for the policy as we expect them to be the most likely to respond to the implementation on the baby bonus.

As this analysis investigates the effects of incentives on fertility, we restrict the treatment group to women of child bearing age. We specifically allow for heterogeneity in age due to its importance in the fertility decision as outlined in the relevant fertility literature (i.e. young women will make a different fertility choice based on their age as opposed to women considered to be in their child bearing prime). Consequently, we allow for variation in the treatment groups based on age. Therefore, the treatment considers women who are; less than 25, less than 30, less than 35, and less than 40, all with a level of education below high school. These treatment groups are referred to as Treatment A, B, C, and D respectively (see *Table 3.5*). Therefore, as age increases, more women of child bearing age are incorporated into the treatment.

Table 3.5: Treatment and Relevant Control Groups

Treatment	**Controls**		
Treatment A	Control 1	Control 2	Control 3
$< HS < 25$	$\geq HS < 25$	$< HS \geq 25 < 40$	$< HS \geq 25$
Treatment B	Control 1	Control 2	Control 3
$< HS < 30$	$\geq HS < 30$	$< HS \geq 30 < 40$	$< HS \geq 30$
Treatment C	Control 1	Control 2	Control 3
$< HS < 35$	$\geq HS < 35$	$< HS \geq 35 < 40$	$< HS \geq 35$
Treatment D	Control 1	Control 2	Control 3
$< HS < 40$	$\geq HS < 40$	$< HS \geq 40$	$\geq HS \geq 40$

In this table $< HS < 25$ implies a less than high school education and less than 25 years old etc.

In addition to the education restrictions previously defined, we require a control group that is not expected to respond to the introduction of the baby bonus. Various controls are selected for comparison. These controls vary from the treated based on age, education or both, as described in *Table 3.5.* The treatment groups comprises of those individuals whose behaviour will change as a result of the introduction of the policy (as outlined above). The treatment group is expected to diverge from the control, post-treatment implementation. Therefore, the treatment and control groups must follow a common trend before the introduction of the bonus, but the treatment group diverges from the control, post-implementation of the bonus. If the common trend assumption is not met the validity of the DID estimators is questionable. We compare and contrast four specific treatments against various possible control groups. Those women with completed fertility are included to check the robustness in the analysis.

Comparisons of Treatment and Control Groups

A visual analysis of the treatment and control groups for the relevant age categories can be found in *Figure 3.1.* The solid lines represent the treatment groups in each graph. These lines indicate the average fertility of women with an education level of less than high school. The difference between each graph is the treatment age restriction. This allows for the inclusion of more women, who also have a low level of education into the treatment group. The dashed and dotted lines represent the potential control groups. For example, the first panel of *Figure 3.1* shows the treatment of those women with less than high school education, under the age of 25. If one of the control categories, such as the $< HS \geq 25$, is selected it can be seen that this line lies below that of the treatment (the first panel of Figure 1). This is because this study includes individuals of the same education category, who have both complete and incomplete fertility, to the age of 60. This is in stark contrast to the $\geq HS < 25$, which follows a similar trend to that of the treatment group in this case. The overall position of this line across the first three graphs in Figure 1 is roughly the same across most of the treatment groups (within the band of 6-10% per cent). For example, the top left graph (Treatment A) shows a similar trend to bottom left graph (Treatment C).

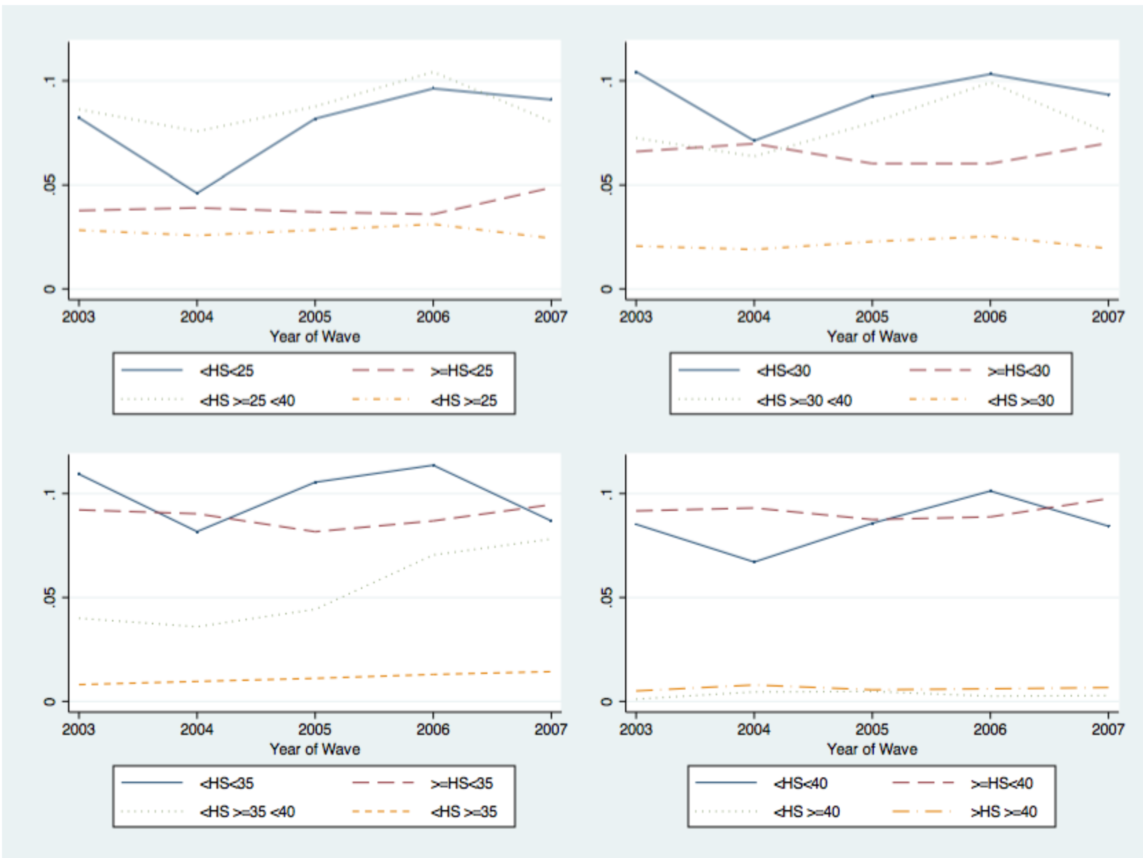


Figure 3.1: Control and Treatment Fertility

Furthermore, it can be seen that the sample analogues of the treatments follows a similar overall trend as the treatment groups.[23] For the third and fourth panel in *Figure 3.1* we also observe the $< HS$ and $\geq HS$ groups in the same age category as the treatment i.e < 35 and < 40 respectively, have very similar fertility levels prior to the implementation of the bonus (see the blue solid for the treatment and the red dashed line for the control group). This common trend observed before the implementation of the policy is a necessary requirement as the use of DID. If this common trend assumption is not met the validity of the DID estimators is questionable.

The fourth graph is slightly different to the others as the controls in the first three graphs would shed no light on Treatment D, as Treatment D incorporates all women who are in the prime age for having children. The controls for this group have been adjusted slightly for better comparison given that it includes all individuals with incomplete fertility (refer to *Table 3.5*). That is, the treatment age is at the age limit for this control. Treatment D is included for robustness in this analysis.

We find that the starting position of the treatment categories is similar, with the position lying between 6% and 10% in 2003. As the treatment generally lies above the analogue control, this indicates the treatments are relevant to this analysis, and that the policy is more likely to incentivise those individuals who have a low level of education compared to those women with a higher level of human capital. Furthermore, this can be seen in the significant volatility displayed in the graphs of the treatments. Finally, with respect to *Figure 3.1*, shows that the dash lines across all panels are flatter overtime, and follow a similar trend in the < 30 and < 40 age treatments.

[23]Here the control group is within the same age category, but those individuals included in the treatment have an education level above that of the treatment.

3.4 Results

3.4.1 Introduction

In this section we analyse and discuss the results obtained through the use of the methodologies described in *Section 3.3.5*. We find evidence that suggests the response of immigrants and natives to the baby bonus is different. This effect is particularly significant in 2007 for those in the Treatment A. For Treatment B and C we find a significant effect in 2006. The effect is strongest for Treatment B, which corresponds to the age for which women are considered to be in their child-bearing prime. Our propensity scores find similar results for individuals belonging to the treatment group, suggesting the treatment selection is effective. Additionally, the application of semiparametric difference-in-difference results in consistent estimates which suggest that the response to the baby bonus is higher for immigrants than for native women, leading to a significant increase in fertility on the whole.

3.4.2 Preliminary Results

In this section we present and discuss the two-way interaction between the treatment ($\tau_{i,t}$) and time ($T_{i,t}$) specified in equation (1) and compare this across the alternative treatment and control categories. *Table 3.6* reports the results for those who fall in the treatment group of having less than a high school education and being less than 25 years of age ($< HS < 25$). Model (1) estimates the two-way interaction term without demographic controls and model (2) controls for the individual level demographics specified in the methodology. The coefficients for the demographics are reported in *Table 7.7* in the appendix of this chapter. The demographic coefficients are found to be statistically and economically significant in most instances. Furthermore the demographic controls add vital information to the model, as seen in the increase in the R-squared in all estimations.

We will begin our analysis of the results from Panel A. In this panel the control group for the analysis includes those women who have an education greater than or equal to a high school level, less than 25 years of age ($\geq HS < 25$). The difference between the control group and the treatment, in this case, is the level of education. This panel shows there is a mild significant effect of belonging to Treatment A. However, there is no significant time effect across both models. This may be due to the inadequacy of the control as a comparison to the treatment group, as it is limited to those within the same age but excludes those who are within childbearing prime, who may also be a target of the policy. This specification also results in the negative coefficient seen on the treatment indicator when controlling for demographics. Considering that we require the control group to be unresponsive in comparison to the treatment with the introduction of the baby bonus (as defined by belonging in the treatment), this may indicate that Control 1 is not an adequate control as those belonging within the control are also responding to the introduction of the baby bonus, as shown in *Figure 3.1*.

Panel B and Panel C present the results using the alternative controls of less than high school, between 25 and 40 years of age ($< HS \geq 25 < 40$); and less than high school, greater than or equal to 25 years, respectively ($< HS \geq 25$). As can be seen these controls vary based on age, but have the same level of human capital as the treatment. Results in both panels are fairly similar to Panel A, and tend to only differ in magnitude. Again, we can see no significant time effects, but we note that the signs on the time dummies are fairly consistent across all panels. There tends to be a negative effect of time in 2004 possibly driven by the postponement of births after the announcement of the bonus, similar to that found in Gans & Leigh (2009), and a positive effect thereafter, when controlling for demographics. Additionally, it can be seen that there is a positive significant effect of having a child for those in the treatment group for model (1) in Panel C, which changes signs when controlling for demographics. There may be unobservable characteristics driving this result, it is safe to assume that limiting the sample at such a young age might impact on the analysis. Therefore we increase the age restriction on the treatment to incorporate more women into the treatment analysis, as shown in *Table 3.7*.

Table 3.6: Treatment and Time Interaction $\tau_{i,t} \times T$
Treatment A: $< HS < 25$

	Panel A		**Panel B**		**Panel C**	
	Control 1 $\geq HS < 25$		Control 2 $< HS \geq 25 < 40$		Control 3 $< HS \geq 25$	
	(1)	(2)	(1)	(2)	(1)	(2)
Treatment τ	0.0445*	-0.0342	-0.0041	-0.0325	0.0539**	-0.0999***
	(0.0242)	(0.0233)	(0.0265)	(0.0402)	(0.0232)	(0.0326)
2004	0.0013	-0.0071	-0.0106	-0.0205	-0.0026	-0.0038
	(0.0119)	(0.0100)	(0.0193)	(0.0196)	(0.0064)	(0.0064)
2005	-0.0007	-0.0093	0.0014	-0.0139	0.0000	-0.0002
	(0.0115)	(0.0095)	(0.0207)	(0.0211)	(0.0067)	(0.0066)
2006	-0.0018	-0.0051	0.0180	0.0216	0.0029	0.0078
	(0.0115)	(0.0097)	(0.0221)	(0.0225)	(0.0070)	(0.0069)
2007	0.0110	-0.0022	-0.0060	-0.0063	-0.0039	0.0005
	(0.0124)	(0.0103)	(0.0213)	(0.0223)	(0.0067)	(0.0067)
τ *2004	-0.0375	0.0014	-0.0256	-0.0006	-0.0336	-0.0264
	(0.0308)	(0.0283)	(0.0344)	(0.0338)	(0.0291)	(0.0293)
τ *2005	0.0003	0.0247	-0.0018	0.0313	-0.0005	0.0054
	(0.0335)	(0.0303)	(0.0377)	(0.0376)	(0.0322)	(0.0333)
τ *2006	0.0158	0.0137	-0.0039	-0.0029	0.0112	0.0094
	(0.0334)	(0.0297)	(0.0384)	(0.0376)	(0.0321)	(0.0326)
τ *2007	-0.0023	-0.0072	0.0147	0.0103	0.0126	0.0093
	(0.0343)	(0.0300)	(0.0384)	(0.0372)	(0.0326)	(0.0322)
Constant	0.0377***	-0.3418	0.0862***	0.0436	0.0283***	0.4757***
	(0.0083)	(0.3955)	(0.0136)	(0.1726)	(0.0045)	(0.0689)
Demographics	No	Yes	No	Yes	No	Yes
Observations	3,528	3,237	2,520	2,360	6,628	6,341
Adjusted R^2	0.0056	0.3695	-0.0014	0.1025	0.0089	0.0903

The output for the control variables can be found in *Table 7.3* in the appendix of this chapter.
Robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3.7 shows the results for Treatment B; women with less than high school qualification and less than 30 years of age ($< HS < 30$). Again, these are compared to the same controls as those seen in *Table 3.6*, with the age restriction lifted to 30. We find similar, and more significant results in this estimation in comparison to *Table 3.6*. We find that depending on the control, belonging to the treatment group could lead to a significant positive effect on fertility, but this effect reduces or disappears in significance when controlling for demographics, although it mostly remains positive. No significant time effects are observed and the interaction terms between the treatment and time are also insignificant. Overall when it comes to

Table 3.7: Treatment and Time Interaction $\tau_{i,t} \times T$
Treatment B: $< HS < 30$

	Panel A		**Panel B**		**Panel C**	
	Control $1 \geq HS < 30$		Control $2 < HS \geq 30 < 40$		Control $3 < HS \geq 30$	
	(1)	(2)	(1)	(2)	(1)	(2)
Treatment τ	0.0384*	-0.0513**	0.0319	0.0055	0.0837***	0.0178
	(0.0218)	(0.0226)	(0.0246)	(0.0368)	(0.0206)	(0.0311)
2004	0.0038	-0.0049	-0.0089	-0.0145	-0.0016	-0.0014
	(0.0119)	(0.0110)	(0.0202)	(0.0207)	(0.0057)	(0.0058)
2005	-0.0058	-0.0089	0.0074	-0.0074	0.0021	0.0022
	(0.0113)	(0.0107)	(0.0218)	(0.0223)	(0.0060)	(0.0061)
2006	-0.0058	-0.0056	0.0267	0.0271	0.0047	0.0092
	(0.0113)	(0.0106)	(0.0238)	(0.0242)	(0.0063)	(0.0065)
2007	0.0041	-0.0050	0.0023	-0.0023	-0.0012	0.0031
	(0.0117)	(0.0108)	(0.0228)	(0.0242)	(0.0061)	(0.0062)
τ*2004	-0.0370	-0.0200	-0.0244	-0.0153	-0.0316	-0.0339
	(0.0287)	(0.0284)	(0.0331)	(0.0332)	-0.0268	-0.0275
τ*2005	-0.0061	0.0159	-0.0192	0.0045	-0.014	-0.0161
	(0.0301)	(0.0301)	(0.0354)	(0.0361)	-0.0285	-0.03
τ*2006	0.0046	0.0326	-0.0279	-0.0176	-0.0059	-0.0101
	(0.0300)	(0.0288)	(0.0366)	(0.0368)	-0.0285	-0.0297
τ*2007	-0.0151	0.0141	-0.0133	-0.0050	-0.0098	-0.0168
	(0.0303)	(0.0289)	(0.0361)	(0.0363)	-0.0286	-0.029
Constant	0.0659***	0.1037	0.0725***	-0.0806	0.0207***	0.2015***
	(0.0082)	(0.1624)	(0.0140)	(0.1181)	-0.004	-0.0742
Demographics	No	Yes	No	Yes	No	Yes
Observations	5,746	5,313	2,520	2,360	6,628	6,341
Adjusted R^2	0.0010	0.2458	-0.0010	0.1021	0.0222	0.0840

The output for the control variables can be found in *Table 7.4* in the appendix of this chapter.
Robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

this specification of the difference-in-difference treatment category, controls (2) and (3) are the closest representatives of an adequate control group for this treatment, as the two specifications shown in Panel B and Panel C have consistent signs when controlling for demographics.

The preliminary results for Treatment C are summarised in *Table 3.8*. In this case we have much similar findings as seen in the previous preliminary results presented in *Table 3.7*. This table shows that being in the treatment group almost always results in an increase in the probability of having a child by approximately 4-8.5 per cent, although this result is negatively significant in Panel A when demographics are

Table 3.8: Treatment and Time Interaction $\tau_{i,t} \times T$
Treatment C: $< HS < 35$

	Panel A Control 1 $\geq HS < 35$		**Panel B** Control 2 $< HS \geq 35 < 40$		**Panel C** Control 3 $< HS \geq 35$	
	(1)	(2)	(1)	(2)	(1)	(2)
Treatment τ	0.0172	-0.0648***	0.0693***	0.0132	0.1012***	0.0841***
	(0.0180)	(0.0191)	(0.0213)	(0.0339)	(0.0163)	(0.0216)
2004	-0.0019	-0.0090	-0.0041	-0.0132	0.0015	0.0010
	(0.0113)	(0.0108)	(0.0200)	(0.0222)	(0.0041)	(0.0044)
2005	-0.0105	-0.0098	0.0043	-0.0061	0.0030	0.0040
	(0.0109)	(0.0108)	(0.0215)	(0.0235)	(0.0043)	(0.0046)
2006	-0.0053	-0.0018	0.0304	0.0362	0.0049	0.0088*
	(0.0110)	(0.0107)	(0.0256)	(0.0277)	(0.0046)	(0.0050)
2007	0.0025	0.0001	0.0381	0.0450	0.0062	0.0102*
	(0.0113)	(0.0108)	(0.0275)	(0.0292)	(0.0049)	(0.0052)
τ*2004	-0.0258	-0.0075	-0.0236	-0.0128	-0.0292	-0.0307
	(0.0245)	(0.0244)	(0.0296)	(0.0309)	(0.0221)	(0.0226)
τ*2005	0.0066	0.0123	-0.0082	0.0010	-0.0069	-0.0141
	(0.0258)	(0.0267)	(0.0317)	(0.0336)	(0.0237)	(0.0249)
τ*2006	0.0096	0.0298	-0.0261	-0.0261	-0.0006	-0.0022
	(0.0258)	(0.0253)	(0.0347)	(0.0362)	(0.0238)	(0.0247)
τ*2007	-0.0250	-0.0061	-0.0606*	-0.0711*	-0.0288	-0.0362
	(0.0253)	(0.0254)	(0.0357)	(0.0367)	(0.0232)	(0.0236)
Constant	0.0921***	-0.0354	0.0400***	-0.1039	0.0081***	0.0166
	(0.0079)	(0.0903)	(0.0139)	(0.1172)	(0.0027)	(0.0584)
Demographics	No	Yes	No	Yes	No	Yes
Observations	8,347	7,799	2,520	2,360	6,628	6,341
Adjusted R^2	-0.0003	0.1760	0.0055	0.1037	0.0461	0.0912

The output for the control variables can be found in *Table 7.5* in the appendix of this chapter.
Robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

included. This may be attributed to the control used; women with a higher level of education have a tendency to delay child rearing (in the 30-40 year old age category). We find that the treatment over time tends to be negative. We believe that the best control for this specification would be Control (1) and (3): greater than high school, less than 35 and less than high school, greater than 35. That is, in order to meet the conditions for the use of DID we need the treatment and control groups to follow similar trends pre policy, and in this case the controls do this effectively.

Table 3.9: Treatment and Time Interaction $\tau_{i,t} \times T$
Treatment D: $< HS < 40$

	Panel A Control $1 \geq HS < 40$		**Panel B** Control $2 < HS \geq 40$		**Panel C** Control $3 \geq HS \geq 40$	
	(1)	(2)	(1)	(2)	(1)	(2)
Treatment τ	-0.0064	-0.0635***	0.0841***	0.0543***	0.0814***	0.0428***
	(0.0135)	(0.0146)	(0.0117)	(0.0136)	(0.0118)	(0.0137)
2004	0.0014	-0.0049	0.0035	0.0033	0.0023	0.0015
	(0.0098)	(0.0096)	(0.0025)	(0.0030)	(0.0028)	(0.0031)
2005	-0.0041	-0.0030	0.0037	0.0055*	-0.0002	0.0017
	(0.0096)	(0.0096)	(0.0026)	(0.0032)	(0.0024)	(0.0028)
2006	-0.0029	-0.0012	0.0015	0.0047	-0.0017	-0.0001
	(0.0096)	(0.0094)	(0.0021)	(0.0029)	(0.0021)	(0.0025)
2007	0.0059	0.0038	0.0017	0.0051*	0.0004	0.0015
	(0.0099)	(0.0096)	(0.0023)	(0.0029)	(0.0024)	(0.0028)
τ*2004	-0.0196	-0.0085	-0.0217	-0.0253	-0.0205	-0.0242
	(0.0188)	(0.0189)	(0.0162)	(0.0166)	(0.0162)	(0.0167)
τ*2005	0.0046	0.0054	-0.0032	-0.0137	0.0006	-0.0102
	(0.0197)	(0.0203)	(0.0174)	(0.0181)	(0.0174)	(0.0180)
τ*2006	0.0189	0.0357*	0.0145	0.0112	0.0177	0.0158
	(0.0203)	(0.0203)	(0.0180)	(0.0187)	(0.0180)	(0.0187)
τ*2007	-0.0068	0.0110	-0.0027	-0.0102	-0.0013	-0.0069
	(0.0202)	(0.0204)	(0.0178)	(0.0182)	(0.0178)	(0.0182)
Constant	0.0916***	-0.2424***	0.0011	0.1132**	0.0039**	0.0976**
	(0.0068)	(0.0541)	(0.0011)	(0.0444)	(0.0017)	(0.0417)
Demographics	No	Yes	No	Yes	No	Yes
Observations	11,280	10,634	6,628	6,341	9,282	8,923
Adjusted R^2	0.0003	0.1333	0.0475	0.0890	0.0513	0.0860

The output for the control variables can be found in *Table 7.6* in the appendix of this chapter.
Robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Finally, with respect to our preliminary analysis, the results for Treatment D are reported in *Table 3.9*. This table shows that the coefficients for the treatment are much more consistent with respect to the treatment variable in Panels B and C of *Table 3.8*. This is logical as it compares people with a significant number of individuals with incomplete fertility to those with complete fertility. We also see positive time effects in Panel B from 2005 onwards, although the interaction terms are not significant. Furthermore controls (2) and (3) show that the treatment reduces by approximately half when controlling for demographics. Overall there is an expected increase in the probability of having a child by 4-8% if a woman belongs to the treatment category with reference to controls (2) and (3).

Now that we have a grasp on the preliminary results from estimation, we can now estimate equation (2).

3.4.3 Native-Immigrant Difference-in-Difference

This section discuss the results of the three-way interaction DID to determine whether there is a significant difference in the responses of immigrants in comparison to natives, given the introduction of the baby bonus. The results are summarised in *Table 3.10*.

In this specification we find that an immigrant in the treatment group, is less likely to have a child than a native in the treatment group. We can see this in the interaction between immigrant status and the treatment variable, $\tau_{i,t} \times I_{i,t}$. This is significant across Panel A, B and C, varying slightly in magnitude based on the control group used in the regression. The effect is also strongest for Treatments B and C, ranging between a 12 to 14 per cent decrease in the probability of having a child, conditional on the covariates. We find that the treatment changes the sign and significance several times across the alternative specifications. For example in Panel C we find that for those individuals in Treatment C (low education and less than 35 years of age), have a higher probability of having a child in comparison to Control (1), those individuals with the same level of education over the age of 35. But against those in Control (3), the results show that those women with a high level of education in the same age category have a decreased probability of having a child. This result is unsurprising, given that 35 years of age is bordering on completed fertility. An individual over the age of 35 will have a child regardless of the incentives, as their decision is based almost solely on other factors. Furthermore it was argued by the Australian government that those under the age of 35 are considered the target group as a whole, disregarding education levels (Martin et al., 2012).

Additionally, we find that the time effects given by the coefficients of the years 2004-2007 are as expected. We observe a decrease in the probability of having a child on average, then increase over time. The two-way interaction of immigrant status and 2004 results in an increased probability of having a child in most cases. However, the coefficients for the time and immigrant dummies are far from consistent across specifications. The same result is found when looking at the effect of belonging to the treatment group over time.

Finally we come to the coefficient of interest (γ_1, in equation (2)). This particular coefficient is difficult to interpret due to the use of a triple interaction. This triple interaction represents a two-way interaction that differs for each level of the third interaction (in this case time). The coefficient indicates the response of an immigrant in the treatment group over time in comparison to a native in the treatment group, accounting for the difference between immigrants and natives in the control group over the time period of 2003-2007. For example, the coefficient for the interaction term in 2004 ($Imm * \tau *2004$) shows the response of an immigrant in the treatment group, compared to an native in the treatment group, accounting for the difference in means for immigrants and natives in the control in 2004.[24]

[24]Refer to the appendix for the derivation of this interpretation.

Table 3.10: Three-way Interaction DID $\tau_{i,t} \times I_{i,t} \times T$

	Panel A $< HS < 25$			Panel B $< HS < 30$			Panel C $< HS < 35$			Panel D $< HS < 40$		
Control	$\geq HS < 25$	$< HS \geq 25$ < 40	$< HS \geq 25$	$\geq HS < 30$	$< HS \geq 30$ < 40	$< HS \geq 30$	$\geq HS < 35$	$< HS \geq 35$ < 40	$< HS \geq 35$	$\geq HS < 40$	$< HS \geq 40$	$\geq HS \geq 40$
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Immigrant	-0.0106	-0.0164	0.0040	-0.0050	0.0082	0.0155	0.0012	0.0488	0.0311	-0.0063	0.0105	-0.0046
	(0.0100)	(0.0399)	(0.0204)	(0.0099)	(0.0451)	(0.0252)	(0.0088)	(0.0594)	(0.0243)	(0.0040)	(0.0196)	(0.0041)
Treatment τ	-0.0904***	-0.0226	-0.0242	0.0281	0.0160	-0.0380	0.0942***	0.0310	-0.0497**	0.0576***	-0.0563***	0.0463***
	(0.0348)	(0.0423)	(0.0253)	(0.0328)	(0.0387)	(0.0246)	(0.0229)	(0.0355)	(0.0206)	(0.0144)	(0.0157)	(0.0146)
Imm*τ	-0.0898***	-0.0969*	-0.0892*	-0.1272***	-0.1409**	-0.1312***	-0.1028***	-0.1543**	-0.1411***	-0.0355	-0.0595	-0.0408
	(0.0300)	(0.0520)	(0.0497)	(0.0276)	(0.0556)	(0.0427)	(0.0346)	(0.0691)	(0.0428)	(0.0324)	(0.0395)	(0.0329)
2004	-0.0060	-0.0287	-0.0068	-0.0025	-0.0211	-0.0026	0.0014	-0.0167	-0.0049	0.0044	-0.0051	0.0008
	(0.0071)	(0.0207)	(0.0107)	(0.0064)	(0.0215)	(0.0117)	(0.0047)	(0.0222)	(0.0116)	(0.0035)	(0.0103)	(0.0038)
2005	0.0001	-0.0099	-0.0090	0.0029	-0.0016	-0.0014	0.0038	-0.0028	-0.0010	0.0053	0.0023	0.0015
	(0.0074)	(0.0228)	(0.0102)	(0.0067)	(0.0238)	(0.0115)	(0.0048)	(0.0232)	(0.0116)	(0.0035)	(0.0105)	(0.0035)
2006	0.0067	0.0149	-0.0067	0.0114	0.0314	-0.0045	0.0100*	0.0370	0.0005	0.0058*	-0.0031	-0.0002
	(0.0077)	(0.0240)	(0.0103)	(0.0073)	(0.0262)	(0.0112)	(0.0054)	(0.0288)	(0.0113)	(0.0033)	(0.0101)	(0.0032)
2007	0.0030	0.0030	0.0020	0.0059	0.0093	-0.0030	0.0137**	0.0613**	0.0021	0.0056*	0.0042	-0.0008
	(0.0077)	(0.0243)	(0.0112)	(0.0071)	(0.0262)	(0.0114)	(0.0059)	(0.0311)	(0.0114)	(0.0034)	(0.0103)	(0.0032)
Imm*2004	0.0136	0.0677	-0.0035	0.0064	0.0511	-0.0183	-0.0029	0.0138	-0.0269	-0.0060	0.0008	0.0022
	(0.0156)	(0.0622)	(0.0295)	(0.0151)	(0.0703)	(0.0339)	(0.0126)	(0.0794)	(0.0316)	(0.0058)	(0.0267)	(0.0064)
Imm*2005	-0.0012	-0.0276	-0.0031	-0.0038	-0.0442	-0.0646**	0.0005	-0.0257	-0.0608*	0.0015	-0.0325	0.0006
	(0.0154)	(0.0587)	(0.0271)	(0.0154)	(0.0683)	(0.0307)	(0.0145)	(0.0933)	(0.0311)	(0.0090)	(0.0263)	(0.0056)
Imm*2006	0.0070	0.0571	0.0174	-0.0132	-0.0355	-0.0076	-0.0070	-0.0020	-0.0143	-0.0060	0.0139	0.0004
	(0.0167)	(0.0682)	(0.0297)	(0.0147)	(0.0684)	(0.0344)	(0.0137)	(0.0948)	(0.0333)	(0.0059)	(0.0282)	(0.0048)
Imm*2007	-0.0162	-0.0929*	-0.0404	-0.0184	-0.1089*	-0.0163	-0.0213*	-0.1498**	-0.0116	-0.0032	-0.0009	0.0079
	(0.0128)	(0.0500)	(0.0281)	(0.0125)	(0.0567)	(0.0353)	(0.0109)	(0.0721)	(0.0339)	(0.0060)	(0.0277)	(0.0063)
τ*2004	-0.0370	-0.0042	-0.0101	-0.0475	-0.0222	-0.0332	-0.0442*	-0.0208	-0.0233	-0.0356**	-0.0167	-0.0325*
	(0.0319)	(0.0365)	(0.0302)	(0.0297)	(0.0355)	(0.0304)	(0.0240)	(0.0319)	(0.0260)	(0.0176)	(0.0202)	(0.0178)
τ*2005	-0.0067	0.0163	0.0129	-0.0270	-0.0104	-0.0009	-0.0164	-0.0041	0.0006	-0.0149	0.0006	-0.0115
	(0.0357)	(0.0404)	(0.0325)	(0.0325)	(0.0390)	(0.0325)	(0.0269)	(0.0349)	(0.0288)	(0.0194)	(0.0218)	(0.0195)
τ*2006	-0.0057	-0.0131	0.0014	-0.0390	-0.0478	0.0081	-0.0178	-0.0411	0.0121	0.0003	0.0277	0.0058
	(0.0349)	(0.0402)	(0.0318)	(0.0312)	(0.0391)	(0.0304)	(0.0261)	(0.0380)	(0.0268)	(0.0198)	(0.0215)	(0.0199)
τ*2007	-0.0111	-0.0172	-0.0255	-0.0355	-0.0310	0.0013	-0.0476*	-0.0943**	-0.0156	-0.0121	0.0096	-0.0063
	(0.0342)	(0.0399)	(0.0322)	(0.0310)	(0.0392)	(0.0307)	(0.0254)	(0.0394)	(0.0271)	(0.0195)	(0.0218)	(0.0195)
Imm*τ*2004	0.1129	0.0410	0.1138	0.1443**	0.0854	0.1310*	0.1423**	0.1125	0.1518**	0.0894*	0.0751	0.0797
	(0.0782)	(0.0924)	(0.0901)	(0.0661)	(0.0934)	(0.0758)	(0.0691)	(0.1033)	(0.0734)	(0.0517)	(0.0578)	(0.0520)
Imm*τ*2005	0.1212	0.1273	0.1268	0.1025	0.1284	0.1570**	0.0233	0.0438	0.0895	0.0123	0.0280	0.0126
	(0.1100)	(0.1078)	(0.0854)	(0.0666)	(0.0903)	(0.0723)	(0.0534)	(0.1054)	(0.0640)	(0.0503)	(0.0581)	(0.0500)
Imm*τ*2006	0.1809	0.1316	0.1393	0.3259***	0.3355***	0.2822***	0.1627**	0.1584	0.1803**	0.1007*	0.0803	0.0969
	(0.1126)	(0.1226)	(0.0904)	(0.1040)	(0.1178)	(0.0935)	(0.0775)	(0.1203)	(0.0789)	(0.0604)	(0.0654)	(0.0611)
Imm*τ*2007	0.2865*	0.3395**	0.2392***	0.2030**	0.2605**	0.1224	0.1004	0.2134**	0.0809	0.0040	-0.0039	-0.0024
	(0.1605)	(0.1472)	(0.0875)	(0.1030)	(0.1115)	(0.0998)	(0.0677)	(0.0961)	(0.0740)	(0.0507)	(0.0593)	(0.0512)
Constant	0.4769***	0.0450	-0.3479	0.2101***	-0.0722	0.0962	0.0166	-0.1055	-0.0380	0.1157***	-0.2438***	0.1001**
	(0.0690)	(0.1729)	(0.3948)	(0.0742)	(0.1177)	(0.1624)	(0.0591)	(0.1171)	(0.0902)	(0.0446)	(0.0543)	(0.0419)
Demographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,341	2,360	3,237	6,341	2,360	5,313	6,341	2,360	7,799	6,341	10,634	8,923
Adjusted R^2	0.0914	0.1034	0.3696	0.0875	0.1047	0.2468	0.0927	0.1048	0.1765	0.0896	0.1334	0.0867

Control variables include age, age squared, employment status, marital status, number of children, partners education, partners labour force status and religion.
See *Table 7.7* in the appendix of this chapter.
Robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The coefficient of γ_1 is consistently positive in all treatment-control combinations. In particular, the results show that for Treatment A there is a positive significant effect in 2007. Panel B shows a significant effect of being an immigrant in the treatment group in 2004, 2006 and 2007 for various controls and a positive effect for all other years. For example, in 2006, a female immigrant belonging to Treatment B has a 28-34 per cent chance of having a baby, in comparison to an immigrant in the control group. Similar results are seen in Panel A and Panel C. This is quite a large effect and shows that immigrants do respond to the implementation of monetary incentives in a significantly positive way. Additionally, there is a similar effect for immigrants in Treatment C, although the size of the effect is much smaller in comparison (between 16 and 18 per cent). This provides sufficient evidence that immigrants respond in a different manner to policies such as the baby bonus when the individual is a direct target for the policy.

3.4.4 Semiparametric Difference-in-Difference Results

To conduct the semiparametric estimation, we estimate the propensity scores to scale the distribution of outcomes for the treated and untreated groups such that the distribution of the covariates are the same for the treatment and control. To estimate the propensity scores, we compare natives in the treatment group to natives in the control and immigrants in the treatment to immigrants in the control. This will estimate the average treatment effect on the treated (ATT) for the two categories of treated individuals. We then compare the result for the ATT for immigrants and natives.

The results of the propensity score matching method are summarised in *Table 3.11.* The table shows that the direction of the ATT is consistent across all treatments, for each given control. From this table, it can be seen that the analogue of the treatment selected based intuition, is actually the poorest with respect to adjusting for bias for Treatments A, B and C. This negative coefficient can be attributed to unobservable characteristics present in the young age category, which may not have been controlled for in the matching process. Additionally, this result may be driven by the fact that, as age increases, the treatment analogue, which is used as a control, move towards their child bearing prime. Therefore it may not be considered a relevant control for the higher age restrictions.

Using Controls (2) and (3) we find an overall positive effect across almost all treatments. For those natives in Treatment A, there is an increased probability of having a child by approximately 5.8 per cent in comparison to the natives in Control (2). We see that this result is consistent with the findings for Treatment B, although there is an increase in this probability as individuals move towards the prime childbearing age (late 20's early 30's). Furthermore, a native in Treatment C has a 6-9 per cent increased probability of having a child in comparison to Controls (2) and (3). Treatment D shows a similar result to the other treatments. There is roughly an 8% increase in the probability of having a child for an individual in this treatment in comparison to natives for Controls (2) and (3). Again we attribute the negative coefficients of control (1) to unobservables, which we have been unable to condition upon in the matching process.

Finally, we compare the results for immigrants. We see that immigrants in the treatment group have a higher probability of having a child if they are in the treatment, than similar immigrants in the control group. For example an immigrant in Treatment B is 6.55% more likely to have a baby, in comparison to an immigrant in Control (2), which is highly significant. We also find that immigrant fertility is higher at a younger age in compt Overall, the results for immigrants are similar to that of natives in the same treatment category, but the magnitude tends to be larger for immigrants. This provides more evidence that natives and immigrants differ with respect to their response to the baby bonus.

The results in *Table 3.11* are consistent with the DID results reported in *Table 3.10* which showed an increase in the probability of immigrant fertility for those immigrants in the treatment group compared to natives in the treatment group. Propensity score matching based on immigrant status adjusts for any additional en-

Table 3.11: Propensity Score Results

	Treatment A			Treatment B		
	$\geq HS < 25$	$< HS \geq 25$ < 40	$< HS \geq 25$	$\geq HS < 30$	$< HS \geq 30$ < 40	$< HS \geq 30$
Native	-0.0160	0.0583***	0.0696***	-0.0201	0.0655***	0.0833***
	(0.0233)	(0.0120)	(0.0117)	(0.0196)	(0.0141)	(0.0112)
Immigrant	-0.1200	0.0638	0.1176**	-0.0581	0.0732	0.1047***
	(0.1328)	(0.0518)	(0.0481)	(0.0776)	(0.0668)	(0.0362)

	Treatment C			Treatment D		
	$\geq HS < 35$	$< HS \geq 35$ < 40	$< HS \geq 35$	$\geq HS < 40$	$< HS \geq 40$	$\geq HS > 40$
Native	-0.0397**	0.0587***	0.0910***	-0.0467***	0.08069***	0.0812***
	(0.0173)	(0.0153)	(0.0090)	(0.0145)	(0.0063)	(0.0068)
Immigrant	0.0071	0.0806	0.0786***	0.0871***	0.0905***	-0.0124
	(0.0610)	(0.0548)	(0.0267)	(0.0179)	(0.0191)	(0.0451)

We do not include partner's labour force status as a mating covariate as it causes failure in the convergence of the propensity score distribution.

Robust standard errors in parentheses.

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

dogeneity or bias that may be present due to observable characteristics, pooled across years. However, if there are unobservables in this estimation, then propensity score matching may result in incorrect estimates. Therefore, we use the propensity scores derived above in a semiparametric estimation of the ATT, which will account for these unobservables. The results for the semiparametric estimation are summarised in *Table 3.12*.

Table 3.12: Semiparametric Difference-in-Difference

	Treatment A			**Treatment B**		
	$\geq HS < 25$	$< HS \geq 25$ < 40	$< HS \geq 25$	$\geq HS < 30$	$< HS \geq 30$ < 40	$< HS \geq 30$
Native	-0.0454	0.0583**	0.0878**	-0.0553*	0.0447	0.0821***
	(0.0398)	(0.0285)	(0.0291)	(0.0322)	(0.0279)	(0.0237)
Immigrant	0.1900	0.2760	0.2481	0.0965	0.1639	0.1377
	(0.1435)	(0.1920)	(0.1748)	(0.0672)	(0.1140)	(0.0970)
	Treatment C			**Treatment D**		
	$\geq HS < 35$	$< HS \geq 35$ < 40	$< HS \geq 35$	$\geq HS < 40$	$< HS \geq 40$	$\geq HS > 40$
Native	-0.0469**	0.0231	0.0739***	0.0747***	0.0837***	-0.0551***
	(0.0238)	(0.0300)	(0.0190)	(0.0130)	(0.0150)	(0.0213)
Immigrant	-0.0509	0.0964	0.0826	0.0405	0.0489	-0.0517
	(0.0624)	(0.0671)	(0.0582)	(0.0296)	(0.0344)	(0.0394)

Estimated over the time preiod of 2003-2007

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

The semiparametric estimation shows there is a general positive probability of having a child for both immigrant and native women. However, Control (1) switches sign as the treatment age restriction increases. For Treatment A, the probability of having a child is substantially higher for immigrant women than for native women, although insignificant across all three estimations. Treatment A provides evidence that those women responding to the implementation of the baby bonus are young adults and have a low level of human capital. This result is consistent with the findings in Martin et al. (2012).

The results for Treatment B are similar to the findings of Treatment A, but smaller in magnitude. We find the probability of having a child decreases against controls (2) and (3), as we broaden the sample of the treatment group. Again in Treatment C we see that controls (2) and (3) is higher for immigrants than their native counterparts. The results for Treatment D are mixed, but are not concerning as this treatment was included for the purpose of covering the population of possible women with incomplete fertility. As it is highly unlikely for many women to give birth in their very late 30's, therefore these estimates may be biased downwards, especially since treatments A, B and C show very similar outcomes. Overall we find that the probability of having a child is higher for immigrant women in the treatment then their counterparts in the control.

3.5 Discussion and Conclusion

This study investigated the effects of monetary incentives on fertility such as the 'baby bonus' in a natural experimental setting using the HILDA. The difference-in-difference and semiparametric DID methodologies applied in this setting allows for the examination of revealed preferences for child bearing for Australian women. The main finding of this study is the observed increase in fertility for women with low levels of human capital when governments provide once off monetary payments for child bearing.

Overall we find a positive effect of the baby bonus on fertility. This effect is particularly significant in 2007 for those in the Treatment A. For Treatment B and C, we find a significant effect over 2006 and 2007. The effect is strongest for Treatment B, in which individuals are in their childbearing prime. We also find in the years where major revisions were undertaken the response was stronger. This time effect may be a result of these subsequent revisions of the baby bonus, resulting in an increase in the observed threshold. Furthermore, the delayed increase may be attributed to the amount of time it takes for fertility decisions to adjust over time. Using propensity score matching, we find similar results for individuals belonging to the treatment group. We observe a decrease in the probability of having a child on average, then increase over time.

We find evidence to suggest that the response of immigrants and natives to the baby bonus is different. The effect is larger for immigrants in the treatment, increasing the probability of having a child by 7-10 per cent in comparison to immigrants in the control for Treatment B when implementing propensity score matching. Similar results are found for natives between 6-8 per cent. When applying a semi-parametric analysis we find these numbers at least double for immigrant women. We also find that immigrant women have an increased probability of having a child given the baby bonus if they are in the treatment group than that of native women, although this result is insignificant. Additionally these findings support the theory developed in *Section 3.2*.

From this we can conclude that the Australian government's implementation of the baby bonus was successful in increasing the fertility rate of those most likely to receive the bonus: women with a low level of human capital. This is especially true for women in the immigrant category with low levels of human capital. As can be seen from the data, we can infer that the policy was effective in improving the fertility rate at the individual level for those residing in Australia. This result is consistent with previous findings in the literature in the context of Australia.

However, the empirical results of this study suggest that this increase in fertility associated with the implementation of the baby bonus was driven by an increase in fertility for women with low levels of human capital. Whether these women were the intended target of the policy is unclear. Therefore policymakers need to consider the groups who may respond to incentives when devising population policies.

Additionally, it has been suggested that the overall increase in the fertility rate is may not be a reflection of the increased child bearing of women with a low level of human capital, but a reflection of the change in social preferences and this observed increase is due to other factors other than the baby bonus. There has been a long term trend towards postponement of children for many women as education levels increased over time. This may have resulted in the initial decrease in the total fertility rate. As the cohort of well-educated Australian women is getting older we are finding a correction for that as previously postponed births are now being born. However, the development of our treatment and control groups in this analysis confirms the role of the bonus in increasing the total fertility rate as both women with both high and low levels of human capital respond to the implementation of the bonus, however the effect is strongest for those with lower education levels.

As the implementation of this bonus incentivised women with low levels of human capital to have children, it raises the question on whether this effect was intentional. The overall result did improve the total fertility rate, however it may be suggested that the subsequent removal and implementation of the paid parental leave system may have been a result of this observed increase in fertility for women with low levels of human capital. The current paid parental leave system, which replace the bonus, is aimed at working women, as it is only available to those who are employed. This change in policies has been actively been debated within Australia for many years as women with a high level of education are more likely to postpone child bearing and rearing. The governments paid parental leave system may be an effort to incentivise working women as those women with a high level of education are more likely to return to work earlier than women with a low level of education. Providing adequate incentives to these women can contribute in a positive manner to the total fertility rate and the economy as a whole.

Chapter 4 Study 2: Employment Instability and Fertility in Australia

4.1 Introduction

Economic and social conditions impact on the decision to bear children; however, the exact relationship is still indeterminate due to the complexity of the fertility decision. Classical economic theory suggests that a counter-cyclical relationship between fertility and unemployment rates should be expected. That is during times of high unemployment, women should have more children as opportunity costs are low (see Adsera & Menendez, 2009; Sobotka et al., 2011). With the exception of some European countries, which experience low levels of female participation in the labour force, this is not generally observed. Recent evidence shows that most developed countries exhibit a pro-cyclical relationship between fertility and unemployment. That is, when more people are employed, women are more likely to have children. Whilst this pro-cyclical relationship is seen in Australia, very little work has been done on the individual level of unemployment and the effects on the fertility decision.

Recent studies have focused on the effect of employment uncertainty on the decision to bear children. Studies have not adequately developed a reason for the reversal of the relationship between unemployment and fertility observed in many developed countries (Castles, 2003; Kogel, 2004).

While there are a few key papers that explore this relationship between stability and fertility, it has not been investigated in the context of the Australian economy (see for example Schmidt, 2008; Hondroyiannis, 2010; Santarelli, 2011; Vignoli et al., 2012; Kreyenfeld et al., 2012). This study aims to provide evidence of the pro-cyclical relationship between fertility and unemployment within Australia using novel econometric techniques. Australia may provide an interesting case study as it has a relatively high female labour force participation rate, whilst being considered a welfare state (Castles, 2001). Moreover, studies that link unemployment to the fertility decision in an Australian context use hazard ratio models (Fan & Maitra, 2010). However, these models do not consider the endogenous relationship of fertility and unemployment present in the interaction between fertility and labour market participation, which this study aims to test. We explore this endogenous relationship; however we argue that it is not the level of employment that matters in the childbearing decision, but the stability of a woman's job or employability. The literature suggests that if unemployment is relatively high or employment consists predominantly of temporary contract jobs, and fertility rates tend to be low, indicating the importance of the economic stability of an individual contributes to the fertility decision (Adsera, 2004; Santarelli, 2011; Kreyenfeld et al., 2012). Therefore, the stability of potential parent's employment contributes significantly to the fertility decision.

Del Bono et al. (2011) show that the reduction in fertility is not due to the income loss generated by unemployment, but arises because displaced workers undergo a career interruption, resulting in a significant loss of job specific human capital. It has been suggested that the birth of a child also reduces the accumulation of job specific human capital. Therefore, the fertility decision is strongly tied to the impression of career interruption or job stability, such that it creates a disincentive for women with high education or qualifications to have children.

This study aims to explore the issue of employment stability and job displacement on the fertility decision of Australian women using the *Household, Income and Labour Dynamics in Australia* (HILDA) *Survey.* At present, the literature has not developed a clear and adequate explanation for why there has been a shift towards the pro-cyclical theory of fertility and why there is an increasing emphasis on the importance of employment stability and job security in the child bearing decision. This study aims to provide evidence in support of pro-cyclical fertility and stability in the Australian context. Due to the endogenous nature of fertility, we will use instrumental variables and propensity score matching methods in our analysis. Furthermore, we take into account heterogeneity in age through the use of stratified propensity score matching, as the fertility decision varies significantly based on the age of the individual. Finally, we add to the literature through a comparison of employment stability and fertility for the immigrant and native subpopulations in the HILDA.

4.2 Methodology

The relationship we want to estimate can be expressed as

$$F_i = \beta_0 + \beta_1 Unemployed + \beta_i \mathbf{X}_i + \epsilon_i \quad (1)$$

where F_i is fertility and is defined as a life event, for which the response is 1 for having a child in a given year and 0 for not having a child in a given year. $\mathbf{X}_i$ is a vector of individual characteristics including age, age squared, number of children, relationship status, religion, educational qualification, occupation and partner's education and labour force status. Our analysis is restricted to females who are active in the labour force. Unemployment is defined as a binary variable given by the Australian Bureau of Statistics (ABS) definition of employment status, this restricts the sample to those who class themselves as employed or unemployed and actively seeking work.[25]

As it is unlikely that unemployment has an exogenous impact on fertility, we use two techniques to address the endogenous relationship between fertility and unemployment: instrumental variables (IV) and propensity score matching (PSM). We also investigate the issue of employment instability, which we believe is the true driver of the fertility decision. We do this by replacing unemployment with a self-assessed indicator for job security in equation (1). Stability is given by a question that asks how secure an individual believes their job is on a 7-point scale.[26] PSM

[25]Those individuals who class themselves as 'Not in the Labour Force (NILF)' are excluded to keep the dependent variable binary. These individuals, by definition are not actively seeking work.

[26]Participants in the HILDA survey are asked to rate the statement "I have a secure future in my job" on a scale from 1-7 where 1 is Strongly Disagree and 7 is Strongly Agree.

requires a binary variable for stability to explore treatment effects. Therefore, we use the job security survey response to define an individual who considers herself in a stable job as one who responds at the high end of the scale between 4-7.[27] These individuals receive a 1 for job stability. Those who answer in the 1-3 point response are considered to be in an unstable job and are given a 0.

4.2.1 Instrumental Variables

The relationship between fertility and unemployment is endogenous in nature. This poses two main questions; (1) Do people leave the workforce (become unemployed) in order to have a child? or (2) Are they already unemployed and therefore more willing to have a child? Consequently, we need to use an adequate instrument that is correlated with the unemployment outcome, but is uncorrelated with the outcome of fertility, making the instrument exogenous to the model, and relevant.

We employ instrumental variables to address this issue of endogeneity in the fertility decision by estimating a first stage regression using an instrument (Z_i) which is correlated with unemployment but uncorrelated with the fertility outcome.

$$\widehat{Unemployed}_i = \alpha + \gamma Z_i + \beta \mathbf{X_i} + \nu_\mathbf{i} \tag{2}$$

We then use the predicted value from the above equation to estimate the second stage regression

$$F_i = \beta_0 + \beta_1 \widehat{Unemployed}_i + \beta_i \mathbf{X}_i + \epsilon_i \tag{3}$$

In economics, the lagged value of a variable is often used as an instrumental variable. Hence, we begin this analysis with lagged unemployment status as a starting point. However, lagged unemployment may not be an adequate instrument as periods of unemployment are highly correlated over time. This may be a problem if we

[27] Points 4-7 represents those who consider their job as secure to very secure (somewhat agree to strongly agree with the statement).

believe unemployment to be endogenous to the analysis. Therefore using the lag of unemployment as an instrument may not be valid, as it may be correlated with the error term. Furthermore, as fertility decisions are made over a significantly long time period, the relationship between fertility and lagged unemployment may be dynamic over this time period. Therefore we expect the use of lagged unemployment to reduce the potential bias from the endogeneity issue, but not eliminate it completely. We therefore use a second, more stringent instrument for our analysis.

Del Bono et al. (2011) recommended job displacement from firm closure as an instrument for unemployment. Job displacement is exogenous to the unemployment decision as unemployment is forced onto the individual by the firm. The HILDA does not track firm closure; hence we are unable to track displaced workers in this manner. However, the HILDA reports information on significant life events including whether an individual was made redundant in a given year. We consider forced redundancy, an exogenous shock to unemployment, and therefore use it as our second and most important instrument for our analysis.[28]

We compare the result from using both instruments. We expect that using lagged unemployment may result in higher coefficient estimates on unemployment than redundancy. We estimate the relationship between fertility and unemployment using OLS in a pooled and panel framework for comparison. We report the robust standard errors for the OLS and we cluster on the person identification for the panel estimations.

4.2.2 Propensity Score Matching

The motivation for the use of propensity score matching arises from the need to adjust for selection effects, driven by underlying differences in those women who choose to have a child as a result of being unemployed and those who choose to have a child given they are employed. Propensity score matching allows us to adjust

[28]The HILDA allows for the extrapolation of forced redundancy from all redundancy as the follow-up to the redundancy question is one on whether the redundancy was voluntary.

the estimates for these differences based on observable characteristics, identify the treatment effect and reduce potential bias (Rosenbaum & Rubin, 1983). One of the advantages of propensity score matching is the reduction in curse of dimensionality. We match individuals on observed control variables including age, gender, number of children, marital status, educational qualifications, partner's labour force status and religion (see Lehrer, 1996; Van de Kaa, 1996). The simplified version of the original model can be expressed as:

$$F_i = \beta \mathbf{X}_i + \epsilon_i \tag{4}$$

where F_i is the binary variable, for having a child. $\mathbf{X}_i$ are the control variables used for matching. We know that:

$$E(F_i) = 1 \times Pr(F_i) + 0 \times Pr(F_i = 0) = Pr(F_i = 1) \tag{5}$$

Letting $P_i = Pr(F_i = 1)$ and $1 - P_i = Pr(F_i = 0)$ then we can express this as

$$E(F_i) = 1 \times P_i + 0 \times (1 - P_i) = P_i \tag{6}$$

and thus

$$Pr(F_i = 1 | x_{1,i}, x_{2,i}, x_{3,i}, \ldots x_{k,i}) = \beta \mathbf{x}_i \tag{7}$$

We need to obtain the difference between the outcomes of having a child on the unemployment status of the parent, where unemployment is indicated as $u_i = 1$ and zero otherwise. Defining the choice of the individual to have a child and not have a child as F_i^1 and F_i^0 respectively. In order to find the treatment on the treated given as:

$$E(F_i^1 - F_i^0 | u_i = 1) \tag{8}$$

The counterfactual, $E(F_i^0 | u_i = 1)$ is not observed. What is realised in the data is that the individual does not choose to become unemployed, that is we can ascertain when an individual remains employed, $E(F_i^0 | u_i = 0)$.

Following this process we then use the conditional independence of those who are unemployed and the counterfactual ($E(F_i^0|u_i = 1)$). This allows us to then estimate the parameter of interest, expressed as:

$$E(F_i^1|\mathbf{X}_i, u_i = 1) - E(F_i^0|\mathbf{X}_i, u_i = 0) \tag{9}$$

By using propensity scores that are obtained through the matching on $\mathbf{X}_i$, we obtain a difference between the means of treatment group and those who are not subject to treatment. This is the difference in fertility for those who decide have a child as a result of unemployment.

We apply the same method described above to test the hypothesis that employment instability, in this case measured by self-assessed job stability, contributes significantly to the fertility decision. Furthermore to analyse the robustness of these results we use our exogenous variable, redundancy, as a treatment in the propensity score matching method. This will allow us to see the outcome of an exogenous shock to unemployment on the fertility outcomes of individuals (see Eliason & Storrie, 2006). For this application of PSM, we use a logit model to estimate the average treatment on the treated (ATT).

4.3 Data

For this study, we use the *Household, Income and Labour Dynamics in Australia* (HILDA) *Survey*. The HILDA is a panel survey, which follows a cohort of individuals from 2001 to 2011. Resampling is conducted only in 2011. We look at women who are within working age (16-65) over all waves 2002-2011.[29] We use Panelwhiz (see Haisken-DeNew & Hahn, 2010) in conjunction with Stata 12 for our analysis.

The methodology we have selected restricts our sample to women in the labour force, due to the need for a binary outcome measure or treatment to implement propensity score matching. We select the control covariates based on the existing fertility literature. These include, age, age squared, relationship status, education,

[29] 2001 was not included in the analysis as we create lagged variables. Therefore we lose a year of the survey.

occupation (or prior occupation if unemployed), partner's education, partner's labour force status and religion. The description of the variables we include in our analysis can be found in *Table 4.1*.

Our dependent variable is a binary measure of fertility. Fertility is defined as a life event response from the survey, which specifically asks if the individual had a child in a given year. We keep only observations that have no missing values for the variables of interest and covariates. As there are a significant number of responses with no partner data recorded, if the partner's data is missing for either education or labour force status we allocate that observation to an additional "missing" category to capture any additional information on single households. If information is missing for the woman's age, relationship status, education, occupation, or religious response, the observation is dropped. to balance the sample. In total the sample consists of 30,435 observations for the analysis of unemployment and 27,990 observations for stability. Descriptive statistics are summarised in *Table 4.2*. Additionally, we report the descriptive statistics for both the employed and unemployed subsamples, as well as the differences in means. From this table we can see that a woman has slightly above a two percent probability of having a child across the sample, and the probability of being unemployed is 4.2%. The unconditional level of fertility is not significantly different between employed and unemployed women. The average woman in the sample also has 1.4 children, which is low in comparison to the average reported by the ABS (Australian Bureau of Statistics, 2012). However, those women who are employed have 1.45 children compared to the 1.3 for unemployed women. This is a statistically significant difference at a 5% level.

Table 4.1: Variable Description

Variable	Type	Description
Fertility	Binary	Had a baby that year. (0) No (reference), (1) Yes.
Unemployment	Binary	ABS LFS Definition (0) Employed, (1) Unemployed.
Stability	Binary	I have a secure future in my job (0) No, (1) Yes.
Age	Continuous	Age of the mother.
Age Squared	Continuous	Age of the mother squared.
Marriage	Binary	Married or Defacto (0) No (reference) (1) Yes.
No. of Children Status	Continuous	Number of children the woman already has. & (3) Not in labour force.
Education	Dummy	(1) Postgrad, (2) Grad Diploma/Certificate, (3) Bachelor or honours, (4) Diploma, (5) Cert III or IV, (6) Cert I or II (7) Cert Other, (8) Year 12 (reference) (9) Year 11 and below.
Occupation	Dummy	(1) Managers (reference), (2) Professionals, (3)Technicians and Trades Workers, (4) Community and Personal Services (5) Sales Workers, (6) Clerical and Administrative Workers (7) Machinery Operators and Drivers, (8) Labourers, (9) Missing
Partners Emp Status	Dummy	Employment (1) Employed (reference) (2) Unemployed & (3) Not in labour force, (4) No Partner LFS Reported
Partners Education	Dummy	(1) Postgrad, (2) Grad Diploma/Certificate, (3) Bachelor or honours, (4) Diploma, (5) Cert III or IV, (6) Cert I or II (7) Cert Other, (8) Year 12 (reference) (8) Year 11 and below.
Religion	Dummy	Religion of mother. (1) Judeo-Christian (reference) (2) Buddhism (3) Hinduism (4) Islam (5) Judaism (6) Other Religion (7) No Religion
Immigrant	Binary	Immigrant status by country of birth (0) Native, (1) Immigrant.

Table 4.2: Descriptive Statistics

Variable	Pooled	Employed	Unemployed	Mean Difference
Fertility	0.024	0.024	0.032	-0.008
	(0.153)	(0.152)	(0.176)	(0.004)
Unemployed	0.042	0.000	1.000	-1.000
	(0.201)	(0.000)	(0.000)	(0.000)
Security	0.842	0.842	0.542	0.301***
	(0.365)	(0.364)	(0.502)	(0.043)
General Covariates				
Age	39.237	39.499	33.278	6.221***
	(12.822)	(12.735)	(13.343)	(0.364)
Agesq	1703.968	1722.364	1285.308	437.056***
	(1009.422)	(1006.798)	(978.319)	(28.708)
No children	1.438	1.446	1.260	0.186***
	(1.386)	(1.379)	(1.524)	(0.040)
Immigrant	0.181	0.181	0.184	-0.003
	(0.385)	(0.385)	(0.388)	(0.011)
Single	0.357	0.348	0.568	-0.220***
	(0.479)	(0.476)	(0.496)	(0.014)
Married	0.492	0.502	0.273	0.229***
	(0.500)	(0.500)	(0.446)	(0.014)
Defacto	0.151	0.150	0.158	-0.008
	(0.358)	(0.357)	(0.365)	(0.010)
Educational Qualification				
Postgrad	0.040	0.041	0.019	0.022***
	(0.196)	(0.198)	(0.136)	(0.006)
Grad Diploma, Grad Cert	0.079	0.082	0.022	0.060***
	(0.270)	(0.274)	(0.146)	(0.008)
Bachelors or Honours	0.178	0.182	0.084	0.098***
	(0.383)	(0.386)	(0.278)	(0.011)
Adv Diploma, Diploma	0.101	0.103	0.057	0.046***
	(0.302)	(0.304)	(0.232)	(0.009)
Cert III or IV	0.155	0.154	0.176	-0.022*
	(0.361)	(0.361)	(0.381)	(0.010)
Cert I or II	0.014	0.014	0.030	-0.017***
	(0.119)	(0.116)	(0.172)	(0.003)
Cert not defined	0.005	0.004	0.016	-0.012***
	(0.069)	(0.065)	(0.127)	(0.002)
High School (reference)	0.182	0.181	0.212	-0.031**
	(0.386)	(0.385)	(0.409)	(0.011)
Year 11 and below	0.245	0.239	0.383	-0.144***
	(0.430)	(0.427)	(0.486)	(0.012)
Occupation*				
Managers	0.091	0.094	0.007	0.087***
	(0.287)	(0.292)	(0.084)	(0.008)
Professionals	0.266	0.277	0.027	0.249***
	(0.442)	(0.447)	(0.163)	(0.013)
Technicians and Trades Workers	0.039	0.041	0.009	0.031***
	(0.194)	(0.197)	(0.096)	(0.006)
Community and Personal Service Workers	0.142	0.146	0.045	0.101***
	(0.349)	(0.353)	(0.208)	(0.010)
Clerical and Administrative Workers	0.234	0.242	0.061	0.181***
	(0.423)	(0.428)	(0.239)	(0.012)
Sales Workers	0.119	0.121	0.066	0.055***
	(0.324)	(0.326)	(0.249)	(0.009)
Machinery Operators and Drivers	0.011	0.011	0.002	0.009**
	(0.102)	(0.104)	(0.048)	(0.003)
Labourers	0.068	0.069	0.059	0.010
	(0.252)	(0.253)	(0.235)	(0.007)
Refused occupation response	0.031	0.000	0.723	-0.723***
	(0.173)	(0.019)	(0.448)	(0.003)

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.2: Descriptive Statistics Cont.

Variable	Pooled	Employed	Unemployed	Mean Difference
Partner's Educational Qualification				
Postgrad	0.034	0.035	0.014	0.021***
	(0.182)	(0.184)	(0.118)	(0.005)
Grad diploma, grad certificate	0.037	0.037	0.014	0.023***
	(0.188)	(0.190)	(0.118)	(0.005)
Bachelor or honours	0.093	0.095	0.037	0.058***
	(0.290)	(0.293)	(0.190)	(0.008)
Adv diploma, diploma	0.060	0.062	0.034	0.027***
	(0.238)	(0.240)	(0.182)	(0.007)
Cert III or IV	0.181	0.183	0.123	0.060***
	(0.385)	(0.387)	(0.329)	(0.011)
Cert I or II	0.006	0.005	0.013	-0.008***
	(0.074)	(0.072)	(0.114)	(0.002)
Cert not defined	0.002	0.002	0.003	-0.002
	(0.040)	(0.040)	(0.056)	(0.001)
High School	0.540	0.550	0.307	0.243***
	(0.498)	(0.498)	(0.461)	(0.014)
Year 11 and below	0.112	0.111	0.129	-0.018*
	(0.315)	(0.314)	(0.335)	(0.009)
Partner Education Not Reported	0.414	0.406	0.601	-0.195***
	(0.493)	(0.491)	(0.490)	(0.014)
Partner's LFS				
Employed	0.062	0.064	0.030	0.033***
	(0.242)	(0.245)	(0.172)	(0.007)
Unemployed	0.010	0.008	0.042	-0.034***
	(0.097)	(0.090)	(0.201)	(0.003)
Not in LF	0.037	0.036	0.050	-0.014**
	(0.188)	(0.186)	(0.218)	(0.005)
No Partner LFS Reported	0.414	0.406	0.601	-0.195***
	(0.493)	(0.491)	(0.490)	(0.014)
Religion				
Judeo-Christian (reference)	0.628	0.632	0.549	0.083***
	-0.483	-0.482	-0.498	-0.014
Buddhism	0.018	0.018	0.012	0.007
	(0.133)	(0.134)	(0.108)	(0.004)
Hinduism	0.005	0.005	0.005	-0.000
	(0.071)	(0.071)	(0.074)	(0.002)
Islam	0.005	0.005	0.016	-0.011***
	(0.073)	(0.070)	(0.124)	(0.002)
Judaism	0.004	0.004	0.004	-0.000
	(0.060)	(0.060)	(0.062)	(0.002)
Other religion	0.014	0.014	0.031	-0.018***
	(0.119)	(0.116)	(0.174)	(0.003)
No religion	0.283	0.281	0.319	-0.037**
	(0.450)	(0.450)	(0.466)	(0.013)
Refused religious response	0.043	0.042	0.065	-0.023***
	(0.202)	(0.200)	(0.246)	(0.006)
Observations	30435	29154	1281	30435

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
NOTE: Occupation is derived from current occupation for women who are employed. For women who are unemployed, the occupation response comes from the previous occupation before unemployment occurred.

The mean differences for education are statistically significant across all levels of education. A woman in the sample has an 18.2% chance of having a high school level of education. Moreover, unemployed women are 21.2% more likely to have a high school level of education, which is 3.1% more than women who are employed. Furthermore, significantly more employed women have a professional occupation.[30] Religious affiliation leans strongly towards Judeo-Christian religions, which account for 63% of religious affiliations.

[30] Compared to the response for unemployed women who listed their previous occupation in this variable.

4.4 Results

The results for our initial fertility regressions can be found in *Table 4.3*. Specification (1) reports the pooled OLS regression results. Specification (2) and (3) report the fixed and random effects panel models. The random effects model assumes that individual specific effects are uncorrelated with the independent variables within the model. Alternatively, the fixed effect model relaxes this assumption, allowing individual specific effect to be correlated with the independent variables within the regression model. Both models allow for unobserved heterogeneity which is not accounted for in the pooled regressions.

These results suggest a married woman has a 1.5-6 percent increased probability of having a child compared to a single woman. A similar result is found for those individuals in a de-facto relationship. The coefficient on the number of children is positive and significant. This suggests, if the woman already has a child it becomes less likely that she will have another child in the future. Education also plays an important role in the fertility decision. We find that women who have an qualification greater than an advanced diploma have a positive and statistically significant probability of having a child in comparison to women who have a high school level of education. This is finding is similar across the unemployment and stability specifications, however the coefficients in the stability specification are smaller than those reported in the unemployment specification. Furthermore, religion does not play a significant effect overall in any of the specifications.

More importantly, unemployment is shown to have a significantly negative effect on the probability of having a child in all 3 specifications. Unemployment results in a 1-1.7% decreased in the probability of having a child, which is as expected. Additionally, in the stability model we find the opposite significant relationship suggesting the job stability results in a positive effect on the probability of having a child, but the magnitude is much smaller. The magnitude for both unemployment is slightly larger than stability. However, these results do not give us an adequate idea of the relationship between unemployment and fertility, due to the endogeneity issue going unaddressed in the simple OLS and panel specifications in *Table 4.3*.

Table 4.3: Impact of Unemployment and Stability on Fertility

	Dependent variable is fertility					
	Unemployment			Stability		
Variables	(1) OLS	(2) FE	(3) RE	(1) OLS	(2) FE	(3) RE
Unemployed	-0.0109**	-0.0174**	-0.0109**			
	(0.0049)	(0.0069)	(0.0052)			
Stability				0.0057***	0.0067**	0.0056***
				(0.0019)	(0.0026)	(0.0020)
General Covariates						
Age	-0.0010**	-0.0187***	-0.0017***	-0.0010***	-0.0173***	-0.0014***
	(0.0004)	(0.0021)	(0.0004)	(0.0004)	(0.0017)	(0.0004)
AgeSq	-0.0000***	0.0002***	-0.0000**	-0.0000***	0.0001***	-0.0000*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	0.0181***	0.0556***	0.0203***	0.0146***	0.0420***	0.0158***
	(0.0037)	(0.0086)	(0.0043)	(0.0036)	(0.0084)	(0.0040)
Defacto	0.0196***	0.0289***	0.0177***	0.0202***	0.0286***	0.0190***
	(0.0040)	(0.0067)	(0.0044)	(0.0039)	(0.0067)	(0.0041)
No.Children	0.0123***	0.1468***	0.0173***	0.0110***	0.1372***	0.0141***
	(0.0008)	(0.0118)	(0.0011)	(0.0008)	(0.0095)	(0.0010)
Educational Qualification						
Postgrad	0.0261***	0.0752***	0.0341***	0.0248***	0.0598***	0.0292***
	(0.0060)	(0.0192)	(0.0074)	(0.0059)	(0.0179)	(0.0070)
Grad diploma, grad certificate	0.0180***	0.0568***	0.0218***	0.0129***	0.0532***	0.0152***
	(0.0046)	(0.0128)	(0.0051)	(0.0043)	(0.0131)	(0.0048)
Bachelor or honours	0.0165***	0.0329***	0.0172***	0.0127***	0.0315***	0.0135***
	(0.0035)	(0.0064)	(0.0038)	(0.0033)	(0.0060)	(0.0036)
Adv diploma, diploma	0.0150***	0.0234***	0.0171***	0.0113***	0.0192***	0.0127***
	(0.0038)	(0.0069)	(0.0044)	(0.0036)	(0.0054)	(0.0040)
Cert III or IV	0.0031	-0.0006	0.0024	0.0033	0.0015	0.0024
	(0.0030)	(0.0067)	(0.0032)	(0.0029)	(0.0068)	(0.0031)
Cert I or II	-0.0050	-0.0188	-0.0053	-0.0040	-0.0122	-0.0049
	(0.0059)	(0.0257)	(0.0078)	(0.0056)	(0.0234)	(0.0068)
Cert not defined	-0.0017	0.0470	0.0043	0.0007	0.0765	0.0030
	(0.0118)	(0.0630)	(0.0194)	(0.0112)	(0.0731)	(0.0178)
Year 11 and below	-0.0062***	-0.0292***	-0.0079***	-0.0046**	-0.0233***	-0.0057**
	(0.0024)	(0.0045)	(0.0026)	(0.0023)	(0.0039)	(0.0024)
Occupation						
Managers	0.0049	-0.0041	0.0032	0.0054	-0.0058	0.0035
	(0.0041)	(0.0070)	(0.0047)	(0.0040)	(0.0074)	(0.0045)
Professionals	0.0025	-0.0063	0.0015	0.0029	-0.0050	0.0020
	(0.0037)	(0.0067)	(0.0042)	(0.0036)	(0.0068)	(0.0040)
Technicians and Trades Workers	0.0099*	-0.0041	0.0079	0.0114**	0.0001	0.0100*
	(0.0055)	(0.0080)	(0.0058)	(0.0054)	(0.0082)	(0.0057)
Community and Personal Service Workers	-0.0008	-0.0034	-0.0015	0.0002	-0.0062	-0.0009
	(0.0035)	(0.0058)	(0.0039)	(0.0034)	(0.0060)	(0.0037)
Sales Workers	0.0019	-0.0081	0.0007	0.0010	-0.0087	0.0002
	(0.0032)	(0.0066)	(0.0038)	(0.0031)	(0.0064)	(0.0035)
Clerical and Administrative Workers	-0.0030	-0.0065	-0.0026	-0.0022	-0.0062	-0.0022
	(0.0036)	(0.0057)	(0.0039)	(0.0035)	(0.0061)	(0.0039)
Machinery Operators and Drivers	0.0068	0.0143	0.0090	0.0059	0.0141	0.0078
	(0.0079)	(0.0132)	(0.0088)	(0.0076)	(0.0134)	(0.0081)
Missing/Refused Occupational Response	0.0319***	0.0279***	0.0323***	0.0203	0.0276	0.0205
	(0.0083)	(0.0108)	(0.0088)	(0.0247)	(0.0329)	(0.0252)

Robust standard errors in parentheses

FE & RE report the bootstrapped VCE with 100 reps

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

Table 4.3: Impact of Unemployment and Stability on Fertility Cont.

	Dependent variable is fertility					
	Unemployment			Stability		
Variables	(1) OLS	(2) FE	(3) RE	(1) OLS	(2) FE	(3) RE
Partner's Educational Qualification						
Postgrad	-0.0115	-0.0300	-0.0125	-0.0078	0.0001	-0.0072
	(0.0083)	(0.0246)	(0.0091)	(0.0078)	(0.0234)	(0.0085)
Grad diploma, grad certificate	-0.0244***	-0.0250	-0.0228**	-0.0163**	0.0046	-0.0131
	(0.0076)	(0.0187)	(0.0090)	(0.0072)	(0.0158)	(0.0083)
Bachelor or honours	-0.0187***	-0.0173	-0.0191***	-0.0143**	-0.0108	-0.0144**
	(0.0065)	(0.0152)	(0.0072)	(0.0061)	(0.0115)	(0.0065)
Adv diploma, diploma	-0.0153**	0.0057	-0.0140*	-0.0108*	0.0222	-0.0086
	(0.0069)	(0.0179)	(0.0077)	(0.0064)	(0.0147)	(0.0071)
Cert III or IV	-0.0227***	-0.0014	-0.0212***	-0.0165***	0.0152	-0.0145**
	(0.0058)	(0.0148)	(0.0065)	(0.0055)	(0.0116)	(0.0058)
Cert I or II	-0.0075	0.0174	-0.0083	-0.0031	0.0266	-0.0025
	(0.0168)	(0.0479)	(0.0228)	(0.0170)	(0.0477)	(0.0221)
Cert not defined	-0.0050	-0.0148	-0.0045	-0.0320***	-0.0950**	-0.0395***
	(0.0268)	(0.0954)	(0.0334)	(0.0060)	(0.0465)	(0.0110)
Year 11 and below	-0.0220***	0.0165	-0.0182***	-0.0166***	0.0344**	-0.0131**
	(0.0059)	(0.0169)	(0.0068)	(0.0055)	(0.0149)	(0.0061)
No Partner Info	-0.0664***	-0.0198	-0.0656***	-0.0576***	-0.0092	-0.0563***
	(0.0142)	(0.0184)	(0.0195)	(0.0117)	(0.0164)	(0.0148)
Partner's LFS						
Unemployed	-0.0078	-0.0072	-0.0054	-0.0088	-0.0067	-0.0076
	(0.0097)	(0.0087)	(0.0090)	(0.0091)	(0.0097)	(0.0088)
Not in LF	0.0013	0.0100	0.0031	0.0023	0.0087	0.0033
	(0.0045)	(0.0085)	(0.0053)	(0.0044)	(0.0085)	(0.0050)
No Partner Info	0.0334**	0.0094	0.0341*	0.0340***	0.0141	0.0345**
	(0.0137)	(0.0148)	(0.0190)	(0.0111)	(0.0143)	(0.0143)
Religion						
Buddisim	-0.0028	-0.0112	-0.0004	-0.0053	-0.0175	-0.0045
	(0.0059)	(0.0150)	(0.0069)	(0.0049)	(0.0129)	(0.0054)
Hinduism	-0.0055	0.0653	0.0055	-0.0074	0.0824	0.0001
	(0.0136)	(0.0591)	(0.0182)	(0.0122)	(0.0719)	(0.0170)
Judaism	-0.0143	-0.1221	-0.0155	-0.0161	0.0051	-0.0184**
	(0.0121)	(0.1311)	(0.0131)	(0.0100)	(0.0124)	(0.0086)
Islam	-0.0111	0.0065	-0.0104	-0.0060	0.0111	-0.0059
	(0.0093)	(0.0112)	(0.0089)	(0.0100)	(0.0088)	(0.0087)
Other Religion	-0.0141***	-0.0205	-0.0146***	-0.0083*	-0.0098	-0.0081
	(0.0043)	(0.0144)	(0.0054)	(0.0048)	(0.0110)	(0.0052)
No Religion	-0.0042**	-0.0016	-0.0033	-0.0028	0.0011	-0.0021
	(0.0020)	(0.0051)	(0.0023)	(0.0019)	(0.0048)	(0.0021)
Refused Religious Response	-0.0078*	-0.0041	-0.0076*	-0.0056	-0.0022	-0.0057
	(0.0041)	(0.0068)	(0.0043)	(0.0040)	(0.0068)	(0.0040)
Constant	0.0780***	0.2611***	0.0882***	0.0593***	0.2189***	0.0648***
	(0.0101)	(0.0461)	(0.0113)	(0.0098)	(0.0412)	(0.0107)
Observations	30,435	30,435	30,435	27,990	27,990	27,990
R-squared	0.0387	0.0738		0.0320	0.0688	
Number of HH		5,941	5,941		5,646	5,646

Robust standard errors in parentheses

FE & RE report the bootstrapped VCE with 100 reps

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

The results of the instrumental variables methodology are summarised in *Table 4.4* & *Table 4.5*. There are three reported models; the first reports the IV regression results using lagged unemployment as the instrument, the second table reports the results using redundancy and the third uses both instruments in the estimation.[31] As shown in *Table 4.4* using lagged unemployment results in a large variance between the fixed effects and random effects specifications where the coefficient on the fixed effects is almost triple the coefficient found using random effects. The coefficient for the pooled OLS model is very similar to the random effects model. The lagged unemployment instrument implies a significant negative relationship between unemployment and the fertility decision. Again we find similar outcomes for other explanatory covariates as seen in the linear probability model in *Table 4.3*.

When using redundancy as the instrumental variable in the regression, we find a somewhat similar result to the coefficients reported in the specification where we instrument unemployment with lagged unemployment. Although, the use of redundancy as an instrument resulted in the coefficient on unemployment being insignificant. We also note that the that the coefficients in the redundancy estimation are not as large as the specification instrumenting with lagged unemployment. This may be due to the high correlation between unemployment and lagged unemployment. When using both instrumental variables in the analysis does provide similar results as the other two specifications. Therefore, we can observe that unemployment has a significant negative effect on the probability of having a child.

[31] The First stage regressions can be found in *Table 7.9* and *Table 7.10* in the appendix of this chapter.

Table 4.4: Unemployment IV Estimation

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Unemployed	-0.0805***	-0.2250***	-0.0852***	-0.0697	-0.0048	-0.0482	-0.0785***	-0.1197***	-0.0776***
	(0.0188)	(0.0624)	(0.0237)	(0.0432)	(0.0661)	(0.0378)	(0.0178)	(0.0339)	(0.0153)
General Covars									
Age	-0.0012***	-0.0198***	-0.0017***	-0.0011***	-0.0187***	-0.0016***	-0.0012***	-0.0193***	-0.0017***
	(0.0004)	(0.0020)	(0.0004)	(0.0004)	(0.0021)	(0.0006)	(0.0004)	(0.0018)	(0.0006)
AgeSq	-0.0000***	0.0002***	-0.0000**	-0.0000***	0.0002***	-0.0000*	-0.0000***	0.0002***	-0.0000*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	0.0176***	0.0559***	0.0190***	0.0177***	0.0556***	0.0194***	0.0176***	0.0558***	0.0192***
	(0.0037)	(0.0065)	(0.0043)	(0.0037)	(0.0100)	(0.0050)	(0.0037)	(0.0077)	(0.0049)
Defacto	0.0194***	0.0282***	0.0179***	0.0194***	0.0289***	0.0179***	0.0194***	0.0285***	0.0179***
	(0.0040)	(0.0047)	(0.0047)	(0.0040)	(0.0050)	(0.0057)	(0.0040)	(0.0078)	(0.0048)
No.Children	0.0124***	0.1481***	0.0159***	0.0124***	0.1467***	0.0161***	0.0124***	0.1475***	0.0161***
	(0.0008)	(0.0121)	(0.0012)	(0.0008)	(0.0088)	(0.0012)	(0.0008)	(0.0126)	(0.0014)
Educational Qualification									
Postgrad	0.0263***	0.0748***	0.0320***	0.0263***	0.0753***	0.0323***	0.0263***	0.0750***	0.0322***
	(0.0060)	(0.0192)	(0.0071)	(0.0060)	(0.0164)	(0.0071)	(0.0060)	(0.0178)	(0.0073)
Grad diploma, grad certificate	0.0180***	0.0585***	0.0207***	0.0180***	0.0567***	0.0209***	0.0180***	0.0576***	0.0208***
	(0.0046)	(0.0162)	(0.0047)	(0.0046)	(0.0128)	(0.0056)	(0.0046)	(0.0116)	(0.0067)
Bachelor or hons.	0.0164***	0.0327***	0.0169***	0.0165***	0.0329***	0.0170***	0.0165***	0.0328***	0.0169***
	(0.0035)	(0.0055)	(0.0035)	(0.0035)	(0.0066)	(0.0039)	(0.0035)	(0.0057)	(0.0034)
Adv diploma, dip.	0.0148***	0.0225***	0.0164***	0.0149***	0.0235***	0.0166***	0.0148***	0.0230***	0.0165***
	(0.0038)	(0.0081)	(0.0041)	(0.0039)	(0.0056)	(0.0055)	(0.0038)	(0.0067)	(0.0053)
Cert III or IV	0.0032	0.0012	0.0027	0.0032	-0.0007	0.0027	0.0032	0.0003	0.0027
	(0.0030)	(0.0081)	(0.0037)	(0.0030)	(0.0077)	(0.0025)	(0.0030)	(0.0080)	(0.0034)
Cert I or II	-0.0047	-0.0154	-0.0047	-0.0047	-0.0190	-0.0050	-0.0047	-0.0171	-0.0048
	(0.0060)	(0.0186)	(0.0070)	(0.0060)	(0.0214)	(0.0099)	(0.0060)	(0.0269)	(0.0072)
Cert not defined	-0.0007	0.0495	0.0037	-0.0008	0.0468	0.0034	-0.0007	0.0482	0.0037
	(0.0118)	(0.0588)	(0.0213)	(0.0119)	(0.0829)	(0.0188)	(0.0118)	(0.0618)	(0.0181)
Year 11 and below	-0.0061**	-0.0285***	-0.0072***	-0.0062**	-0.0292***	-0.0074**	-0.0062**	-0.0288***	-0.0073**
	(0.0024)	(0.0052)	(0.0025)	(0.0024)	(0.0048)	(0.0029)	(0.0024)	(0.0033)	(0.0030)
Occupation									
Managers	0.0029	-0.0063	0.0016	0.0032	-0.0039	0.0025	0.0030	-0.0052	0.0018
	(0.0041)	(0.0057)	(0.0053)	(0.0043)	(0.0079)	(0.0051)	(0.0041)	(0.0056)	(0.0058)
Professionals	0.0007	-0.0093	-0.0002	0.0009	-0.0061	0.0007	0.0007	-0.0078	-0.0000
	(0.0038)	(0.0057)	(0.0039)	(0.0040)	(0.0084)	(0.0050)	(0.0038)	(0.0059)	(0.0056)
Technicians and Trades Workers	0.0081	-0.0081	0.0065	0.0084	-0.0039	0.0074	0.0082	-0.0061	0.0066
	(0.0055)	(0.0056)	(0.0062)	(0.0056)	(0.0104)	(0.0065)	(0.0055)	(0.0072)	(0.0067)
Community and Personal Services	-0.0024	-0.0061	-0.0031	-0.0021	-0.0032	-0.0022	-0.0023	-0.0047	-0.0029
	(0.0035)	(0.0054)	(0.0041)	(0.0037)	(0.0079)	(0.0044)	(0.0035)	(0.0048)	(0.0043)
Sales Workers	0.0004	-0.0098	-0.0006	0.0007	-0.0080	0.0002	0.0005	-0.0089*	-0.0004
	(0.0032)	(0.0065)	(0.0039)	(0.0033)	(0.0088)	(0.0028)	(0.0032)	(0.0053)	(0.0043)
Clerical and Admin Workers	-0.0044	-0.0084	-0.0042	-0.0041	-0.0064	-0.0035	-0.0043	-0.0075	-0.0041
	(0.0036)	(0.0055)	(0.0044)	(0.0037)	(0.0076)	(0.0038)	(0.0036)	(0.0058)	(0.0052)
Machinery Operators & Drivers	0.0050	0.0123	0.0066	0.0053	0.0144	0.0076	0.0050	0.0133	0.0069
	(0.0080)	(0.0128)	(0.0079)	(0.0080)	(0.0119)	(0.0077)	(0.0080)	(0.0135)	(0.0123)
Missing/Refused Occ Response	0.0978***	0.2139***	0.1019***	0.0876**	0.0167	0.0672*	0.0959***	0.1196***	0.0947***
	(0.0191)	(0.0571)	(0.0205)	(0.0413)	(0.0602)	(0.0376)	(0.0181)	(0.0283)	(0.0164)

Robust standard errors in parentheses

FE & RE report the bootstrapped VCE with 100 reps

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

Unemployment IV Estimation cont.

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Partner's Educ. Qualification									
Postgrad	-0.0111	-0.0267	-0.0117	-0.0111	-0.0302	-0.0121	-0.0111	-0.0284	-0.0118
	(0.0083)	(0.0196)	(0.0092)	(0.0083)	(0.0239)	(0.0086)	(0.0083)	(0.0304)	(0.0100)
Grad diploma, grad certificate	-0.0239***	-0.0211	-0.0228**	-0.0240***	-0.0252	-0.0229***	-0.0239***	-0.0231	-0.0228***
	(0.0076)	(0.0138)	(0.0090)	(0.0076)	(0.0210)	(0.0068)	(0.0076)	(0.0235)	(0.0049)
Bachelor or hons.	-0.0183***	-0.0160	-0.0186**	-0.0184***	-0.0174	-0.0188***	-0.0183***	-0.0167	-0.0186***
	(0.0065)	(0.0117)	(0.0074)	(0.0065)	(0.0184)	(0.0070)	(0.0065)	(0.0168)	(0.0063)
Adv diploma, dip.	-0.0150**	0.0084	-0.0141**	-0.0151**	0.0056	-0.0142*	-0.0150**	0.0070	-0.0141***
	(0.0068)	(0.0176)	(0.0062)	(0.0069)	(0.0195)	(0.0077)	(0.0068)	(0.0255)	(0.0048)
Cert III or IV	-0.0222***	0.0007	-0.0211***	-0.0223***	-0.0015	-0.0213***	-0.0222***	-0.0003	-0.0211***
	(0.0058)	(0.0088)	(0.0053)	(0.0058)	(0.0181)	(0.0053)	(0.0058)	(0.0194)	(0.0052)
Cert I or II	-0.0070	0.0188	-0.0077	-0.0071	0.0173	-0.0080	-0.0070	0.0181	-0.0078
	(0.0167)	(0.0363)	(0.0211)	(0.0167)	(0.0486)	(0.0306)	(0.0167)	(0.0463)	(0.0264)
Cert not defined	-0.0039	-0.0250	-0.0031	-0.0040	-0.0142	-0.0037	-0.0039	-0.0198	-0.0032
	(0.0266)	(0.0869)	(0.0500)	(0.0266)	(0.1113)	(0.0414)	(0.0266)	(0.1490)	(0.0271)
Year 11 and below	-0.0215***	0.0164	-0.0187***	-0.0216***	0.0166	-0.0188***	-0.0215***	0.0165	-0.0187***
	(0.0059)	(0.0147)	(0.0054)	(0.0060)	(0.0176)	(0.0061)	(0.0059)	(0.0220)	(0.0056)
No Partner Info	-0.0676***	-0.0205	-0.0674***	-0.0675***	-0.0198	-0.0667***	-0.0676***	-0.0202	-0.0672***
	(0.0139)	(0.0208)	(0.0189)	(0.0139)	(0.0197)	(0.0194)	(0.0139)	(0.0225)	(0.0210)
Partner's LFS									
Unemployed	-0.0050	-0.0048	-0.0031	-0.0054	-0.0074	-0.0044	-0.0051	-0.0060	-0.0033
	(0.0096)	(0.0085)	(0.0095)	(0.0096)	(0.0067)	(0.0083)	(0.0096)	(0.0079)	(0.0084)
Not in LF	0.0017	0.0106	0.0031	0.0017	0.0100	0.0029	0.0017	0.0103	0.0031
	(0.0045)	(0.0086)	(0.0052)	(0.0045)	(0.0077)	(0.0053)	(0.0045)	(0.0096)	(0.0053)
No Partner Info	0.0349***	0.0115	0.0358*	0.0347***	0.0093	0.0350*	0.0349***	0.0105	0.0356*
	(0.0134)	(0.0166)	(0.0186)	(0.0134)	(0.0162)	(0.0193)	(0.0134)	(0.0163)	(0.0205)
Religion									
Buddisim	-0.0026	-0.0123	-0.0007	-0.0026	-0.0111	-0.0007	-0.0026	-0.0117	-0.0007
	(0.0059)	(0.0150)	(0.0088)	(0.0059)	(0.0152)	(0.0084)	(0.0059)	(0.0137)	(0.0070)
Hinduism	-0.0061	0.0637	0.0016	-0.0060	0.0654	0.0024	-0.0061	0.0645	0.0020
	(0.0136)	(0.1434)	(0.0146)	(0.0136)	(0.0565)	(0.0203)	(0.0136)	(0.0677)	(0.0243)
Judaism	-0.0140	-0.1219	-0.0147	-0.0141	-0.1221	-0.0149	-0.0140	-0.1220	-0.0148
	(0.0121)	(0.1322)	(0.0105)	(0.0121)	(0.1425)	(0.0147)	(0.0121)	(0.2291)	(0.0128)
Islam	-0.0107	0.0222***	-0.0101	-0.0108	0.0056	-0.0104	-0.0107	0.0142*	-0.0102
	(0.0093)	(0.0080)	(0.0115)	(0.0093)	(0.0161)	(0.0078)	(0.0093)	(0.0080)	(0.0099)
Other Religion	-0.0128***	-0.0168	-0.0129***	-0.0130***	-0.0207	-0.0137**	-0.0128***	-0.0186	-0.0131**
	(0.0044)	(0.0183)	(0.0044)	(0.0044)	(0.0153)	(0.0062)	(0.0044)	(0.0167)	(0.0056)
No Religion	-0.0040**	-0.0018	-0.0034	-0.0040**	-0.0015	-0.0035*	-0.0040**	-0.0017	-0.0034
	(0.0020)	(0.0038)	(0.0024)	(0.0020)	(0.0056)	(0.0020)	(0.0020)	(0.0056)	(0.0023)
Refused Religious Response	-0.0073*	-0.0046	-0.0072*	-0.0074*	-0.0041	-0.0074**	-0.0073*	-0.0043	-0.0073*
	(0.0041)	(0.0073)	(0.0042)	(0.0041)	(0.0084)	(0.0037)	(0.0041)	(0.0081)	(0.0043)
Constant	0.0845***	0.2878***	0.0920***	0.0835***	0.2595***	0.0890***	0.0843***	0.2743***	0.0916***
	(0.0103)	(0.0537)	(0.0124)	(0.0110)	(0.0502)	(0.0131)	(0.0103)	(0.0475)	(0.0125)
Observations	30,435	30,435	30,435	30,435	30,435	30,435	30,435	30,435	30,435
R-squared	0.0363			0.0369			0.0364		
Number of HH		5,941	5,941		5,941	5,941		5,941	5,941

Robust standard errors in parentheses

FE & RE report the bootstrapped VCE with 100 reps

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

Exploring the relationship between stability and fertility using the instruments leads to the results summarised in *Table 4.5*. The three specifications all show a positive impact of stability on fertility. Using redundancy as an instrument suggests that if a woman believes her job is relatively stable, there is an increase in the probability of having a child of approximately 4-7 per cent, statistically significant at a 10% level in the pooled estimation. These coefficients for stability are much higher when using an instrumental variable to estimate the relationship than in the linear probability model reported in *Table 4.3*. Similarly, the results show that using lagged unemployment results in high estimates of the impact of stability on the fertility decision. In this case the results may also be significantly bias as using both instruments reduces the coefficient for stability significantly. This suggests that the impact of employment stability on fertility is significantly underestimated in the standard OLS model, which is significant in specification (1) and (3). The results also show that as age increases, there is a decreased probability of having a child. Furthermore, those women who already have children have an increased likelihood of having an additional child.

Overall, we find a significant negative effect of unemployment on the probability of having a child and a significantly positive effect of an individual's self-assessed employment stability. Additionally, the results show that job stability is more important for the decision to bear children than unemployment.

Table 4.5: Stability IV Estimation

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Stability	0.1377***	0.3923	0.1377***	0.0383*	0.0690	0.0358	0.0666***	0.1358*	0.0678***
	(0.0268)	(0.2443)	(0.0299)	(0.0202)	(0.0923)	(0.0357)	(0.0162)	(0.0718)	(0.0212)
General Covars									
Age	-0.0020***	-0.0243***	-0.0020***	-0.0012***	-0.0185***	-0.0016***	-0.0014***	-0.0197***	-0.0017***
	(0.0005)	(0.0042)	(0.0005)	(0.0004)	(0.0032)	(0.0004)	(0.0004)	(0.0023)	(0.0005)
AgeSq	0.0000	0.0002***	0.0000	-0.0000*	0.0002***	-0.0000	-0.0000	0.0002***	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	0.0128***	0.0370***	0.0128**	0.0141***	0.0412***	0.0151***	0.0137***	0.0403***	0.0144***
	(0.0038)	(0.0130)	(0.0051)	(0.0036)	(0.0081)	(0.0037)	(0.0036)	(0.0085)	(0.0043)
Defacto	0.0195***	0.0271***	0.0195***	0.0201***	0.0283***	0.0190***	0.0199***	0.0281***	0.0190***
	(0.0041)	(0.0090)	(0.0046)	(0.0039)	(0.0054)	(0.0039)	(0.0039)	(0.0065)	(0.0056)
No.Children	0.0112***	0.1470***	0.0112***	0.0111***	0.1388***	0.0135***	0.0111***	0.1405***	0.0131***
	(0.0009)	(0.0118)	(0.0010)	(0.0008)	(0.0081)	(0.0013)	(0.0008)	(0.0100)	(0.0016)
Educational Qualification									
Postgrad	0.0340***	0.0544**	0.0340***	0.0271***	0.0589***	0.0304***	0.0291***	0.0580**	0.0319***
	(0.0066)	(0.0218)	(0.0057)	(0.0061)	(0.0204)	(0.0072)	(0.0061)	(0.0227)	(0.0098)
Grad diploma, grad certificate	0.0139***	0.0526***	0.0139***	0.0131***	0.0531***	0.0150***	0.0133***	0.0530***	0.0148**
	(0.0045)	(0.0145)	(0.0047)	(0.0043)	(0.0125)	(0.0042)	(0.0043)	(0.0156)	(0.0059)
Bachelor or hons.	0.0145***	0.0249*	0.0145***	0.0132***	0.0304***	0.0137***	0.0135***	0.0293***	0.0140***
	(0.0035)	(0.0129)	(0.0032)	(0.0033)	(0.0074)	(0.0043)	(0.0034)	(0.0071)	(0.0045)
Adv diploma, dip.	0.0143***	0.0234	0.0143***	0.0121***	0.0199***	0.0131***	0.0127***	0.0206***	0.0135***
	(0.0039)	(0.0168)	(0.0045)	(0.0036)	(0.0071)	(0.0037)	(0.0037)	(0.0073)	(0.0044)
Cert III or IV	0.0038	-0.0035	0.0038	0.0034	0.0007	0.0026	0.0035	-0.0002	0.0029
	(0.0031)	(0.0156)	(0.0025)	(0.0029)	(0.0057)	(0.0029)	(0.0029)	(0.0089)	(0.0042)
Cert I or II	-0.0037	-0.0247	-0.0037	-0.0039	-0.0142	-0.0046	-0.0039	-0.0163	-0.0043
	(0.0062)	(0.0367)	(0.0081)	(0.0057)	(0.0270)	(0.0050)	(0.0057)	(0.0254)	(0.0076)
Cert not defined	0.0156	0.1047	0.0156	0.0044	0.0811	0.0057	0.0076	0.0859	0.0088
	(0.0126)	(0.1137)	(0.0196)	(0.0114)	(0.0965)	(0.0159)	(0.0115)	(0.0710)	(0.0174)
Year 11 and below	-0.0038	-0.0201*	-0.0038*	-0.0044*	-0.0227***	-0.0052*	-0.0042*	-0.0222***	-0.0048
	(0.0025)	(0.0116)	(0.0022)	(0.0023)	(0.0040)	(0.0028)	(0.0023)	(0.0035)	(0.0030)
Occupation									
Managers	-0.0083	-0.0340	-0.0083*	0.0020	-0.0104	0.0007	-0.0009	-0.0152	-0.0023
	(0.0051)	(0.0233)	(0.0046)	(0.0046)	(0.0097)	(0.0068)	(0.0044)	(0.0100)	(0.0047)
Professionals	-0.0104**	-0.0277	-0.0104***	-0.0004	-0.0087	-0.0008	-0.0032	-0.0126	-0.0039
	(0.0047)	(0.0210)	(0.0038)	(0.0042)	(0.0070)	(0.0065)	(0.0040)	(0.0093)	(0.0034)
Technicians and Trades Workers	0.0041	-0.0200	0.0041	0.0096*	-0.0032	0.0085	0.0080	-0.0066	0.0068
	(0.0059)	(0.0145)	(0.0047)	(0.0056)	(0.0056)	(0.0062)	(0.0056)	(0.0117)	(0.0048)
Community and Personal Services	-0.0062	-0.0206	-0.0062	-0.0014	-0.0086*	-0.0022	-0.0027	-0.0111	-0.0036
	(0.0038)	(0.0159)	(0.0043)	(0.0036)	(0.0051)	(0.0045)	(0.0035)	(0.0080)	(0.0030)
Sales Workers	-0.0091**	-0.0259*	-0.0091**	-0.0015	-0.0115*	-0.0020	-0.0037	-0.0145	-0.0043
	(0.0038)	(0.0154)	(0.0042)	(0.0034)	(0.0068)	(0.0051)	(0.0033)	(0.0106)	(0.0029)
Clerical and Admin Workers	-0.0069*	-0.0177	-0.0069*	-0.0034	-0.0080	-0.0033	-0.0044	-0.0100	-0.0045
	(0.0039)	(0.0123)	(0.0040)	(0.0036)	(0.0071)	(0.0048)	(0.0036)	(0.0078)	(0.0033)
Machinery Operators & Drivers	0.0019	0.0337*	0.0019	0.0049	0.0172	0.0068	0.0041	0.0206*	0.0057
	(0.0083)	(0.0194)	(0.0093)	(0.0076)	(0.0161)	(0.0095)	(0.0077)	(0.0125)	(0.0104)
Missing/Refused Occ Response	0.0309	0.0353	0.0309	0.0229	0.0289	0.0224	0.0252	0.0302	0.0246
	(0.0255)	(0.0284)	(0.0227)	(0.0246)	(0.0431)	(0.0240)	(0.0247)	(0.0405)	(0.0236)

Robust standard errors in parentheses

FE & RE report the bootstrapped VCE with 100 reps

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

Stability IV Estimation cont.

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Partner's Educ. Qualification									
Postgrad	-0.0008	0.0028	-0.0008	-0.0061	0.0005	-0.0058	-0.0046	0.0010	-0.0043
	(0.0081)	(0.0273)	(0.0089)	(0.0079)	(0.0230)	(0.0092)	(0.0079)	(0.0245)	(0.0090)
Grad diploma, grad certificate	-0.0144*	0.0116	-0.0144	-0.0158**	0.0057	-0.0132	-0.0154**	0.0069	-0.0132*
	(0.0075)	(0.0252)	(0.0096)	(0.0072)	(0.0224)	(0.0098)	(0.0073)	(0.0157)	(0.0073)
Bachelor or hons.	-0.0090	-0.0035	-0.0090	-0.0130**	-0.0097	-0.0131*	-0.0119*	-0.0084	-0.0118*
	(0.0063)	(0.0181)	(0.0071)	(0.0062)	(0.0136)	(0.0069)	(0.0062)	(0.0117)	(0.0068)
Adv diploma, dip.	-0.0083	0.0167	-0.0083	-0.0102	0.0213	-0.0085	-0.0097	0.0204	-0.0083
	(0.0066)	(0.0225)	(0.0061)	(0.0065)	(0.0169)	(0.0068)	(0.0065)	(0.0133)	(0.0066)
Cert III or IV	-0.0161***	0.0041	-0.0161***	-0.0164***	0.0134	-0.0148**	-0.0163***	0.0115	-0.0151**
	(0.0056)	(0.0161)	(0.0053)	(0.0055)	(0.0121)	(0.0058)	(0.0055)	(0.0159)	(0.0059)
Cert I or II	-0.0045	0.0284	-0.0045	-0.0035	0.0269	-0.0028	-0.0038	0.0272	-0.0032
	(0.0171)	(0.0585)	(0.0260)	(0.0169)	(0.0493)	(0.0276)	(0.0169)	(0.0415)	(0.0227)
Cert not defined	-0.0428***	-0.0692	-0.0428***	-0.0347***	-0.0908*	-0.0401***	-0.0370***	-0.0864	-0.0413***
	(0.0087)	(0.0671)	(0.0156)	(0.0064)	(0.0547)	(0.0114)	(0.0068)	(0.0643)	(0.0100)
Year 11 and below	-0.0137**	0.0272	-0.0137**	-0.0159***	0.0332**	-0.0131**	-0.0152***	0.0320	-0.0130**
	(0.0057)	(0.0202)	(0.0064)	(0.0056)	(0.0130)	(0.0067)	(0.0056)	(0.0202)	(0.0066)
No Partner Info	-0.0801***	-0.0896	-0.0801***	-0.0632***	-0.0222	-0.0616***	-0.0680***	-0.0361	-0.0671***
	(0.0116)	(0.1560)	(0.0122)	(0.0117)	(0.0354)	(0.0182)	(0.0113)	(0.0379)	(0.0165)
Partner's LFS									
Unemployed	-0.0043	-0.0033	-0.0043	-0.0077	-0.0062	-0.0069	-0.0067	-0.0056	-0.0061
	(0.0098)	(0.0104)	(0.0086)	(0.0092)	(0.0084)	(0.0067)	(0.0093)	(0.0123)	(0.0074)
Not in LF	0.0019	0.0063	0.0019	0.0022	0.0083	0.0030	0.0021	0.0079	0.0027
	(0.0047)	(0.0118)	(0.0052)	(0.0044)	(0.0065)	(0.0042)	(0.0045)	(0.0084)	(0.0046)
No Partner Info	0.0620***	0.0990	0.0620***	0.0409***	0.0278	0.0406**	0.0469***	0.0425	0.0472***
	(0.0116)	(0.1660)	(0.0098)	(0.0116)	(0.0398)	(0.0159)	(0.0111)	(0.0339)	(0.0142)
Religion									
Buddisim	-0.0033	-0.0257	-0.0033	-0.0048	-0.0188	-0.0042	-0.0044	-0.0202	-0.0038
	(0.0055)	(0.0206)	(0.0069)	(0.0050)	(0.0126)	(0.0075)	(0.0051)	(0.0149)	(0.0053)
Hinduism	-0.0028	0.0899	-0.0028	-0.0063	0.0836	-0.0002	-0.0053	0.0849	-0.0003
	(0.0137)	(0.1159)	(0.0136)	(0.0125)	(0.0831)	(0.0216)	(0.0128)	(0.0752)	(0.0209)
Judaism	0.0005	-0.0443	0.0005	-0.0120	-0.0029	-0.0141	-0.0085	-0.0115	-0.0097
	(0.0115)	(0.1473)	(0.0136)	(0.0104)	(0.0282)	(0.0107)	(0.0104)	(0.0647)	(0.0104)
Islam	-0.0027	-0.0454	-0.0027	-0.0052	0.0020	-0.0053	-0.0045	-0.0078	-0.0045
	(0.0112)	(0.1637)	(0.0087)	(0.0101)	(0.0535)	(0.0103)	(0.0103)	(0.0993)	(0.0073)
Other Religion	-0.0041	-0.0240	-0.0041	-0.0073	-0.0121	-0.0074	-0.0064	-0.0146	-0.0065
	(0.0055)	(0.0199)	(0.0051)	(0.0049)	(0.0108)	(0.0051)	(0.0050)	(0.0118)	(0.0049)
No Religion	-0.0012	-0.0001	-0.0012	-0.0024	0.0009	-0.0019	-0.0020	0.0007	-0.0017
	(0.0021)	(0.0055)	(0.0022)	(0.0020)	(0.0058)	(0.0022)	(0.0020)	(0.0061)	(0.0030)
Refused Religious Response	-0.0013	-0.0010	-0.0013	-0.0045	-0.0020	-0.0048	-0.0036	-0.0018	-0.0039
	(0.0043)	(0.0079)	(0.0039)	(0.0041)	(0.0070)	(0.0039)	(0.0041)	(0.0088)	(0.0038)
Constant	-0.0294	0.0780	-0.0294	0.0374**	0.1962***	0.0438	0.0184	0.1717***	0.0216
	(0.0206)	(0.1570)	(0.0215)	(0.0169)	(0.0665)	(0.0275)	(0.0147)	(0.0421)	(0.0195)
Observations	27,990	27,990	27,990	27,990	27,990	27,990	27,990	27,990	27,990
R-squared				0.0248			0.0069		
Number of HH		5,646	5,646		5,646	5,646		5,646	5,646

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

We estimate the propensity scores for women to adjust for potential selection effects cause by differences in the observed characteristics between women who are employed and those who are unemployed. We delegate the treatments as unemployment, stability and redundancy respectively. We use redundancy as a treatment since using either unemployment or stability may not result in unbiased results, as there may still be an endogenous effect of these variables on the fertility decision, which may go unaddressed in the estimation of the propensity scores,. The results for the propensity scores are summarised in *Table 4.6*.

Table 4.6: Propensity Score Results

		Pooled	White-Collar	Blue-Collar
Unemployed	Coeff	0.0086	0.0109	0.0109
	St Error	(0.0072)	(0.0073)	(0.0079)
Stability	Coeff	0.0098***	0.0038	0.0150***
	St Error	(0.0028)	(0.004)	(0.0033)
Redundancy	Coeff	0.0000	-0.0029	0.0000
	St Error	(0.0074)	(0.0085)	(0.0115)

Bootstrapped standard errors (500 reps) reported in parentheses
We match on age, agesq, marital status, number of children
religion and partner's labour force status.[32]
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

When estimating the propensity score, we match on age, age squared, marital status, education, partners labour force status and religion. We are unable to match on partners education as it is highly correlated with partners labour force status due to the number of missing values. Furthermore, the common support is not satisfied in the instances where we are able to match on both. However, literature shows that

[32]We do not match on partner's education as the common support is not met when included. However this is not concerning as the literature thus far suggest that labour force status plays the critical role. See Pailhe & Solaz (2012); Vignoli et al. (2012); Schmitt (2012). This may be due to the fact that education is highly correlated with labour force status, and therefore we can only match on one of these variables.

partners labour force status is more important in determining fertility decisions as it is an indicator of overall economic stability of a family (see for example Pailhe & Solaz, 2012; Vignoli et al., 2012; Schmitt, 2012).

The results for unemployment are surprising. The propensity score matching method suggests to us a positive relationship between unemployment and fertility in the pooled sample, although the result is insignificant. Stability shows the expected sign and significance suggesting the impact of stability on fertility choices is positive. However, the magnitude for stability slightly higher than the result reported for unemployment. The results also show that redundancy has no impact on the fertility choice, but is insignificant. The results for redundancy also suggest that there may still be some bias in the results for unemployment as redundancy is an exogenous shock to the woman's employment status.

Additionally, we compare those women in the unemployed category to those women in white-collar jobs and blue-collar jobs in a similar analysis to Del Bono et al. (2011) who emphasised the role of job displacement on the fertility outcomes of white and blue collar workers. The results show that those women who are unemployed are more likely to have a child than those in the white-collar category. We also see that for unemployed vs white collar workers, there is a decreased probability of having a child if made redundant, which is the directional effect we expect. There is also an observed positive relationship between stability and fertility for both white collar workers and blue collar workers.

Additionally, we stratify the sample by age categories to consolidate our findings. Stratification forces the nearest neighbour match for both the treatment and control to be selected from the specified category or strata. In this case we expect women to have differing fertility preferences given their age category. For example, women between the ages of 18-25 will have a significantly different fertility response based on the matching covariates than those in the 30-35 year old age category. We implement stratified matching by age and estimate the average treatment on the treated. The results for the stratified propensity scores are summarised in *Table 4.7*. These results show a negative effect of unemployment on fertility. Additionally, we find that an unemployed woman is less likely 1.31 percent less to have a child than an employed woman. Stability has a strong positive significant effect on the probability of having a child, which is consistent with the results thus far, although the magnitude is not as large. Finally, redundancy has a positive significant effect on the fertility decision. The magnitude of redundancy is not as large as the result for unemployment, but the coefficients are fairly similar. This suggests there may still be some bias in the estimates when using unemployment to estimate the propensity scores and therefore unemployment may be a weak treatment to use when analysing the fertility decision.

Table 4.7: Propensity Score Matching Results with Stratification

	Stratification		
	Unemployment	Stability	Redundancy
Coeff	-0.0131***	0.0126***	-0.0127***
St Error	(0.0001)	(0.0001)	(0.0002)

Bootstrapped standard errors (500 reps) reported in parentheses
Note: age is not used as a matching covariate when using a a sample stratified by age as it may have confounding effetcs.
We do not match on partner's education for reasons previously stated.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.4.1 Incorporating the Transition to NILF due to Fertility

The methodology we have selected and implemented above restricts our sample to women actively participating in the labour force. If a woman was participating in the labour force and subsequently had a child resulting in their decision to remove themselves from the labour force, they would be removed from the data set if we drop all NILF responses. However, we can perform a robustness check by adjusting our analysis to include those women who exit the labour force as a result from having a child. To solve this potential bias, we reintroduce women who transition from active participation to non-participation (NILF) as a direct result of observed fertility. We identify these women by observing their labour market status 2 years prior to having the a child, and their labour market status after having the child.[33] For women who are observed leaving the labour forces, we set their employment status equal to observation reported before the child was born for all subsequent reports of NILF.[34] So if a woman reported her employment status as employed, had a child and consequently left the labour market, all subsequent values where she reports NILF, the observation be reported as employed. Women who report NILF in all years are dropped from the sample.[35] Again, we use the control covariates previously identified in *Section 4.3* which includes age, age squared, relationship status, education, occupation (or prior occupation if unemployed), partner's education, partner's labour force status and religion. When we implement this adjustment, we find the sample size increases to 32,053 observations in the unemployment specification and 28,098 observations for the stability specification. The results for the IV specification are summarised in *Table 4.8*.[36]

Table 4.8 shows that including women who transition to non-participation in the labour force actually causes the coefficients on both unemployment and stability to increase significantly in comparison to *Table 4.4* and *Table 4.5*, where these women were not accounted for. However, both estimations with and without the transitional NILF women indicate a negative impact of unemployment on fertility and a positive impact of stability.

[33]We selected 2 years to account for the lag in child birth that may not allow for full observation of the transition from employment/unemployment to NILF.

[34]Unless there is a self-reported change in participation. Therefore, we only do this adjustment for those women who have a child and subsequently report their status as NILF.

[35]This reduces sample selection bias that would be introduced by dropping all NILF responses.

[36]Full specifications can be found in 7.11 the appendix of this chapter.

Table 4.8: Unemployment IV Estimation

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Unemployment	-0.2467***	-0.4271***	-0.2582***	-0.2192***	-0.2245***	-0.2157***	-0.2445***	-0.3448***	-0.2547***
	(0.0170)	(0.0555)	(0.0201)	(0.0373)	(0.0577)	(0.0431)	(0.0162)	(0.0443)	(0.0215)
Stability	0.1750***	0.4380	0.1750***	0.0467**	0.0960	0.0461*	0.0850***	0.1608**	0.0875***
	(0.0373)	(0.4312)	(0.0476)	(0.0208)	(0.0594)	(0.0278)	(0.0179)	(0.0708)	(0.0188)

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.9: Propensity Score Results with Women Transitioning to NILF

		Pooled	White-Collar	Blue-Collar
Unemployed	Coeff	0.0177	0.0389***	0.0429***
	St Error	(0.0108)	(0.0090)	(0.0097)
Stability	Coeff	0.0089***	0.0046	0.0128***
	St Error	(0.0032)	(0.0040)	(0.0035)
Redundancy	Coeff	-0.0032	-0.0085	0.0048
	St Error	(0.0095)	(0.0094)	(0.0127)

Bootstrapped standard errors (500 reps) reported in parentheses
We match on age, agesq, marital status, number of children
religion and partner's labour force status.[37]
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[37]We do not match on partner's education as the common support is not met when included. However this is not concerning as the literature thus far suggest that labour force status plays the critical role. See Pailhe & Solaz (2012); Vignoli et al. (2012); Schmitt (2012). This may be due to the fact that education is highly correlated with labour force status, and therefore we can only match on one of these variables.

In addition to the results from the IV estimation results, when implementing both propensity score matching method to the NILF sample, we find very similar results to the sample that excludes the NILF responses. *Table 4.8* shows that stability still makes a positive significant effect on the probability of having a child in the pooled sample. In this case, when we compare it to the results in *Table 4.6* we find that the coefficient of stability is not as large with a difference between the two estimations of 0.9%. Furthermore, we can confirm the results in *Table 4.9* suggests that unemployment as a treatment group for matching may also be overestimating the effect of unemployment on fertility as redundancy, an exogenous shock to fertility provides a negative coefficient.

Finally in the stratified sample, we find that implementing the stratification by age the coefficients on all three specifications actually increase in magnitude. The results in *Table 4.10* show that if a woman in is unemployed she is approximately 2% less likely to have a child. A similar result is found for redundancy, which suggests being made redundant decreases the probability of having a child by 3%. Both of these results are statistically significant at a 1% level. With respect to employment stability, we find a positive significant effect on fertility which is also larger than the coefficient reported in *Table 4.7*.

Overall when we analyse the data including women who transition to a NILF status after experiencing fertility, we find similar results to the specifications that exclude them from the sample. However, we emphasise that these results are larger in magnitude. This suggests that when we dropped them from the sample, we specifically found the lower bound of the relationship between unemployment, employment stability and redundancy on the fertility choices of Australian women.

Table 4.10: Propensity Score Matching Results with Stratification Including Women Transitioning to NILF

	Stratification		
	Unemployment	Stability	Redundancy
Coeff	-0.0215***	0.0143***	-0.0300***
St Error	(0.0002)	(0.0001)	(0.0002)

Bootstrapped standard errors (500 reps) reported in parentheses
Note: age is not used as a matching covariate when using a a sample stratified by age as it may have confounding effetcs.
We do not match on partner's education for reasons previously stated.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.4.2 The Importance of Employment Stability for Immigrants and Natives

This section explores the difference between immigrant and natives subpopulations within the HILDA data. *Table 4.11* and *Table 4.12* report the coefficients for the IV estimations of unemployment and stability respectively. *Table 4.11* shows a negative significant impact for both immigrants and natives when using the lag of unemployment as an instrument. The pure employment status specification suggests an 8-22% decreased probability of having a child across the three IV specifications. Furthermore, *Panel A* suggests a 25-45% decrease in the probability of having a child for a native who is unemployed if we include the women who transition to NILF as a result of fertility. A very similar result is found for immigrants when using lagged unemployment to potentially address the endogeneity issue. However, the use of redundancy as an instrument for unemployment shows no significant effect on either natives or immigrants. Overall, we find that immigrants and natives have very similar outcomes for unemployment, as shown in *Table 4.11.* However, the results for immigrants are only statistically significant in the specification which includes the NILF women.

Table 4.11: Unemployment IV Estimation by Immigrant Status

	Lagged Unemployment			Redundancy			Both Instruments		
Panel A: Natives									
	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Emp. Only									
Coeff	-0.0879***	-0.2113**	-0.0901***	-0.0684	-0.0323	-0.0518	-0.0840***	-0.1136**	-0.0814***
St Error	(0.0204)	(0.0929)	(0.0249)	(0.0466)	(0.0655)	(0.0342)	(0.0193)	(0.0511)	(0.0189)
With NILF									
Coeff	-0.2471***	-0.4456***	-0.2583***	-0.2090***	-0.2241***	-0.2045***	-0.2438***	-0.3461***	-0.2538***
St Error	(0.0186)	(0.0724)	(0.0197)	(0.0413)	(0.0601)	(0.0382)	(0.0178)	(0.0527)	(0.0155)
Panel B: Immigrants									
	Lagged Unemployment			Redundancy			Both Instruments		
	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Emp. Only									
Coeff	-0.0506	-0.2137***	-0.0799	-0.0816	0.0942	-0.0113	-0.0545	-0.1460**	-0.0732
St Error	(0.0471)	(0.0688)	(0.0508)	(0.1141)	(0.3088)	(0.1378)	(0.0451)	(0.0720)	(0.0602)
With NILF									
Coeff	-0.2444***	-0.3415***	-0.2582***	-0.2659***	-0.2665***	-0.2760**	-0.2459***	-0.3214***	-0.2595***
St Error	(0.0417)	(0.1027)	(0.0427)	(0.0887)	(0.0733)	(0.1188)	(0.0401)	(0.1026)	(0.0558)

Bootstrapped standard errors (500 reps) reported in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The impact of stability on fertility is also very similar between the native and immigrant populations, as seen in *Table 4.12*. However, if we compare *Table 4.11* and *Table 4.12*, we find job stability has a stronger impact on fertility when instrumenting with lagged unemployment. This effect is much smaller in the specification which implements both instruments in the regression. Again, using the redundancy instrument, we find a positive effect on individual fertility outcomes, however it is only significant for natives in specification (1). In the case where we implement both instruments, we find a positive significant effect of stability for natives at a 1% level, however that effect is diminished for immigrants.

Table 4.12: Stability IV Estimation by Immigrant Status

Panel A: Natives

	Lagged Unemployment			Redundancy			Both Instruments		
	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Emp. Only									
Coeff	0.1489***	0.3903	0.1489***	0.0400*	0.1041**	0.0390	0.0664***	0.1583***	0.0672***
St Error	(0.0345)	(0.5280)	(0.0474)	(0.0226)	(0.0471)	(0.0250)	(0.0188)	(0.0262)	(0.0123)
With NILF									
Coeff	0.1846***	0.4485*	0.1846***	0.0489**	0.1274	0.0490	0.0842***	0.1819***	0.0854***
St Error	(0.0466)	(0.2476)	(0.0434)	(0.0231)	(0.0967)	(0.0342)	(0.0205)	(0.0535)	(0.0189)

Panel B: Immigrants

	Lagged Unemployment			Redundancy			Both Instruments		
	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Emp. Only									
Coeff	0.1194***	0.3617	0.1254*	0.0325	-0.0696	0.0098	0.0729**	0.0721	0.0793*
St Error	(0.0390)	(21.7307)	(0.0754)	(0.0471)	(0.4138)	(0.0443)	(0.0302)	(0.1017)	(0.0441)
With NILF									
Coeff	0.1493***	0.3385***	0.1691***	0.0327	-0.0549	0.0197	0.0865**	0.0773	0.1014*
St Error	(0.0534)	(0.0905)	(0.0636)	(0.0474)	(0.4375)	(0.0607)	(0.0337)	(0.1446)	(0.0519)

Bootstrapped standard errors (500 reps) reported in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Finally, we also apply stratified PSM to the immigrant and native subsamples. The results are reported in *Table 4.13*. This table highlights a key difference between the immigrant and native subsamples: unemployment has a small positive effect on fertility for immigrants, however it has a smaller negative effect on fertility for natives. This suggests that if an immigrant is unemployed, they have a 2.5% chance of having a child, significant at a 1% level. Furthermore, we find a positive effect of stability for natives, but not for immigrants. Therefore, a native has a 0.54% increased probability of having a child if the individual feels stable in their job. Redundancy is found to have a negative impact on fertility for natives, which is approximately half the size of the redundancy coefficient for unemployment that is observed for immigrants. The signs of the coefficients shown *Table 4.13* are consistent for the employment specification and the specification that incorporates the women who transition to non-participation. Overall we find a positive effect of stability on the fertility levels of women. Furthermore, the analysis in this chapter provides evidence to suggest the relationship between fertility and unemployment may be overestimated when matching within age strata. This suggests that age plays a key role in the fertility decision.

Table 4.13: Stratified Propensity Score Matching Results by Immigrant Status

	Employment Only Specification					
	Natives			**Immigrants**		
	Unemployment	Stability	Redundancy	Unemployment	Stability	Redundancy
Coeff	-0.018***	0.0076***	-0.0120***	0.0248***	-0.0048***	-0.0387***
St Error	(0.0001)	(0.0001)	(0.0002)	(0.0008)	(0.0004)	(0.0021)
	Stratification With Transition NILF Women Included					
	Natives			**Immigrants**		
	Unemployment	Stability	Redundancy	Unemployment	Stability	Redundancy
Coeff	-0.0315***	0.0090***	-0.0336***	0.0364***	0.0192***	-0.0256***
St Error	(0.0001)	(0.0001)	(0.0003)	(0.0008)	(0.0004)	(0.0020)

Bootstrapped standard errors (500 reps) reported in parentheses

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

4.5 Conclusion

This study explored the effect of unemployment and stability on the fertility decision. Using both instrumental variables and propensity score matching, we found that unemployment has a positive effect on the fertility decision of Australian women in the pooled sample, however when using stratified propensity score matching this effect is reversed. Additionally, stability is shown to have a positive significant effect on the probability of having a child, suggesting that stability contributes significantly to the child bearing decision of women. These results extend to those women who transition to non-participation in the labour force as a consequence of fertility. This effect of stability on fertility is also found to be positively significant when analysing the immigrant and native subpopulations of women in the HILDA. We find a positive significant effect of stability measured by perceived job security in the stratified propensity score matching results. Unemployment is found to have a negative effect on both native and immigrant fertility when stratifying the sample. Furthermore, the result of this study show the use of redundancy as an exogenous measure of unemployment results in reduced estimates of the impact of unemployment on fertility and therefore provides evidence unemployment as a treatment overestimates the fertility decision.

The main contribution of this study is to highlight the role of job stability and perceived job security in the fertility decision. The literature has focused on the role of unemployment on fertility decisions, with very few studies addressing the observed relationship reversal exhibited in developed countries. The results of this study have significant implications for policymakers, as increase perceived job security may encourage women to have children. In addition, this study highlights the important role of policy to assist with the participation and re-entry of women into the workforce post-child bearing/rearing.

Chapter 5 Study 3: The Quality Quantity Trade-off - Evidence In Australia

5.1 Introduction

The previous two chapters analysed two main factors involved in the decision to have children for individuals and families. These studies have significant policy implications for governments and decision makers. However, the determinants of the fertility decision are not limited to monetary incentives and employment stability. Within the field of population economics, the quality-quantity trade-off theory has successfully rationalised the issue surrounding the changes in family preferences driving the decrease in total fertility rates in many developed countries.

In recent times, the fertility literature has had a strong focus on explaining decisions relating to investing in child quality versus increasing the quantity of children in a family. Although the economic theory of this quality-quantity trade-off is sound there is very little evidence to support the theory outside of the US and Europe. This has led to debate over the legitimacy of the theory in a broader context. This study aims to provide evidence of the quality-quantity trade-off in Australia.

The quality-quantity trade-off theory describes the decision for families to have additional children, or increase expenditure on current children to improve child 'quality' (Becker, 1992; Becker & Tomes, 1976; Becker et al., 1960). Improved child quality refers to parental investment, used to enhance a child's outcomes and potentially provide a better future for their offspring. Enhanced child outcomes include (but are not limited to) improved employment, health, and educational outcomes. Potential parents make their decision to have additional children or to invest in existing children, based on the utility derived from the fertility decision.

There are many ways the outcomes of each child can be improved through investment. The investment in each individual child can range from spending on education though private schooling or tutoring, to providing a child with extra curricula activities or individual space. Investment in child quality can also include the additional effort or parental time given by either parent. Although higher quality does not necessarily mean superior, children who are considered higher quality tend to have improved educational and labour market outcomes than those children considered lower quality (Heckman et al., 2006).

As seen in the literature review in *Chapter 2*, there are two core areas in which the quality-quantity trade-off literature is focused; (1) the expected negative association between family size and investment in children, and (2) the effect of additional births on the cognitive development or schooling outcomes of children in the family. This study has a strong focus on the second point, where evidence is highly mixed and a research gap can be filled using Australian data. This study explores the quality-quantity trade-off experienced by Australian families, specifically focusing on health and educational outcomes, adding to the literature through the use of a distributional analysis.

5.2 Methodology

5.2.1 Introduction

This study uses the *Longitudinal Survey of Australian Children* (LSAC) to analyse the impact of 'sibship' size on the health and educational outcomes of children.[38] The LSAC is a survey that follows the progression and development of approximately 10,000 children and families in Australia. The LSAC commenced in 2004 with two cohorts; families with 4-5 year old children (Cohort K) and families with 0-1 year old infants (Cohort B). The study child (SC) is the focus of the survey as the aim

[38]Sibship size refers to the number of siblings in the household.

of the LSAC is to follow the development of the SC over time. Furthermore, there is only one study child per household in the survey. Hence, this analysis focuses on the impact the presence of siblings has on the SC.

The analysis in this study requires two key variables to test the existence of the quality- quantity trade-off. Firstly we require a measure of child quality. This study uses four outcome measures as proxies for child quality, since quality cannot be directly measured. These measures of child outcomes include the Peabody Picture Vocabulary Test (PPVT), the 'Who am I?' test (WAI), weight-for-height, and Body Mass Index (BMI) Percentile. PPVT and WAI are measures of a child's cognitive ability and development,[39] while weight-for-height percentile, and BMI Percentile are measures of health outcomes.

PPVT and WAI measure the cognitive development of children and can be used in a similar manner to IQ tests and standardised test scores which have been the focal point for the quality-quantity trade-off literature. However, measures of cognitive development provide a better measure of ability for young children in this scenario. Moreover, this study examines both PPVT and WAI which are developed to measure different cognitive outcomes, thereby providing a check for the consistency of this analysis. The literature shows that weight-for-height is a good measure for the overall indicator of health as it reflects chronic nutrition issues (see for example Linnemayr & Alderman, 2011; Onis et al., 2007; Cogill, 2003; Waterlow et al., 1977). The analysis of BMI percentile is included as a robustness check.

The measure for child quantity is the number of children in the household including the study child. We also create a latent variable in the form of a binary indicator (Two Plus), which takes a value of 1 if there are two or more children in the household (including the study child) and 0 otherwise. This is necessary for the methodologies we implement in this study, which will be discussed further below.

[39] The Peabody Picture Vocabulary Test (PPVT) is a receptive vocabulary test, which provides an estimate of verbal ability and aptitude of a child. PPVT is conducted in Standardized American English. The 'Who am I?' test is a direct assessment measure that requires children to copy shapes (e.g. circle, triangle, square etc.) and write numbers, letters, words and sentences which is assessed using Rasch Modelling used to score a child on a scale of 1 to 100.

This study contributes to the gap in research through the use of a distributional analysis using instrumental variables. This allows for comprehensive analysis of the quality-quantity trade-off beyond the average effects that mask important differences elsewhere in the distribution. Furthermore, this analysis will help develop the literature, as the confounding results currently observed within the quality-quantity trade-off literature may be due to the econometric analysis focusing on the average child. Although these methods are not new to the literature (see Millimet & Wang, 2011), applications of distributional analysis on child outcomes are few and far between. Furthermore, this method has not been applied within the context of Australia, although the effects have been investigated on the average in the past year (see Cobb-Clark & Moschion, 2013).

We motivate the use of a distributional analysis from the potential for heterogeneity in the effect of family size on child outcomes. The heterogeneity originates from the unobserved ability of the child. For instance; consider two children, one has a high level of ability and one has a low level of ability, but in all other ways these children are the same. The child with the high level of ability may be affected in a different manner than the low ability child, when an additional child is added to their family. This may be through numerous factors such as the loss of parental time investment, or the loss of physical or monetary investment. Furthermore, parents may choose to invest more or less in a child given the innate child quality.

Assuming that returns to investment in child quality are concave; if a low ability child is significantly compensated by parents in an attempt to increase their perceived quality, then the marginal effect on a child with a high level of ability may be larger (shown by a negative impact at the high end of the distribution for the high ability child). If parents choose not to compensate low ability children, then the impact of an increase in the number of children in the household will negatively impact those children at the low end of the distribution of outcomes. This is similar to the argument in Winterhalder & Leslie (2002). It remains to be seen which impact will be observed. Therefore, we expect children within the tails of the distribution (low or high level of innate ability) to be negatively affected by an increase in family size.

The relationship between child quality (Q_i), and the number of children in the household (N_i) can be expressed as:

$$Q_i = \alpha + \gamma N_i + \beta \mathbf{X_i} + \epsilon_\mathbf{i} \tag{1}$$

where Q_i is represented in our analysis by the child's test score or health outcome. $\mathbf{X_i}$ is a vector of control covariates including; year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status, immigrant status and educational qualifications of the parents (see *Table 5.1* for a full description of the variables included as covariates in this analysis). Empirically testing this trade-off between child quality (Q_i) and child quantity (N_i) is difficult because the family size decision for child quality and child quantity may be determined simultaneously implying an endogeneity issue (Angrist et al., 2005). Furthermore, not only is there a negative causal relationship between investment in quality or quantity, there may also be interaction between the covariates and the quality-quantity decision (Angrist et al., 2010; Angrist & Evans, 1998).

Therefore we employ the use of instrumental variables to address the endogeneity issue. For this we use two instruments previously outlined in the literature: (1) a twin or multiple birth dummy indicator for second births, and (2) a sex composition indicator (see Angrist et al., 2010; Angrist & Evans, 1998).

A twin birth or multiple births causes an exogenous deviation from the desired family size. Exploiting this exogenous deviation allows for the identification of the causal effect of family size on child outcomes. This instrument has been used frequently in the fertility literature (see Angrist & Evans, 1998; Angrist et al., 2010; Conley & Glauber, 2006; Lee, 2008). Twins or multiple births represent an exogenous shock to fertility, which can change planned parental investment to compensate for an additional child. The instrument we use is an indicator as a twin for the second birth in a family. Therefore the instrument for twins takes a value of 1 if the second birth is a twin or multiple births and 0 otherwise.

Additionally, sex composition is used as an instrument because it allows for a wider generalisation of results beyond twin/multiple birth families, extending to families with 2 or more children. Among others, Angrist & Evans (1998) introduced the use of sex composition when analysing the effects of family size on labour market outcomes of adults. There is an inherent preference in developed countries towards having one male and one female child within the family. Angrist & Evans (1998) showed that parents with two male, or two female children as the first and second born, were approximately six per cent more likely to have a third child. More recently Conley & Glauber (2006) applied this instrument in their paper to the same end. For this analysis in this study, we create a sex composition indicator which takes a value of 1 if the first two births in a family are children of the same gender and 0 otherwise.

5.2.2 Instrumental Variables (IV) approach

This study analyses the impact of additional children in the household on a single child in the family, known as the study child. The focus of the analysis is the impact of the existence of siblings on the health and educational outcomes of the study child. We begin by estimating the first stage regression to predict the number of children in the household for each of the individual instruments, twins as the second birth and sex composition of the first two births in a family, denoted as (Z_i):

$$\hat{N}_i = \alpha + \gamma Z_i + \beta \mathbf{X_i} + \nu_\mathbf{i} \tag{2}$$

The predicted values for the number of siblings in the household $(\hat{N}_i)$ is then used in the second stage regression:

$$Q_i = \alpha + \gamma \hat{N}_i + \beta \mathbf{X_i} + \epsilon_\mathbf{i} \tag{3}$$

This gives the IV estimation of the relationship between fertility and child outcomes for the average child. As the twin or multiple births cause an exogenous increase in the number of children, we are able to exploit the reaction in the predicted family size to estimate the causal effect of fertility on child quality, removing the bias caused by the endogeneity of quality and quantity.

We also estimate the results for equation (2) using the binary indicator, 'Two Plus' which takes a value of 1 if there are two or more children in the household (including the study child) and zero otherwise. We estimate both the individual IV specifications and a combined IV specification.

5.2.3 Quantile Regression (QR) approach

As the relevant literature has strongly focuses on the use of instrumental variables to explore the quality-quantity trade-off, the interpretation of results have been strongly focused on the effect of an increase in family size on the average child. However, children are heterogeneous, and therefore an increase in family size can impact on high quality and low quality children differently. Furthermore, policymakers are intrinsically interested in distributional analysis of child health and education performance due to the long-term implications on the future labour force. This may result in the true impact of the quality-quantity trade-off being masked as both positive and negative impacts of additional children in the family on the outcomes of children are average across all children, regardless of ability. Using quantile regression (QR), we evaluate the quality-quantity trade-off across the distribution of child quality indicators. We use the model for quantile regression based on Koenker & Bassett Jr (1978).

We define the outcome variable Q_i to have a distribution function $F(q_i)$ such that

$$F(q_i) = Prob(Q_i \leq q_i) \tag{4}$$

Within this distribution of outcomes, it can be said that a child is in the τth quantile if the child performs better than τ but worse than $(1 - \tau)$ where $0 < \tau < 1$ (Koenker & Bassett Jr, 1978). At the median ($\tau = 0.50$), half of the children perform better and half perform worse (Koenker & Bassett Jr, 1978). In most cases the interest lies in how the child in the τth quantile is affected by the relevant covariates in the analysis. Assuming linearity, the distribution can be described as:

$$Quant_\tau(Q_i|\mathbf{X}_i) = \alpha(\tau) + \gamma(\tau)N_i + \beta(\tau)\mathbf{X_i} \quad (5)$$

$\alpha(\tau)$, $\beta(\tau)$ and $\gamma(\tau)$ are obtained by minimising

$$argmin \sum \rho_\tau(Q_i - \alpha_i - \beta_i\mathbf{X}_i - \gamma N_i) \quad (6)$$

where:

$$\rho_\tau = \begin{cases} \tau & \text{if } Q_i - \alpha_i - \beta_i\mathbf{X}_i - \gamma N_i \leq 0 \\ (1-\tau) & \text{if } Q_i - \alpha_i - \beta_i\mathbf{X}_i - \gamma N_i > 0 \end{cases}$$

In this case the coefficients $\alpha(\tau)$, $\beta(\tau)$ and $\gamma(\tau)$ are dependent on the quantile being investigated (Koenker & Hallock, 2001). We estimate the results QR (6) using the binary indicator, 'Two Plus' in place of the number of siblings for ease of comparison between models.

Unfortunately QR does not successfully address the issue of endogeneity in the quality-quantity trade-off model. The estimates obtained through the use of QR will be biased, as the interaction between child quality and child quantity is not addressed. Therefore, we also apply quantile regression with instrumental variables.

5.2.4 Instrumental Variables Quantile Regression (IV-QR)

It is possible to extend the application of instrumental variables in the context of QR to address the bias caused by the endogeneity issue through the use of instrumental variable quantile regression (IV-QR). We follow the application of IV-QR used in Chernozhukov & Hansen (2008). We adjust the quantile regression as follows:

$$Q_i = \alpha(U) + \gamma(U)N_i + \beta(U)\mathbf{X}_i, \qquad U|\mathbf{X}, Z \sim Uniform(0,1) \tag{7}$$

where U is a rank variable that incorporates the unobserved heterogeneity from each child's level of ability, and Z_i a vector of instruments (twin/multiple births and sex composition) that are correlated with N_i but uncorrelated with Q_i.

Again we estimate this model using the binary indicator for N_i which takes a value of 1 if the family has two or more children (including the study child) and 0 otherwise.[40] N_i is then defined as:

$$N_i = \delta(X, Z, V) \tag{8}$$

where V consists of unobserved random variables that are correlated with U. This is the selection assumption outlined in Chernozhukov & Hansen (2008).

Conditional on X_i and Z, the linear quantile equation becomes:

$$Quant_\tau(Q_i|\mathbf{X}_i) = \alpha(\tau) + \gamma_1(\tau)N_i + \beta(\tau)\mathbf{X}_i = \alpha(\tau) + \gamma_2(\tau)Z_i + \beta(\tau)\mathbf{X}_i \tag{9}$$

To find a solution, we again take the argument of the minimum with respect to the above equation (see Kwak, 2010), as follows:

$$argmin \sum \rho_\tau \left[Q_i - (\alpha_i(\tau) + \beta_i(\tau)\mathbf{X}_i + \gamma(\tau)Z_i)\right] \tag{10}$$

IV-QR allows for the analysis of the effect on all children that experience in the treatment, in this case the treatment is two or more children in the household. This implies the treatment is the existence of siblings. The major limitation of the implementation of IV-QR is that it does not allow the treatment assignment to vary across the distribution of outcomes (Millimet & Wang, 2011). As the existence of siblings may depend on a number of characteristics, this is a significant limitation as

[40] This is the 'Two Plus' binary indicator outlined previously.

we are unable to isolate those who drive the effect by switching from no treatment to treatment.

5.2.5 Quantile Treatment Effects (QTE) approach

Due to the limitations of the IV-QR discussed above we apply quantile treatment effects (QTE). Quantile treatment effects allow for the identification of a treatment on a subpopulation known as "compliers". Compliers are those who respond to the implementation of a treatment or policy by switching. In addition to compliers there are always- and never-takers who do not respond to the implementation of the treatment (Abadie et al., 2002). The assignment of treatment status is therefore determined by the instrument. The treatment effect can be identified for the compliers as $N_1 > N_0$. In the application of QTE, we are only able to utilise one instrument for the assignment of treatment status, unlike the IV and IV-QR estimation methods.

Following Abadie et al. (2002) we define a the binary endogenous treatment we analyse, in this case as before, we use having two or more children as the treatment (N_i). We also define a binary instrumental variable Z (as before) which is used to identify the compliers to the treatment in an exogenous manner:

$$Quant_\tau(Q_i|\mathbf{X}_i, N, N_1 > N_0) = \alpha(\tau) + \gamma(\tau)N + \beta(\tau)\mathbf{X}_i \tag{11}$$

where $Quant_\tau(Q_i|\mathbf{X}_i, N, N_1 > N_0)$ denotes the τth quantile of Q_i given X and N for the compliers. The conditional quantile function is then solved by

$$argmin \sum \rho_\tau \left[(Q_i - \alpha_i(\tau) - \beta_i(\tau)\mathbf{X}_i - \gamma(\tau)Z_i) | \, N_1 > N_0 \right] \tag{12}$$

with ρ_τ defined as in equation (12). Abadie et al. (2002) identify the following inverse propensity score weighting matrix which is used to find the compliers in the analysis. Therefore, equation (12) is adjusted as follows:

$$\kappa(N, Z, X) = 1 - \frac{N(1-Z)}{1-\pi_0(X)} - \frac{(1-N)Z}{\pi_0(X)} \tag{13}$$

where $\pi_0(X) = P(Z = 1|X)$ and 0 otherwise, and κ=1 when $N = Z$. Therefore, $E(Z|X)$ is estimated and plugged into κ to identify the compliers for the treatment in an exogenous manner. This makes the conditional quantile function:

$$argmin \sum \kappa\rho_\tau(Q_i - \beta_i(\tau)\mathbf{X}_i - \gamma(\tau)N_i) \tag{14}$$

This gives the conditional quantile treatment effects.

Unconditional Quantile Treatment Effects

In addition, this study also estimates the unconditional endogenous QTE from Froelich & Melly (2013). Unconditional QTEs are useful when analysing the impact if treatments on the distribution of the unconditional outcome variable. The unconditional QTE has two advantages over the conditional QTE: (1) including covariates that are independent from the treatment can change the limit of the estimated conditional QTE, and (2) unconditional effects can be estimated consistently at the rate of $\sqrt{n}$ without any parametric restrictions (Froelich & Melly, 2013). Therefore, QTEs are entirely non-parametric which removes the restrictive assumption for QTE to be the same, independent from the value of X.

Froelich & Melly (2013) define the unconditional QTE for the τth quantile as:

$$\Delta^\tau = Quant^\tau_{Q^1} - Quant^\tau_{Q^0} \tag{15}$$

The quantile function becomes:

$$argmin \sum \phi_i\rho_\tau(Q_i - \alpha - \Delta N_i) \tag{16}$$

where:

$$\phi_i = \frac{Z_i Pr(Z=1|X_i)}{Pr(Z=1|X_i)[1-Pr(Z=1|X-1)]}(2N_i - 1) \quad (17)$$

This weighting estimator is equivalent to using two univariate weighted quantile regressions separately for $N = 1$ and $N = 0$.

In this case, the quantile function is not conditioned upon X. This is why this application is considered an 'unconditional' quantile treatment effect. However, when identifying compliers using the weighting function recommended by Froelich & Melly (2013), we do condition upon X with the treatment on the observed characteristics, as these drive compliance to the treatment.

Overall, the methodologies used in this study, whilst extensive should shed light on the quality-quantity trade-off in Australia. IV, QR, IV-QR and QTE all contribute to this analysis, but QTE reveals the most information on the existence of the quality-quantity trade-off due to the analysis of compliers as compliers are the most effective target for policy implementation as they do not participate in the treatment if ineligible but do participate if eligible. Therefore, if a policy specifically targeted compliers, it would be effective.

5.2.6 Data

As discussed in *Section 5.2.1*, to implement our analysis we use the data from the LSAC. The LSAC tracks the development of Australian children and families. The LSAC commenced in 2004 with two cohorts; families with 4-5 year old children (Cohort K) and families with 0-1 year old infants (Cohort B). PPVT were collected in 2004, 2006, 2008 for Cohort K and 2008, 2010 and 2012 for Cohort B. WAI scores were collected in 2004 for Cohort K and 2008 for Cohort B. BMI is collected during every major wave for each child.[41] However, weight-for-height is collected in 2004

[41]BMI is measured in every major wave which occurs ever second year: 2004, 2006, 2008, 2010, 2012

for Cohort K and in 2006 and 2008 for Cohort B.[42] We use a panel format where possible in the IV estimations, but due to WAI tests being conducted once per cohort, and weight-for-height being collected only once for Cohort K, the analysis of these outcomes is cross sectional. A pooled analysis is conducted for the QR, IV-QR and QTE analyses. We use Panelwhiz (see Haisken-DeNew & Hahn, 2010) in conjunction with Stata 12 for this analysis.

[42]The analysis was also conducted on weight-for-age which is collected in every major wave. Similar results were found, however as weight-for-height is an indicator of chronic health issues we focus on it as the main indicator for child health.

Table 5.1: Variable Description

Variable	**Type**	**Description**
Age	Continuous	Age of the SC
Sex	Discrete	Sex of the SC (0) Male (1) Female
Indigenous status of SC	Discrete	Indigenous status of the SC (0) Not Indigenous (1) Aboriginal (2) Torres Strait Islander (3) Both
SC's number of siblings	Continuous	Number of children present in SC's Household
Two or more children in SC household	Discrete	Two or more children present in Study Child's household (0) No (1) Yes (derived)
Covariates for SC's mother		
Age	Continuous	Age of the SC's mother
Immigrant status	Discrete	Immigrant status of SC's mother (0) Native, (1) Immigrant
Labour force status	Discrete	Labour force status of SC's mother (0) Employed (1) Unemployed (2) Not in Labour Force (NILF) (3) Refused/ Not stated/ Not Present
Educational qualification	Discrete	Highest Qualification of SC's mother (1) Postgraduate degree (2) Graduate diploma/cert (3) Bachelor degree inc hons (4) Advanced diploma/diploma (5) Trade Certificate/Certificate (6) Other (7) High School (reference) (8) < High School (9) Refused/Not stated
Indigenous status	Discrete	Indigenous status of the SC's mother (0) Not Indigenous (1) Aboriginal (2) Torres Strait Islander (3) Both
Covariates for SC's father		
Age	Continuous	Age of the SC's father
Immigrant status	Discrete	Immigrant status of SC's father (0) Native, (1) Immigrant
Labour force status	Discrete	Labour force status of SC's father (0) Employed (1) Unemployed (2) Not in Labour Force (NILF) (3) Refused/ Not stated/ Not Present
Educational qualification	Discrete	Highest Qualification of SC's father (1) Postgraduate degree (2) Graduate diploma/cert (3) Bachelor degree inc hons (4) Advanced diploma/diploma (5) Trade Certificate/Certificate (6) Other (7) High School (reference) (8) < High School (9) Refused/Not stated
Indigenous status	Discrete	Indigenous status of the SC's father (0) Not Indigenous (1) Aboriginal (2) Torres Strait Islander (3) Both
Dependent Variables		
SC PPVT Score	Continuous	SC Peabody Picture Vocabulary Test (PPVT) score
SC WAI Score	Continuous	SC Who am I? (WAI) test score
SC BMI percentile	Continuous	SC Body Mass Index (BMI) as a percentile based on Centers for Disease Control and Prevention (CDC) growth charts.
SC Weight for Height Percentile	Continuous	SC Weight for Height percentile based on CDC growth charts.
Instruments		
Second birth was a twin or multiple birth	Discrete	Second birth in family was a twin or multiple birth, (0) No (1) Yes
Sex composition dummy	Discrete	First two children were the same gender (0) No (1) Yes

Descriptive Statistics

A description of the variables used in this analysis can be found in *Table 5.1*. Descriptive statistics for study child characteristics and parental characteristics can be found in *Table 5.2* and *Table 5.3* respectively. It can be seen that approximately 49% of children in the analysis are females. The average household has between 1.3 and 1.5 children including the SC. The average unconditional PPVT, WAI, BMI percentile and weight-for-height is lower for the older cohort (Cohort K). There is approximately a two per cent chance that a family has a twin or multiple birth as the second birth in the household. Sex composition suggests almost 11 per cent of families have two children of the same gender for the first and second birth in the household.

Table 5.3 shows the average age of a mother is between 35 and 39 years. Father's are slightly older than mothers. There are more immigrant parents in Cohort K.[43] Over one third of mothers are not in the labour force (NILF) in the younger cohort whereas 26% of mothers in the older cohort are NILF. Education and indigenous status are fairly similar across both cohorts.

[43]Immigrant status is derived from the country of birth information reported in the survey. If the country of birth is not Australia, then the individual is classed as an immigrant

Table 5.2: Child Characteristics

Cohort	B	K
Age of the Study Child	4.061	8.072
	(2.950)	(2.946)
Sex of the study child	0.487	0.490
	(0.500)	(0.500)
Aboriginal	0.033	0.029
	(0.178)	(0.168)
Torres Strait Islander	0.003	0.002
	(0.055)	(0.039)
Both	0.003	0.002
	(0.051)	(0.044)
No. of Children in HH	1.368	1.583
	(1.058)	(1.061)
Two or more children in SC HH	0.450	0.573
	(0.497)	(0.495)
Child Outcomes		
SC PPVT score	72.788	72.043
	(7.914)	(8.030)
SC WAI score	65.488	64.024
	(8.557)	(8.070)
SC BMI percentile	63.457	62.163
	(27.600)	(27.708)
SC Weight-for-Height	64.971	63.861
	(27.234)	(25.689)
Instruments		
Second birth was a twin or multiple birth	0.025	0.022
	(0.157)	(0.145)
Sex composition dummy	0.109	0.107
	(0.312)	(0.309)

Table 5.3: Parent Characteristics

	Cohort			Cohort	
Mother's Characteristics	B	K	**Father's Characteristics**	B	K
Age	35.116	38.714	Age	37.719	41.342
	(6.145)	(6.083)		(6.712)	(6.799)
Immigrant status	0.294	0.402	Immigrant status	0.213	0.242
	(0.455)	(0.490)		(0.409)	(0.428)
Labour force status			***Labour force status***		
Employed	0.626	0.702	Employed	0.897	0.88
	(0.484)	(0.457)		(0.304)	(0.325)
Unemployed	0.026	0.029	Unemployed	0.018	0.015
	(0.160)	(0.167)		(0.132)	(0.122)
NILF	0.346	0.264	NILF	0.037	0.041
	(0.476)	(0.441)		(0.189)	(0.199)
Not present/Not stated/	0.001	0.005	Not present/Not stated/	0.048	0.063
Refused	(0.037)	(0.069)	Refused	(0.215)	(0.243)
Educational			***Educational***		
qualification			***qualification***		
Postgraduate degree	0.080	0.072	Postgraduate degree	0.073	0.078
	(0.272)	(0.258)		(0.261)	(0.268)
Graduate diploma/cert	0.071	0.074	Graduate diploma/cert	0.057	0.054
	(0.257)	(0.261)		(0.231)	(0.227)
Bachelor degree inc hons	0.203	0.165	Bachelor degree inc hons	0.145	0.130
	(0.402)	(0.371)		(0.352)	(0.336)
Advanced diploma/	0.103	0.096	Advanced diploma/	0.081	0.075
diploma	(0.304)	(0.295)	diploma	(0.272)	(0.263)
Trade Certificate/	0.268	0.277	Trade Certificate/	0.319	0.309
Certificate	(0.443)	(0.448)	Certificate	(0.466)	(0.462)
Other	0.015	0.016	Other	0.029	0.022
	(0.120)	(0.126)		(0.168)	(0.146)
High School	0.167	0.169	High School	0.104	0.102
	(0.373)	(0.375)		(0.305)	(0.303)
< High School	0.088	0.118	< High School	0.070	0.081
	(0.284)	(0.322)		(0.255)	(0.272)
Refused/Not stated	0.004	0.013	Refused/Not stated	0.122	0.150
	(0.065)	(0.113)		(0.327)	(0.357)
Indigenous status			***Indigenous status***		
Aboriginal	0.023	0.021	Aboriginal	0.013	0.011
	(0.151)	(0.142)		(0.111)	(0.103)
Torres Strait Islander	0.002	0.002	Torres Strait Islander	0.002	0.001
	(0.040)	(0.040)		(0.047)	(0.031)
Both	0.001	0.001	Both	0.001	0.001
	(0.023)	(0.027)		(0.029)	(0.023)

5.3 Result

In this section we discuss the results for the methodologies outlined in *Section 5.2*. *Table 5.4* reports the medians for the child quality proxies; PPVT, WAI, weight-for-height percentile and BMI percentile. The median shows the observation at the middle of the distribution, where half of the observations lie below the median and the other half lie above the median. This can be useful in comparisons to the means reported in *Table 5.2*. For example, half of the children in this analysis have a PPVT test score below 71.95. This shows the median and average are fairly similar for PPVT score and WAI scores. But for weight-for-height percentile and BMI percentile there is an approximate 4 point difference between the mean and the median (comparing to *Table 5.2*). The results from the application of instrumental variables are summarised in *Table 5.5* to *5.12*. We report the results for both the twin instrument and sex composition specifications and then the combined instrument specification, as a robustness check.

Table 5.4: Medians of outcome variables

	PPVT	WAI	Weight For Height Percentile	BMI Percentile
Median	71.955	65.000	70.34	67.996
St. Err.	(0.093)	(0.063)	(0.309)	(0.221)
Obs.	25460	9076	13733	38491

The results for educational outcomes are reported in *Table 5.5* and *Table 5.6* for PPVT scores, and *Table 5.7* and *Table 5.8* reports the results for WAI scores. Weight-for-height results are reported in *Table 5.9* and *Table 5.10*. BMI percentile results are *Table 5.11* and *Table 5.12*.

As the LSAC follows a panel format, where possible we estimate the instrumental variable fixed and random effects models. The use of a panel data format allows for us to control for unobservable characteristics, caused by individual heterogeneity. Fixed effects accounts for unobserved heterogeneity, allowing for individual specific effects to be correlated with the covariates. The random effects model requires the assumption that the individual specific effects to be uncorrelated with the independent variables. Specification (1) shows the pooled IV results, specification (2) reports the fixed effects (FE) and specification (3) reports the random effects (RE) results when using the twin or multiple births instrument. Specification (4) shows the pooled IV results, specification (5) reports the fixed effects (FE) and specification (6) reports the random effects (RE) results when using sex composition as the instrument in the regression. *Table 5.5* shows the results for instrumenting using twins (or multiple births) and sex composition on the PPVT scores of the study child. *Panel A* reports the coefficients for when the fertility measure is the number of siblings in the household. *Panel B* shows the results when using the binary indicator of 'Two Plus'. This second estimation is reported to ensure comparability with the other selected methodologies used in this analysis.

The results in specification (1) of *Panel A* shows that as the number of siblings in the household increases, there is a negative impact on the SC's PPVT scores of approximately 1.5 points for each additional sibling, which is both economically and statistically significant when instrumenting using the twin instrument. This negative effect is shown in all specifications for *Panel A*, but is insignificant for the FE models. Specifications (1) and (3) are consistent and approximately the same magnitude for the impact of additional children on the SC's PPVT scores. Additionally, in *Panel A*, shows that using sex composition reduces the negative impact of additional children on the SC given the increase in the number of siblings in the household compared to using the twin instrument (specifications (1-3)).

Table 5.5: Instrumental Variable Estimation for PPVT Scores

	PANEL A NUMBER OF SIBLINGS						PANEL B TWO OR MORE CHILDREN IN HOUSEHOLD					
	Twin Instrument			Sex Composition Instrument			Twin Instrument			Sex Composition Instrument		
	Pooled IV (1)	FE (2)	RE (3)	Pooled IV (4)	FE (5)	RE (6)	Pooled IV (1)	FE (2)	RE (3)	Pooled IV (4)	FE (5)	RE (6)
No. Siblings	-1.5308***	-35.2989	-1.5932**	-0.9928***	-0.0399	-1.0211***						
	(0.4733)	(92.6155)	(0.6249)	(0.1212)	(0.2286)	(0.1345)						
Two Plus							-3.1625***	-143.6469	-3.2885***	-1.7858***	-0.0758	-1.8604***
							(0.9432)	(233.7495)	(0.9017)	(0.2164)	(0.9631)	(0.2076)
Cohort	7.3370***		-0.1651	7.5404***		-0.2555***	7.1341***		-0.1967	7.4844***		-0.2698***
	(0.5170)		(0.1403)	(0.4283)		(0.0888)	(0.5214)		(0.1264)	(0.4282)		(0.0869)
Observations	12,033	12,033	12,033	18,326	18,326	18,326	12,033	12,033	12,033	18,326	18,326	18,326
R-squared	0.5789			0.5845			0.5748			0.5831		
Number of HH		4,602	4,602		6,978	6,978		4,602	4,602		6,978	6,978

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status, immigrant status and educational qualifications of the parents
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5.6: Instrumental Variable Estimation for PPVT Scores with Two Instruments

PANEL A

	NUMBER OF SIBLINGS			TWO OR MORE CHILDREN IN HOUSEHOLD		
	Pooled IV	FE	RE	Pooled IV	FE	RE
	(1)	(2)	(3)	(1)	(2)	(3)
No. Siblings	-0.9194***	-0.0989	-0.9336***			
	(0.1470)	(0.4760)	(0.1687)			
Two Plus				-1.5569***	-0.1780	-1.6042***
				(0.2468)	(0.9870)	(0.2430)
Cohort	7.3279***		-0.1338	7.1936***		-0.1541
	(0.5643)		(0.1693)	(0.5631)		(0.1097)
Observations	9,783	9,783	9,783	9,783	9,783	9,783
R-squared	0.5838			0.5838		
Number of HH		3,759	3,759		3,759	3,759

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status,
immigrant status and educational qualifications of the parents
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel B suggests that using the binary indicator to estimate the relationship between child quantity and child quality results in the estimates diverge further into the negatives on the SC (in comparison to *Panel A*). The results in *Panel B* for *Table 5.5* suggest that the study child loses between 1.8 to 3.2 point on their PPVT scores. Therefore, both *Panel A* and *Panel B* suggest that the presence of additional siblings in the household has a negative significant impact on the study child's PPVT scores on the average.

Table 5.6 shows the results for IV with the use of both the twin and sex composition. The impact of additional children on the study child is similar to the findings in *Table 5.5*, however the magnitude is generally not as large. However, that negative impact may be overestimated when using one instrument in the regression. This suggests that the existence of other children in the household has an negative impact on the study child. Additionally, we find that the coefficients from using both instruments are closer to the coefficients report for the sex composition IV results.

The results for the IV for WAI are reported in *Table 5.7*. *Panel A* reports the coefficients for when the fertility measure is the number of siblings in the household and *Panel B* shows the results when using the binary indicator of 'Two Plus'. In this case as WAI scores are only collected once for each child, unlike PPVT, hence we use a cross sectional analysis. In this case WAI shows very similar results for the pooled estimations as those found in *Table 5.5*. We also analyse the effects by cohort separately.

Table 5.7: Instrumental Variable Estimation for WAI Scores

	PANEL A NUMBER OF SIBLINGS						PANEL B TWO OR MORE CHILDREN IN HOUSEHOLD					
	Twin Instrument			Sex Composition Instrument			Twin Instrument			Sex Composition Instrument		
	Pooled IV (1)	Cohort K (2)	Cohort B (3)	Pooled IV (4)	Cohort K (5)	Cohort B (6)	Pooled IV (1)	Cohort K (2)	Cohort B (3)	Pooled IV (4)	Cohort K (5)	Cohort B (6)
No. Siblings	-1.9952**	-1.9779*	-1.6152	-1.0859***	-0.6429**	-1.6898***						
	(0.9080)	(1.1692)	(1.3175)	(0.2070)	(0.2683)	(0.3262)						
Two Plus							-3.9385**	-4.1572*	-3.0132	-1.8857***	-1.1375**	-2.8535***
							(1.7851)	(2.4274)	(2.4631)	(0.3582)	(0.4749)	(0.5446)
Cohort	-1.1777***			-1.3442***			-1.2096***			-1.3592***		
	(0.2459)			(0.1989)			(0.2471)			(0.1992)		
Observations	4,424	2,326	2,098	6,640	3,546	3,094	4,424	2,326	2,098	6,640	3,546	3,094
R-squared	0.2007	0.1947	0.2252	0.2135	0.1986	0.2213	0.1907	0.1783	0.2201	0.2112	0.1973	0.2170

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status, immigrant status and educational qualifications of the parents

Robust standard errors in parentheses

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

Table 5.8: Instrumental Variable Estimation for WAI Scores with Two Instruments

PANEL A

	NUMBER OF SIBLINGS			TWO OR MORE CHILDREN IN HOUSEHOLD		
	Pooled IV (1)	Cohort K (2)	Cohort B (3)	Pooled IV (1)	Cohort K (2)	Cohort B (3)
No. Siblings	-1.3502***	-0.7864**	-2.0012***			
	(0.2665)	(0.3487)	(0.4129)			
Two Plus				-2.2175***	-1.3341**	-3.1587***
				(0.4356)	(0.5854)	(0.6478)
Cohort	-1.3810***			-1.4126***		
	(0.2709)			(0.2718)		
Constant	37.7523***	34.9708***	40.1863***	36.7595***	34.3124***	38.8536***
	(1.9028)	(2.6553)	(2.7043)	(1.8489)	(2.5420)	(2.6707)
Observations	3,555	1,860	1,695	3,555	1,860	1,695
R-squared	0.2137	0.2146	0.2189	0.2092	0.2119	0.2124

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status,
immigrant status and educational qualifications of the parents
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel A of *Table 5.7* suggests that as the number of siblings in the household increases, the study child loses between 0.6 and 2 points on average on their WAI score. The effect is more significant when using sex composition as the instrument (specifications (4-6) in *Panel A*). Similar results are shown for 'Two Plus' in *Panel B*, with the magnitude of the effect being larger. *Table 5.7* also shows that cohort plays an important role in the WAI scores when using sex composition in either model specification. The results shown in *Table 5.7* are consistent with the results in *Table 5.5*. In both cases, an increase in the number of siblings in the household has a negative impact on the study child's educational outcomes. Again, *Table 5.8* shows the regression results using both the twin and sex composition instrument. The coefficients found for the number of siblings is similar in magnitude to the coefficients for sex composition, suggesting that the twin instrument may be bias. The results for two or more children are also similar as those reported in *Table 5.7*.

Weight-for-height percentile shows mixed results in *Table 5.9*. *Panel A* shows a negative significant effect for both the twin and sex composition instruments. When separating the sample by cohort, we find there is a almost a one percent difference in the weight-for-height percentile. However, the cohort who gains a percent switches based on the choice of instrument for the total number of siblings in the household. This suggests that the presence of siblings decreases the study child's weight-for-height percentile. *Panel B* shows inconsistent results when using the two or more children in the household measure for the number of children in the household. We find that the sign and significance changes between the specifications. However, it is important to note that the twin instrument is likely overestimates the relationship between an exogenous increase in family size, as weight measures are potentially endogenous for twin and multiple births (Angrist et al., 2010). The use of sex composition as an instrument leads to coefficients that are much smaller than those reported for the twin instrument.

Finally, with respect to weight-for-height percentile, *Table 5.10* reports the the results from using both instrumental variables. We find the coefficients for both two plus and number of siblings are smaller than in the case with using only the twin instrument and much closer in magnitude to the specifications that use the sex composition instrument. Again, the sign switches, making it difficult to draw conclusions as to the effect of additional children on health outcomes

Table 5.9: Instrumental Variable Estimation for Weight-for-Height Percentile

	PANEL A NUMBER OF SIBLINGS						PANEL B TWO OR MORE CHILDREN IN HOUSEHOLD					
	Twin Instrument			Sex Composition Instrument			Twin Instrument			Sex Composition Instrument		
	Pooled IV (1)	Cohort K (2)	Cohort B (3)	Pooled IV (4)	Cohort K (5)	Cohort B (6)	Pooled IV (1)	Cohort K (2)	Cohort B (3)	Pooled IV (4)	Cohort K (5)	Cohort B (6)
No. Siblings	-8.8469**	-8.0148*	-9.1046*	0.2144	1.4546	-0.5566						
	(3.7884)	(4.5934)	(5.1690)	(0.7546)	(0.9312)	(1.0774)						
Two Plus							-16.1241**	-16.8435*	-15.5474*	0.3630	2.5543	-0.9224
							(6.7588)	(9.1784)	(8.6939)	(1.2774)	(1.6321)	(1.7875)
Constant	81.6125***	84.8225***	76.7507***	74.1000***	71.1685***	73.3136***	78.4083***	83.5576***	73.9963***	74.2621***	72.3397***	72.9192***
	(7.3851)	(11.7267)	(8.4972)	(4.1288)	(6.0827)	(5.5604)	(6.4582)	(10.8296)	(7.7563)	(4.0373)	(5.9894)	(5.4619)
Observations	6,729	2,342	4,387	10,087	3,563	6,524	6,729	2,342	4,387	10,087	3,563	6,524
R-squared				0.0124	0.0169	0.0146				0.0125	0.0176	0.0141

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status, immigrant status and educational qualifications of the parents

Robust standard errors in parentheses

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

Weight-for-height is only collected for 2004 for Cohort K and 2006 & 2008 for Cohort B.

Table 5.10: Instrumental Variable Estimation for Weight-for-Height Percentile with Two Instruments

PANEL A

	NUMBER OF SIBLINGS			TWO OR MORE CHILDREN IN HOUSEHOLD		
	Pooled IV (1)	Cohort K (2)	Cohort B (3)	Pooled IV (1)	Cohort K (2)	Cohort B (3)
No. siblings	-0.4379	8.6015	0.0415			
	(0.9679)	(12.5641)	(0.8985)			
Two Plus				-0.7909	10.9586	-0.0357
				(1.5094)	(13.2809)	(1.5880)
Cohort			-0.8790			-0.8764
			(0.8684)			(1.0172)
Constant	73.3116***	52.9433	70.6111***	72.9981***	57.1653	70.7094***
	(6.1114)	(51.3876)	(3.5928)	(5.8317)	(44.7407)	(4.3643)
Observations	5,412	5,412	5,412	5,412	5,412	5,412
R-squared	0.0164			0.0159		
Number of HH		3,784	3,784		3,784	3,784

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status,
immigrant status and educational qualifications of the parents
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Weight-for-height is only collected for 2004 for Cohort K and 2006 & 2008 for Cohort B.

Table 5.11: Instrumental Variable Estimation for BMI Percentile

	PANEL A NUMBER OF SIBLINGS						PANEL B TWO OR MORE CHILDREN IN HOUSEHOLD					
	Twin Instrument			Sex Composition Instrument			Twin Instrument			Sex Composition Instrument		
	Pooled IV (1)	FE (2)	RE (3)	Pooled IV (4)	FE (5)	RE (6)	Pooled IV (1)	FE (2)	RE (3)	Pooled IV (4)	FE (5)	RE (6)
No. Siblings	-9.2104***	119.1975	-9.1461**	1.1888*	-2.8014**	-0.1299						
	(3.4364)	(93.8467)	(3.7635)	(0.7070)	(1.0882)	(0.6159)						
Two Plus							-18.0176***	320.9704***	-17.9539***	2.1104*	-4.8063**	-0.2294
							(6.4188)	(99.3814)	(6.1331)	(1.2537)	(2.0319)	(1.0250)
Cohort	0.9944		0.3111	2.5358		0.9136	-0.1289		0.1441	2.6350		0.9114
	(3.0661)		(0.7911)	(2.3536)		(0.5653)	(3.0207)		(0.6476)	(2.3518)		(0.6534)
Observations	17,853	17,853	17,853	27,579	27,579	27,579	17,853	17,853	17,853	27,579	27,579	27,579
Number of HH		4,826	4,826		7,377	7,377		4,826	4,826		7,377	7,377
R-squared				0.0132						0.0133		

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status, immigrant status and educational qualifications of the parents
Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 5.12: Instrumental Variable Estimation for BMI Percentile with Two Instruments

PANEL A

	NUMBER OF SIBLINGS			TWO OR MORE CHILDREN IN HOUSEHOLD		
	Pooled IV (1)	FE (2)	RE (3)	Pooled IV (1)	FE (2)	RE (3)
No. Siblings	0.2026	-2.8208*	-0.6184			
	(0.8881)	(1.6292)	(0.7454)			
Two Plus				0.2245	-4.4667*	-1.0852
				(1.4614)	(2.5106)	(1.2471)
Cohort	0.6454		0.0969	0.6756		0.0900
	(3.1904)		(0.7378)	(3.1819)		(0.7213)
Constant	64.6708***	60.7579***	67.1975***	64.9464***	58.2636**	66.7349***
	(4.1354)	(20.0147)	(2.7280)	(3.7864)	(22.6338)	(3.0889)
Observations	14,569	14,569	14,569	14,569	14,569	14,569
R-squared	0.0155			0.0156		
Number of HH		4,014	4,014		4,014	4,014

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status,
immigrant status and educational qualifications of the parents
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As the results in *Table 5.9* are conflicting, we should analyse the results for BMI percentile in *Table 5.11* before drawing any conclusions, with respect to the impact of the number of siblings on the study child. BMI also shows fairly inconsistent results depending on the instrument used. Compared to *Table 5.9* the results for BMI percentile in *Table 5.11* show a smaller overall effect on the health outcomes of the study child. Within *Table 5.11*, it can be seen in *Panel A* that the pooled IV in specification (4) has a positive significant effect on the study child's BMI percentile when instrumenting with sex composition. The results for using the twin instrument in *Panel A* is fairly consistent with *Panel A Table 5.9*, the difference being the magnitude of the effect. In the model with two or more children ('Two Plus') the result for BMI are again inconsistent, switching signs and significance. Therefore, we find mixed positive and negative effect of the additional children on the study child's weight-format and BMI measure.[44] However, it is important to note that there may be a birth order effect that is confounding the estimates.[45]

Finally, the instrumental variable result for BMI percentile using both the twin instrument and sex composition instrument are reported in *Table 5.12*. We observe much smaller coefficients when both the twin and sex composition variables are used to instrument sibling size. Furthermore the results in *Table 5.12* reiterate the results observed in *Table 5.10*, suggesting that using a twin instrument may impact on the coefficient for family size due to the interrelationship between twinning/multiple births and health outcomes.

Overall we can see from the instrumental variable regressions discussed above, there is a negative impact of additional children on the study child's outcomes and therefore provides evidence that there is a quality-quantity trade-off occurring at the average.

[44] Weight-for-age percentile is also a measure which could be used in this analysis instead of BMI as it can show long term health issues in children when used in conjunction with weight-for-height. We explored weight-for-age and the results were similar.

[45] Birth order effects cannot be controlled for, as the questionnaire does not provide adequate information on the age of the study childs siblings.

5.3.1 Quantile Regression Results

Table 5.13 shows the results for the quantile regression at the median ($\tau = 0.5$), including all covariates used in our analysis at the median using quantile regression. Specification (1) reports the results for PPVT scores, (2) reports the results for WAI score, (3) reports the weight-for-height percentile results and (4) reports the BMI percentile against the 'Two Plus' indicator for two of more children in the household. In this instance we are not instrumenting to adjust for bias, so true inference is not possible. It can be seen that QR also exhibits a negative relationship between an increase in the number of siblings in the household and the outcomes of the study child for PPVT and WAI. Weight-for-height shows a positive significant effect. However when looking at the BMI percentile specification we find a negative coefficient, leading to conflicting results.

Furthermore, we also report the QR for the deciles with robust standard errors in *Table 5.14*. In this table it can be seen that the effect of an increase in the number of siblings on the study child is different depending on where in the distribution of outcomes the child lies. For example, we can see from the robust QR for WAI that there is a monotonic negative impact on the outcome of the child as we move along the distribution. This suggests that those children at the higher end of the distribution are affected more negatively by the presence of siblings than those at the low end of the distribution. However, WAI also shows a consistent negative impact on test scores due to the existence of siblings in the household.

Table 5.13: Quantile Regression Results

	(1) PPVT	(2) WAI	(3) Weight for Height	(4) BMI Percentile
Two Plus	-1.0619***	-1.1602***	1.5584**	-0.4565
	(0.0938)	(0.2168)	(0.7617)	(0.5015)
Year				
2006	3.2689***		0.2656	-4.8680***
	(0.1789)		(1.8882)	(0.8675)
2008	1.6681***	0.9493***	0.8523	-1.5882*
	(0.1586)	(0.2318)	(0.9419)	(0.9107)
2010	3.8465***			-3.7046***
	(0.1796)			(1.0236)
2012	2.5434***			-2.1311*
	(0.2261)			(1.1887)
Study Child Controls				
Age of SC	2.8148***	5.3547***	-1.6747*	-1.2776***
	(0.0378)	(0.2622)	(0.8671)	(0.1353)
Sex of SC	-0.1750*	5.1180***	-3.1267***	-0.9565**
	(0.0916)	(0.2101)	(0.7234)	(0.4879)
Indigenous status				
Aboriginal	-0.3553	-0.2127	6.5623	1.3158
	(0.6702)	(1.5143)	(5.1251)	(3.5850)
Torres Strait Islander	-1.4630	1.5913	24.2742	14.5170
	(2.5185)	(5.7794)	(17.2220)	(12.3291)
Both	-4.1476**	-4.7711	-0.1377	-6.6090
	(2.1017)	(4.6942)	(14.8872)	(11.3192)
Mother's Controls				
Age	0.1053***	0.0008	0.0055	0.1187*
	(0.0126)	(0.0288)	(0.1002)	(0.0673)
Immigrant Status	-1.3705***	0.9980***	-4.0785***	-3.3968***
	(0.1253)	(0.2875)	(0.9949)	(0.6673)
Labour Force Status				
Unemployed	-0.7061**	-0.6759	-5.9917**	-3.0440*
	(0.3207)	(0.7253)	(2.5480)	(1.7213)
NILF	-0.1835*	-0.5890**	-2.4060***	-1.4793**
	(0.1078)	(0.2326)	(0.7935)	(0.5811)
Educational Qualifications				
Postgraduate degree	1.7313***	1.9069***	0.3756	-0.7759
	(0.2112)	(0.4808)	(1.6656)	(1.1312)
Graduate diploma/cert	0.8908***	1.4772***	0.4793	0.5548
	(0.2084)	(0.4651)	(1.6331)	(1.1108)
Bachelor degree inc hons	1.2412***	1.7203***	-1.1855	-0.9876
	(0.1638)	(0.3500)	(1.2289)	(0.8867)
Advanced diploma/diploma	0.5559***	0.8049**	-0.5897	-1.5821
	(0.1881)	(0.4096)	(1.4306)	(1.0099)
Trade Certificate/Certificate	-0.2009	0.5028	0.9487	1.1959
	(0.1482)	(0.3066)	(1.0979)	(0.8044)
Other	0.3435	1.8221**	0.4759	1.3651
	(0.3746)	(0.9084)	(3.0737)	(1.9985)
< High School	-0.5774***	-1.4354***	0.0068	3.5465***
	(0.1938)	(0.5552)	(1.6421)	(1.0188)
Refused/Not stated	0.0232	0.4132	-12.4042	9.2121
	(1.1659)	(3.2228)	(10.3690)	(5.8096)

Table 5.13: Quantile Regression Results

	(1) PPVT	(2) WAI	(3) Weight for Height	(4) BMI Percentile
Indigenous status				
Aboriginal	-0.9364	-1.6927	-2.8461	-0.0759
	(0.6224)	(1.3747)	(4.6211)	(3.3492)
Torres Strait Islander	-0.5123	-5.0990	-4.3785	8.9967
	(1.7460)	(3.9387)	(12.8562)	(9.1427)
Both	6.3999*	3.6352	-2.1091	9.5551
	(3.6083)	(5.9537)	(20.3384)	(17.0217)
Father's Controls				
Age	-0.0124	-0.0100	0.0766	0.0343
	(0.0105)	(0.0239)	(0.0836)	(0.0561)
Immigrant Status	-0.7141***	1.0296***	0.9442	0.9144
	(0.1226)	(0.2816)	(0.9727)	(0.6524)
Labour Force Status				
Unemployed	-0.8011**	0.1900	-1.2605	0.5628
	(0.3934)	(0.8790)	(3.0323)	(2.0866)
NILF	-0.5195**	-0.8108	-0.5200	1.1265
	(0.2537)	(0.5658)	(1.9729)	(1.3207)
Educational Qualifications				
Postgraduate degree	2.0831***	1.3714***	-2.8580*	-3.3419***
	(0.2196)	(0.4834)	(1.7238)	(1.1799)
Graduate diploma/cert	0.8990***	0.6417	-2.3742	-1.3296
	(0.2317)	(0.5053)	(1.7830)	(1.2469)
Bachelor degree inc hons	1.5869***	1.6059***	-2.1224	-2.1966**
	(0.1889)	(0.3943)	(1.4076)	(1.0243)
Advanced diploma/diploma	0.5194**	0.6551	-2.6392*	-2.3008**
	(0.2097)	(0.4505)	(1.6039)	(1.1355)
Trade Certificate/Certificate	-0.2871*	-0.2392	0.0085	2.0586**
	(0.1621)	(0.3188)	(1.1641)	(0.8851)
Other	0.1307	0.2756	3.0373	2.6682*
	(0.3004)	(0.6760)	(2.2703)	(1.6177)
< High School	-0.8643***	-0.8874	2.6173	3.5671***
	(0.2165)	(0.5892)	(1.7887)	(1.1462)
Refused/Not stated	-0.8867**	-0.0785	-4.5225	-2.5806
	(0.4145)	(0.9134)	(3.1561)	(2.2142)
Indigenous status				
Aboriginal	-0.1117	-0.4247	-6.1935	3.7608
	(0.6081)	(1.3482)	(4.5211)	(3.2009)
Torres Strait Islander	0.6220	-2.6590	-10.7493	-9.6027
	(2.3097)	(5.1040)	(15.1673)	(11.0385)
Both	3.1044	0.1488	-25.5653	-0.1143
	(2.4607)	(4.8472)	(16.8379)	(13.1596)
Constant	49.9657***	33.8496***	79.1424***	74.4709***
	(0.4172)	(1.3981)	(4.7426)	(2.1509)
Observations	20,555	7,503	11,395	30,825

Robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

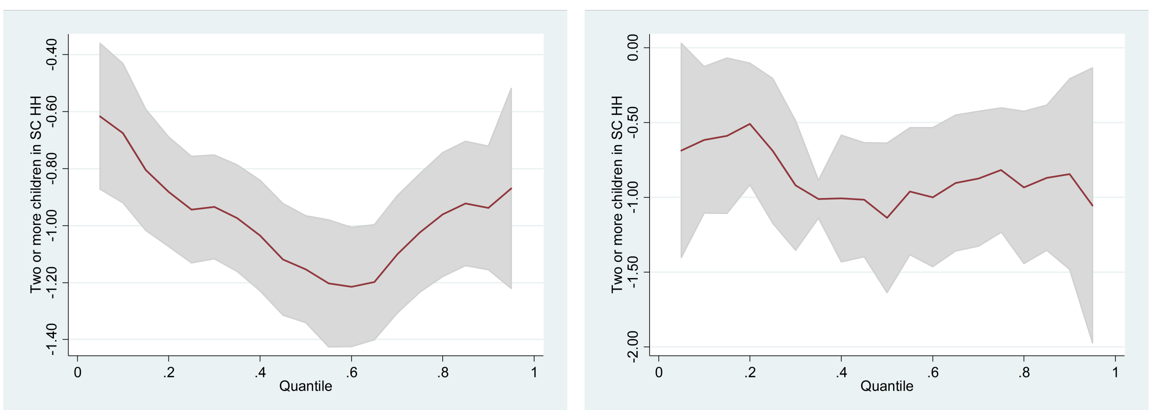
Table 5.14: Quantile Regression (deciles) with Robust Standard Errors

	Quantile									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Obs
PPVT										
Two Plus	-1.4749***	0.0000	0.0000	0.0000	-0.4469***	-0.9832***	-1.0279***	-1.0726***	-1.1620***	25460
	(0.3303)	(0.1747)	(0.1381)	(0.1056)	(0.1280)	(0.1365)	(0.1263)	(0.1199)	(0.1126)	
WAI										
Two Plus	-0.0588	-1.0588***	-1.1176***	-1.0588***	-1.1176***	-1.1176***	-1.1765***	-1.2941***	-2.8235***	9,076
	(0.2666)	(0.2435)	(0.2297)	(0.2196)	(0.2152)	(0.2203)	(0.2259)	(0.2442)	(0.2839)	
Weight for Height										
Two Plus	-1.3804	0.0325	0.3641	0.7114	0.6892	-0.2648	0.0979	-0.4922	-0.0397	13,733
	(1.0694)	(0.9881)	(0.8849)	(0.7997)	(0.6470)	(0.5749)	(0.4882)	(0.3981)	(0.3070)	
BMI Percentile										
Two Plus	-1.0447*	-1.2376**	-1.3894***	-1.7154***	-1.4693***	-1.2098***	-1.2092***	-0.7986***	-0.2640	38,491
	(0.5557)	(0.5496)	(0.5223)	(0.4878)	(0.4421)	(0.3864)	(0.3260)	(0.2518)	(0.1685)	

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status, immigrant status and educational qualifications of the parents
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

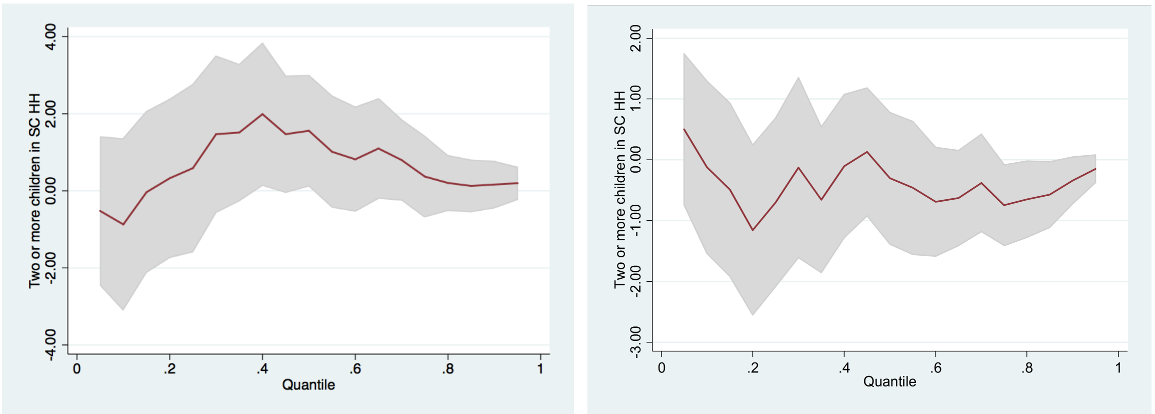
PPVT scores show a similar impact on the children at the higher end of the distribution. This suggests that children who have a higher level of ability are affected in a significantly negative manner when they have a sibling. Although the bottom tail also experiences a significant loss in reported test scores.

The results for weight-for-height suggest that if the study child is at the tails of the distribution they the child will be impacted more negatively by the presence of siblings. This is similar to the result found for BMI percentile, although the values are less negative for BMI and are consistent across the distribution in comparison to weight-for-height percentile. The results for all outcomes measures are displayed in *Figure 5.1* and *Figure 5.2*. These graphs add additional emphasis for this analysis of the distribution of child outcomes. As can be seen, the outcomes for the study child vary significantly based on where in the distribution the child lies. This is particularly noticeable along the entire distribution for our educational outcomes shown in *Figure 5.1*.



(a) PPVT (b) WAI

Figure 5.1: QR Educational Outcomes



(a) Weight-for-Height Percentile (b) BMI Percentile

Figure 5.2: QR Health Outcomes

5.3.2 IV-QR Results

Table 5.15 and *Table 5.16* show the results of the implementation of IV-QR using the twin and sex composition instruments respectively.[46] The results for *Table 5.15* are similar to that of *Table 5.14* for PPVT but for WAI the results are starkly different. We no longer see the negative impact of additional children on test scores increasing as we move to the higher end of the distribution. In fact, those children who experience the most significant impact of additional children in the household are now at the low end of the distribution of the WAI test distribution when using the twin instrument. *Table 5.16* shows a similar result for PPVT and WAI to the QR specification when instrumenting with sex composition. The results for educational outcomes in *Table 5.16* are significantly more consistent with *Table 5.14*, than the results for education in *Table 5.15*. However, both specifications show that there is a negative impact of an increase in the number of siblings on the cognitive skills of the study child.

[46] This study uses the -cqiv- command in Stata, implementing an uncensored version to obtain the IV-QR or "qiv".

Table 5.15: Instrumental Variables Quantile Regression with Twin Instrument (IV-QR) (deciles)

	Quantile									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Obs
PPVT										
Two Plus	-2.4199**	-2.6228***	-2.8590***	-2.8369***	-4.1335***	-4.1527***	-3.7353***	-4.3137***	-2.8613***	12,798
	(1.0621)	(0.9641)	(0.7710)	(0.9180)	(0.9602)	(0.9448)	(0.9959)	(0.8799)	(1.0280)	
WAI										
Two Plus	-6.9071***	-4.8138*	-2.3487	-3.9036*	-4.6364*	-3.7106*	-2.7144	-1.4968	-2.7388	4,656
	(2.4522)	(2.6405)	(2.0096)	(2.0763)	(2.4949)	(2.1564)	(2.1458)	(2.3750)	(2.9363)	
Weight for Height										
Two Plus	-19.5496	-33.9466***	-23.2624**	-26.9971***	-23.0364***	-11.7992**	-7.7041	-8.5575***	-8.4607***	7,096
	(12.4537)	(10.0649)	(9.1885)	(7.0898)	(6.9961)	(5.8140)	(5.3010)	(3.1148)	(2.1747)	
BMI Percentile										
Two Plus	-24.4937***	-28.8860***	-33.9089***	-31.9023***	-20.8647***	-15.9740***	-12.5982***	-9.3782***	-7.3002***	19,025
	(6.4377)	(6.8766)	(5.7914)	(5.2878)	(5.1325)	(4.2040)	(3.9370)	(2.7150)	(1.6095)	

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status, immigrant status and educational qualifications of the parents
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The health outcome results shown in *Table 5.15* and *Table 5.16* are conflicting. Using the twins instrument, we find a significantly negative impact of an additional child on weight-for-height percentile and BMI percentile, whereas the sex composition instrument suggests a mild positive effect in the middle of the distribution for weight-for-height and a mildly positive effect for BMI (at a 10% significance level). However, this is only significant for BMI. The coefficients between for weight-for-height percentile and BMI percentile have a similar magnitude in this case. Again, the lack of consistent coefficient estimate between the two specifications in *Table 5.15* and *Table 5.16* may be due to the existing relationship between twin/multiple births and weight, or potential birth order effects. Moreover, we may not be seeing an impact due to health outcomes not contributing to the quality-quantity trade-off in developed countries like Australia where healthcare is provided predominantly by the government.

Table 5.16: Instrumental Variables Quantile Regression with Sex Composition Instrument (IV-QR) (deciles)

	Quantile									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Obs
PPVT										
Two Plus	-1.3559***	-1.2875***	-1.6395***	-1.6489***	-1.8333***	-1.7382***	-1.8166***	-1.8352***	-1.6466***	19,496
	(0.2146)	(0.2157)	(0.1786)	(0.2247)	(0.1983)	(0.2147)	(0.2015)	(0.2059)	(0.2434)	
WAI										
Two Plus	-1.1576*	-0.0837	-1.8317***	-1.8383***	-2.1220***	-1.8443***	-1.7772***	-2.0817***	-2.3182***	6,974
	(0.6043)	(6.4718)	(0.4302)	(0.4274)	(0.4962)	(0.4778)	(0.4347)	(0.5079)	(0.7412)	
Weight for Height										
Two Plus	-0.6112	-2.2676	-1.2990	0.8686	2.3551	2.1846	1.5844	0.6069	0.0423	10,624
	(2.3185)	(2.3056)	(1.9918)	(1.5692)	(1.6824)	(1.3846)	(1.0477)	(0.7653)	(0.6195)	
BMI Percentile										
Two Plus	0.8656	1.8831	1.7738	2.0507*	1.9353*	1.8166*	1.2589*	1.0824	0.3835	29,400
	(1.4408)	(1.3308)	(1.2418)	(1.0891)	(1.0797)	(0.9665)	(0.7410)	(0.6836)	(0.4002)	

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status, immigrant status and educational qualifications of the parents

Robust standard errors in parentheses

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

Table 5.17: Instrumental Variables Quantile Regression with Both Instruments (IV-QR) (deciles)

	Quantile									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	Obs
PPVT										
Two Plus	-1.0637***	-1.1598***	-1.3998***	-1.3768***	-1.6193***	-1.4716***	-1.5913***	-1.5367***	-1.3859***	10,378
	(0.2751)	(0.2596)	(0.2216)	(0.2268)	(0.2187)	(0.2931)	(0.2463)	(0.2345)	(0.2570)	
WAI										
Two Plus	-1.3960**	-1.4578***	-2.0035***	-1.9705***	-2.4337***	-2.0378***	-1.9873***	-2.2493***	-3.0923***	3,725
	(0.6174)	(0.5593)	(0.4784)	(0.4921)	(0.6471)	(0.6396)	(0.6228)	(0.6768)	(0.7403)	
Weight for Height										
Two Plus	-3.8470	-2.3492	-3.4462	-0.6574	1.5619	1.1311	1.0864	0.6996	0.0161	5,680
	(3.2789)	(2.8967)	(2.4771)	(1.8322)	(1.7515)	(1.6026)	(1.1726)	(0.8697)	(0.6384)	
BMI Percentile										
Two Plus	-1.2309	-1.5630	-1.0389	-0.7446	0.5141	0.6825	0.6467	0.3594	0.0129	15,471
	(1.7510)	(1.4748)	(1.3733)	(1.3464)	(1.1978)	(0.9853)	(1.0825)	(0.8424)	(0.4414)	

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status, immigrant status and educational qualifications of the parents
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Finally, the results for IV-QR using both the twin and sex composition instruments is summarised in *Table 5.17.* We find no significant effect for health outcomes, which helps consolidate our findings in *Table 5.15* and *Table 5.16*. Similarly, for educational outcomes we find a negative significant effect of the presence of additional children in the household on the cognitive outcomes of the study child.

5.3.3 Quantile Treatment Effects

This section outlines the results for both the conditional and unconditional treatment effects. As seen in *Section 5.2.5*, the application of quantile treatment effects limits the instrumental variable choice to one instrument per estimation. We report the twin or multiple birth and sex composition specifications separately.

Conditional QTE

For PPVT scores the results of the Abadie, Angrist & Imbens (2002) method for conditional QTE are summarised in *Table 5.18.* In this model of QTEs, both the weighting matrix and the estimation of the quantile function are conditioned on the control variables. As can be seen the results for both the twin instrument (*Panel A*) and the sex composition instrument (*Panel B*) show consistently negative results for all quantiles. The effects are highest at the 60th percentile. Additionally, *Table 5.18* reports covariates including year, age and sex of the study child. It can be seen that as age increases, the PPVT score of the study child increases. Both *Panel A* and *Panel B* shows that sex is only important at the tails of the distribution for PPVT. Yearly indicators are almost always significant across the distribution, with the exception of a few at the ends of the distribution.

Table 5.18: Quantile Treatment Effects for PPVT Scores (AAI Method)

	Quantile								
	PANEL A: Twin Instrument								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Two Plus	-1.9666**	-2.3348***	-2.2387***	-2.5323***	-2.9045***	-2.9961***	-2.7807***	-2.6044***	-2.3604**
	(0.8639)	(0.7571)	(0.7872)	(0.6739)	(0.7139)	(0.8802)	(0.9441)	(0.8942)	(1.0363)
Age of SC	3.1966***	2.7765***	2.6500***	2.6844***	2.6158***	2.5706***	2.6188***	2.6859***	2.5979***
	(0.0966)	(0.1006)	(0.0756)	(0.0793)	(0.0731)	(0.0710)	(0.0747)	(0.0833)	(0.0905)
Sex of SC	0.2802	0.4414**	0.0192	-0.1843	-0.2536	-0.4273**	-0.4779***	-0.4086**	-0.6514***
	(0.2228)	(0.2092)	(0.1926)	(0.1764)	(0.1958)	(0.1892)	(0.1836)	(0.1860)	(0.2229)
Year									
2006	3.2036***	3.2367***	3.1589***	2.8172***	2.9507***	3.1821***	3.2990***	2.8534***	2.4053***
	(0.3602)	(0.4140)	(0.3631)	(0.3383)	(0.4079)	(0.4339)	(0.4056)	(0.4122)	(0.4518)
2008	0.5330	2.0645***	2.0678***	1.6593***	1.4382***	1.1716***	0.8038**	0.2175	0.2845
	(0.4070)	(0.4847)	(0.3596)	(0.3172)	(0.3446)	(0.3150)	(0.3219)	(0.3991)	(0.4290)
2010	3.2016***	3.6514***	3.2972***	3.2054***	3.6330***	3.6879***	3.4356***	2.7607***	2.7319***
	(0.3724)	(0.4200)	(0.3715)	(0.3874)	(0.4834)	(0.3870)	(0.3809)	(0.4440)	(0.4348)
2012	0.6820	2.4222***	2.8632***	2.6394***	2.4949***	2.0562***	1.4612***	0.6597	0.5135
	(0.5482)	(0.5562)	(0.4693)	(0.4552)	(0.4624)	(0.4261)	(0.4410)	(0.5072)	(0.5515)
Observations	12,037	12,037	12,037	12,037	12,037	12,037	12,037	12,037	12,037
	PANEL B: Sex Composition Instrument								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Two Plus	-1.3121***	-1.4712***	-1.4921***	-1.6715***	-1.8982***	-1.8928***	-1.7780***	-1.6553***	-1.5349***
	(0.1995)	(0.2119)	(0.1710)	(0.1957)	(0.2246)	(0.2132)	(0.2256)	(0.2162)	(0.2360)
Age of SC	3.2347***	2.9063***	2.7339***	2.7397***	2.7353***	2.7657***	2.8206***	2.7935***	2.8035***
	(0.0589)	(0.0729)	(0.0481)	(0.0508)	(0.0523)	(0.0447)	(0.0483)	(0.0524)	(0.0639)
Sex of SC	0.2945**	0.3505***	0.1291	0.0674	-0.0052	-0.0384	-0.1727	-0.2859**	-0.4023***
	(0.1351)	(0.1303)	(0.1100)	(0.1222)	(0.1316)	(0.1169)	(0.1179)	(0.1197)	(0.1359)
Year									
2006	3.2102***	3.3557***	3.3321***	3.0553***	3.0969***	3.4203***	3.3891***	2.9390***	2.2918***
	(0.2329)	(0.2676)	(0.2037)	(0.2340)	(0.2691)	(0.2664)	(0.2550)	(0.2526)	(0.2756)
2008	0.2376	1.5560***	1.9497***	1.7428***	1.4850***	1.3470***	1.0248***	0.7176***	0.2407
	(0.2337)	(0.3449)	(0.2074)	(0.2087)	(0.2040)	(0.1843)	(0.2282)	(0.2450)	(0.2646)
2010	3.1710***	3.4766***	3.4766***	3.5316***	3.8414***	3.9208***	3.5969***	3.0145***	2.3288***
	(0.2383)	(0.2725)	(0.2065)	(0.2559)	(0.2873)	(0.2433)	(0.2509)	(0.2420)	(0.2792)
2012	0.7691**	2.1413***	2.8366***	2.6587***	2.2998***	1.9931***	1.3080***	0.9226***	0.2247
	(0.3487)	(0.3893)	(0.3149)	(0.3062)	(0.3089)	(0.2657)	(0.3040)	(0.3054)	(0.3454)
Observations	18,338	18,338	18,338	18,338	18,338	18,338	18,338	18,338	18,338

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status, immigrant status and educational qualifications of the parents

Robust standard errors in parentheses

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

Table 5.19 shows the conditional QTE for WAI scores. In this case the twin instrument in *Panel A* shows a significant effect of an additional sibling on the study child in the middle of the distribution but the coefficients are negative and significant. The second panel of *Table 5.19* shows a similar result for WAI to those seen using the sex composition instrument in *Table 5.16*. Those children at the higher end of the distribution experience a loss of 1-2 points when there is a sibling in the household. The covariates in this specification are also significant across the distribution. Age has a positive effect on the study childs WAI score, but in magnitude it is smallest at the 10th percentile. The sex indicator is also positive implying if the study child is female the WAI score will be between a 4-5 points higher than male children. We can conclude from this analysis there is evidence that additional children reduce the educational outcomes of the study child, specifically with respect to cognitive development. This is in comparison to the results found in Cobb-Clark & Moschion (2013), who found no effect of additional children on the average Australian child when analysing NAPLAN scores.

Table 5.19: Quantile Treatment Effects for WAI Scores (AAI Method)

	Quantile								
	PANEL A: Twin Instrument								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Two Plus	-2.8136	-2.9897	-3.2416*	-3.3785*	-3.4650*	-3.8551**	-3.4041	-3.6407	-4.5251
	(2.4669)	(2.2179)	(1.7028)	(1.8225)	(1.7849)	(1.8423)	(2.1101)	(2.2803)	(2.9575)
Age of SC	4.2721***	5.0823***	5.4286***	5.2522***	5.6783***	5.7028***	5.4563***	5.2611***	6.5392***
	(0.8862)	(0.7740)	(0.5146)	(0.6183)	(0.5143)	(0.4990)	(0.6119)	(0.6139)	(0.9504)
Sex of SC	4.3798***	5.2420***	5.2155***	5.3491***	5.4115***	4.9472***	5.0082***	5.1162***	4.2821***
	(0.5949)	(0.4612)	(0.4659)	(0.4366)	(0.4197)	(0.4027)	(0.4563)	(0.4871)	(0.6223)
Year									
2006	1.0175*	1.4959***	1.0387**	0.9967**	1.0160**	1.7618***	1.5717***	1.5590***	1.8328***
	(0.5770)	(0.4737)	(0.4665)	(0.4496)	(0.4415)	(0.4296)	(0.4660)	(0.5019)	(0.6767)
	PANEL B: Sex Composition Instrument								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Two Plus	-1.9780***	-1.6493***	-1.8414***	-2.0163***	-2.0980***	-2.1029***	-1.7947***	-1.9516***	-2.1446***
	(0.4409)	(0.4482)	(0.4363)	(0.4263)	(0.4204)	(0.4905)	(0.4777)	(0.4618)	(0.5881)
Age of SC	3.7344***	4.5891***	5.0381***	5.2262***	5.4941***	5.4025***	5.1765***	5.0208***	6.0854***
	(0.4392)	(0.3532)	(0.3681)	(0.3638)	(0.3081)	(0.3375)	(0.3087)	(0.3857)	(0.5320)
Sex of SC	4.6683***	5.5305***	5.6583***	5.4741***	5.4274***	5.3715***	5.0144***	4.9273***	4.6635***
	(0.3019)	(0.2776)	(0.2723)	(0.2787)	(0.2483)	(0.2736)	(0.2539)	(0.2898)	(0.3816)
Year									
2006	0.7287**	0.8841***	1.0236***	0.9669***	1.0039***	1.1072***	1.2857***	1.3979***	2.0120***
	(0.3079)	(0.3007)	(0.2810)	(0.2962)	(0.2588)	(0.2834)	(0.2765)	(0.3225)	(0.3756)

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status, immigrant status and educational qualifications of the parents
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The conditional QTE for health outcomes are summarised in *Table 5.20* and *Table 5.21*. Both tables show a fairly consistent result across the distribution when estimating the conditional QTE using the twin instrument (*Panel A*). The results show that the children in the middle of the distribution have the largest negative effect in terms of magnitude. Sex composition proves to be inconsistent. In *Table 5.20*, sex composition shows no effect on the weight-for-height percentile of the study child, whereas *Table 5.21* shows a positive significant effect on BMI percentile on the lower half of the distribution. Additionally the coefficients for age and sex are inconsistent. Furthermore, the results in *Table 5.20* show a negative significant effect for both age and sex. The BMI specification shows age and sex being significant at the top end of the distribution in *Panel A* when using the twin instrument, but sex composition in *Panel B* suggests that age is important across the whole distribution. Overall, these results suggest that there may not be a trade-off in terms of health outcomes.

Table 5.20: Quantile Treatment Effects for Weight for Height (AAI Method)

					Quantile				
					PANEL A: Twin Instrument				
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Two Plus	-12.4576**	-18.9964***	-18.8265**	-19.2546***	-17.9806**	-15.7909*	-12.9558*	-10.1987	-6.5343
	(5.7748)	(6.7784)	(7.3917)	(7.1509)	(7.5840)	(8.1019)	(7.6231)	(6.2879)	(5.7774)
Age SC	-1.8225	-1.7369	-5.0596**	-3.5902*	-2.7362	-1.4991	-0.8196	-0.8559	-0.6988
	(2.4057)	(2.3716)	(1.9911)	(2.1779)	(1.8825)	(1.4600)	(1.3424)	(1.0709)	(0.6981)
Sex SC	-1.5603	-2.6732	-4.4610**	-5.1985***	-4.6341***	-4.2452***	-3.3781***	-2.9714***	-1.2063**
	(2.3510)	(2.0639)	(1.7608)	(1.4898)	(1.5254)	(1.2082)	(1.1043)	(0.8204)	(0.6120)
Year									
2006	-4.7463	-3.2139	-8.6004*	-3.7835	0.2991	2.5058	4.3282	3.6640*	2.7618*
	(5.3305)	(5.1960)	(4.6179)	(4.5838)	(4.0524)	(3.1343)	(3.1094)	(2.1616)	(1.5779)
2008	0.7397	0.1790	-0.2256	0.3712	2.5210	2.8722*	1.8234	2.0293*	1.6886**
	(2.8693)	(2.9569)	(2.5386)	(1.9921)	(1.9007)	(1.5231)	(1.3456)	(1.1018)	(0.8288)
					PANEL B: Sex Composition Instrument				
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Two Plus	-0.6675	-0.3588	1.0908	1.6311	1.5127	1.3209	1.0367	-0.1367	-0.2601
	(2.3041)	(2.2837)	(2.0491)	(1.7226)	(1.6166)	(1.2447)	(1.0350)	(0.8100)	(0.6163)
Age SC	-2.8749*	-3.3058*	-3.7245***	-2.0641*	-1.9255*	-1.3925	-0.9262	-0.5111	-0.2708
	(1.4857)	(1.7421)	(1.3911)	(1.2301)	(1.1011)	(1.0215)	(0.7294)	(0.6345)	(0.4016)
Sex SC	-2.1200	-2.1920*	-3.4722***	-4.0115***	-4.1150***	-3.8940***	-2.6108***	-2.7070***	-1.0247***
	(1.4214)	(1.3071)	(1.1834)	(0.9680)	(0.8919)	(0.7339)	(0.6381)	(0.4901)	(0.3527)
Year									
2006	-6.9759**	-6.0923*	-6.0417**	-1.6017	0.2496	2.0417	2.8371*	3.2230**	2.2586**
	(3.2233)	(3.5140)	(3.0278)	(2.6294)	(2.2761)	(2.2576)	(1.6032)	(1.2756)	(0.8838)
2008	-2.0820	-2.0674	-0.9114	0.3259	1.1660	1.7018*	1.1331	0.6579	0.2540
	(1.8230)	(1.6953)	(1.4948)	(1.1914)	(1.0975)	(0.9209)	(0.8028)	(0.6656)	(0.5106)

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status, immigrant status and educational qualifications of the parents
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5.21: Quantile Treatment Effects for BMI Percentile (AAI Method)

Quantile

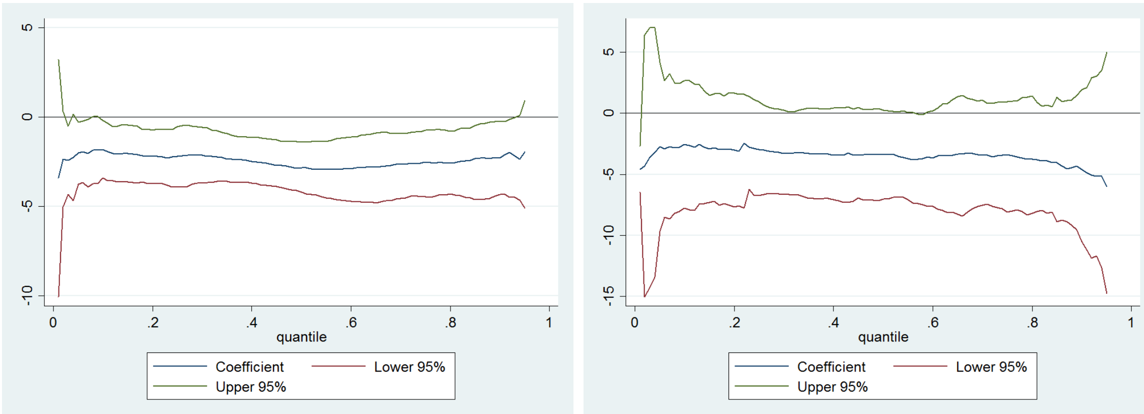
PANEL A: Twin Instrument

	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Two Plus	-11.9162***	-17.7236***	-19.8580***	-20.2341***	-20.1836***	-18.1966***	-15.9458***	-12.5105***	-7.9896*
	(3.2756)	(3.9957)	(4.0237)	(4.3015)	(4.5340)	(5.0548)	(4.8805)	(4.4853)	(4.7428)
Age of SC	-0.7460*	-0.5783	-0.5288*	-0.9839***	-0.7882***	-0.7153***	-0.5266**	-0.3711**	-0.1380
	(0.4456)	(0.3726)	(0.3192)	(0.3291)	(0.2671)	(0.2390)	(0.2421)	(0.1789)	(0.1102)
Sex of SC	-0.6530	-0.2175	-1.3076	-1.7493	-2.7398***	-2.7607***	-2.9682***	-2.5466***	-0.7379**
	(1.3551)	(1.2454)	(1.1273)	(1.0930)	(0.9167)	(0.8639)	(0.7739)	(0.5972)	(0.3743)
Year									
2006	-4.9455*	-3.3305	-5.0127**	-4.7277***	-3.0964**	-2.8195*	-2.9600**	-0.9150	0.1788
	(2.5523)	(2.0529)	(2.1966)	(1.7720)	(1.4487)	(1.4657)	(1.3386)	(0.8889)	(0.6297)
2008	1.5693	0.1237	-1.1350	0.2038	1.3079	1.1604	0.2246	1.2456	1.0772*
	(2.6746)	(2.2308)	(2.4017)	(1.8694)	(1.5898)	(1.4994)	(1.3457)	(0.9356)	(0.6365)
2010	0.2313	-2.2350	-3.0555	-1.7603	-0.5466	-0.1681	-1.0557	0.4186	0.9894
	(3.0880)	(2.5656)	(2.5083)	(2.0372)	(1.7155)	(1.7338)	(1.5866)	(1.1585)	(0.7882)
2012	0.2362	-2.9589	-4.1198	-0.8239	1.1692	0.9015	1.1275	1.8733	1.3281
	(3.3253)	(2.9428)	(2.8781)	(2.7955)	(2.0109)	(2.0456)	(1.8757)	(1.3582)	(0.9047)

PANEL B: Sex Composition Instrument

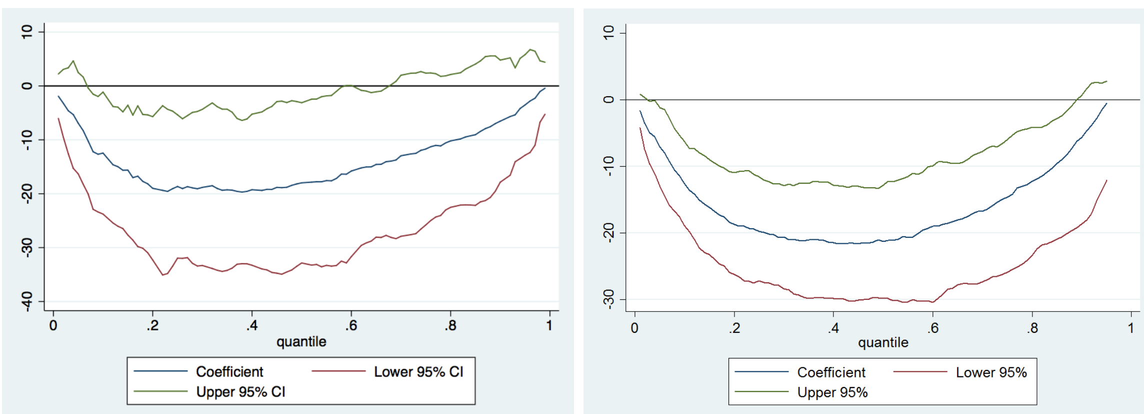
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Two Plus	3.6481**	2.9567**	2.8485**	2.8777***	2.4569**	1.5500*	0.9926	0.2033	0.0295
	(1.4579)	(1.4083)	(1.2912)	(1.0445)	(1.0294)	(0.8699)	(0.6748)	(0.6078)	(0.3786)
Age of SC	-0.8364***	-0.8622***	-0.7834***	-1.0956***	-0.8692***	-0.6567***	-0.5798***	-0.4202***	-0.2001***
	(0.2241)	(0.2224)	(0.2137)	(0.1902)	(0.1746)	(0.1478)	(0.1278)	(0.1041)	(0.0678)
Sex of SC	-0.3189	-0.1756	-0.9233	-1.4742**	-2.0315***	-2.2790***	-2.2111***	-2.2794***	-1.3113***
	(0.8187)	(0.7782)	(0.7530)	(0.6551)	(0.6024)	(0.5232)	(0.4460)	(0.3539)	(0.2271)
Year									
2006	-4.4234***	-4.7914***	-5.5536***	-5.0531***	-4.3537***	-2.6725***	-2.9035***	-1.7925***	-0.8602**
	(1.5165)	(1.2921)	(1.3006)	(1.0354)	(0.9753)	(0.8422)	(0.7275)	(0.5381)	(0.3668)
2008	-2.3622	-1.8617	-1.9225	-0.9804	-0.4588	0.4477	-0.3293	0.2093	-0.2197
	(1.5846)	(1.5219)	(1.4521)	(1.1290)	(1.0329)	(0.8926)	(0.7618)	(0.5552)	(0.3764)
2010	-2.0123	-2.9030*	-3.5786**	-2.4544*	-1.8685	-1.5269	-1.9915**	-0.7640	-0.7649
	(1.7921)	(1.6195)	(1.5777)	(1.2980)	(1.1732)	(1.0153)	(0.8884)	(0.7099)	(0.4854)
2012	-2.0921	-3.7505**	-3.3315*	-1.3516	-0.8547	-0.5467	-0.3797	0.3419	-0.3165
	(1.9693)	(1.8412)	(1.9007)	(1.6435)	(1.4005)	(1.2056)	(1.1105)	(0.8701)	(0.5387)

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status, immigrant status and educational qualifications of the parents
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1



(a) PPVT (b) WAI

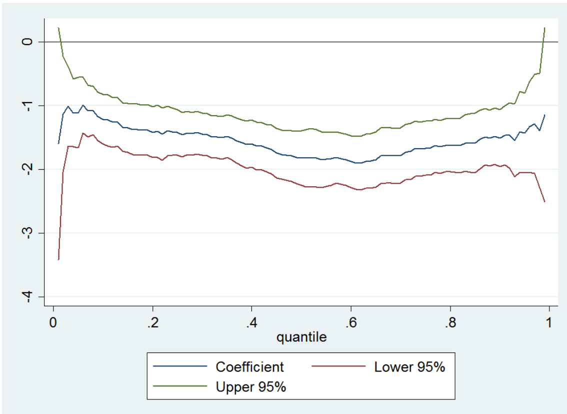
Figure 5.3: Conditional QTE Educational Outcomeswith Twin Instrument



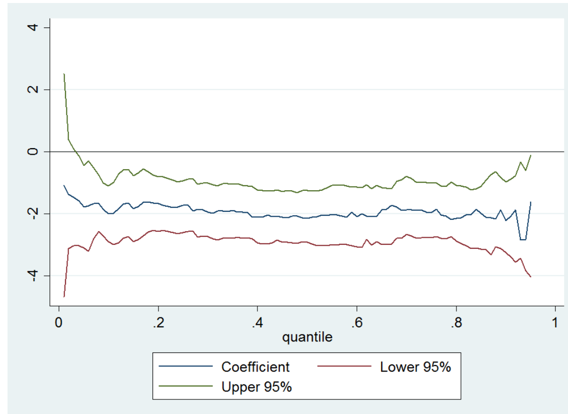
(a) Weight-for-Height Percentile (b) BMI Percentile

Figure 5.4: Conditional QTE Health Outcomes with Twin Instrument

A graphical representation of all conditional QTE result can be seen in *Figure 5.3* and *Figure 5.4* for the specifications which use the twin/multiple birth instrument and in *Figure 5.5* and *Figure 5.6* for sex composition. *Figure 5.3* shows the distribution of education outcomes is spread further at the tails of the distribution, and *Figure 5.4* shows a 'U' shape to the distribution of health outcomes. *Figure 5.5*

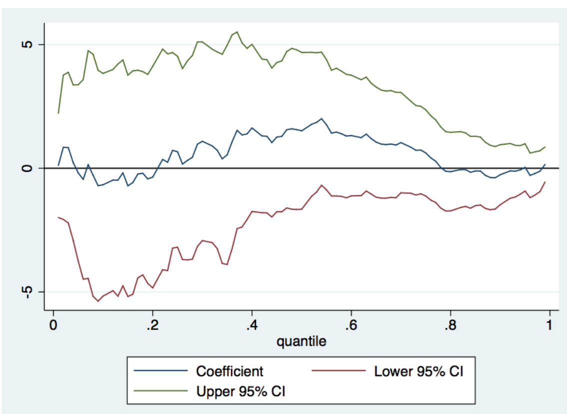


(a) PPVT



(b) WAI

Figure 5.5: Conditional QTE Educational Outcomes with Sex Composition Instrument



(a) Weight-for-Height Percentile

(b) BMI Percentile

Figure 5.6: Conditional QTE Health Outcomes with Sex Composition Instrument

shows a similar effect on the distribution as *Figure 5.3*. The difference being that *Figure 5.5* is centred more around zero. *Figure 5.6 (a)* shows more consistent results observed in *Figure 5.2*.

Unconditional QTE

Finally, the unconditional treatment effects are summarised in *Table 5.22*. Unconditional QTE relax the assumptions imposed when using the conditional QTE (see *Section 5.3.3*). When using the twin instrument to estimate the effects of additional children on PPVT scores, the results show that the compliers who are affected negatively affected by the addition of a sibling are those at the low end of the distribution. Using the sex composition instrument, we find a negative significant effect along the entire distribution affecting those in the bottom 10% most.

WAI results show little to no effect on the study child's educational outcomes from the presence of an additional child when using the twin treatment, but sex composition shows a fairly consistent negative effect that is stronger at the tails of the distribution. This suggests that in the larger pool of compliers, those at both the high end and the low end of the distribution are impacted by the presence of siblings in the household. Again sex composition proves to be a better instrument as it is more consistent and allows for the analysis of QTE to extend to a larger sample than using twins as an instrument (see Angrist et al., 2010; Angrist & Evans, 1998).

The results for health outcomes are fairly consistent on the sample that uses the twins as an instrument (see specifications (3) and (4) in the first panel), the results for the compliers is not consistent between the twin and sex composition instruments. Weight-for-height is not affected in the sex composition estimation, whereas when using the twins instrument it is significant at the lower tail of the distribution. This result may be driven by the fact that twins share the same space when developing in the womb, leading to decreased birth weight and other health indicators. Therefore, it is more likely there is no effect of additional births on weight-for-height percentile. However, it can be seen that BMI is very similar between both estimations.

Table 5.22: Unconditional Quantile Treatment Effects

	Twin Instrument				Sex Composition Instrument			
	(1) PPVT	(2) WAI	(3) Weight for Height	(4) BMI Percentile	(1) PPVT	(2) WAI	(3) Weight for Height	(4) BMI Percentile
Quantile 0.1	-4.2011**	-2.6471	-16.0025***	-13.3929***	-3.5307***	-2.6471***	-1.0740	3.9168**
	(1.7752)	(5.7643)	(5.6943)	(2.1447)	(0.6275)	(0.7250)	(2.8885)	(1.8708)
Quantile 0.2	-3.6648*	-2.1176	-18.9004**	-26.3848***	-0.5810	-2.1176**	0.2500	4.0767**
	(2.0826)	(2.3640)	(9.6221)	(3.3461)	(0.4991)	(0.8392)	(2.3104)	(1.5886)
Quantile 0.3	-5.6760***	-2.2941	-6.2305	-26.1808***	-0.8146*	-1.0588	-0.8453	3.5606**
	(2.1854)	(1.5331)	(7.0932)	(7.2032)	(0.4701)	(0.6832)	(2.2847)	(1.4912)
Quantile 0.4	-5.0950**	-4.2941**	-13.5802*	-23.2738***	-1.9218***	-1.0588*	0.2774	2.7404**
	(2.1352)	(1.8791)	(7.1617)	(8.0897)	(0.4393)	(0.5931)	(2.5225)	(1.3844)
Quantile 0.5	-4.6480**	-4.2941	-15.4780	-19.2402**	-1.0279***	-1.0588*	3.5858**	2.7188*
	(2.0355)	(2.6415)	(10.3985)	(7.9812)	(0.3850)	(0.6068)	(1.5582)	(1.4443)
Quantile 0.6	-5.3184***	-3.8824	-6.8259	-14.3700	-3.7542***	-1.1176*	0.7397	3.0306***
	(1.9815)	(5.3499)	(12.1809)	(10.0488)	(0.3808)	(0.6033)	(1.3178)	(1.0262)
Quantile 0.7	-4.5140*	-3.4118	-3.0437	-11.2350	-1.2514***	-2.2941***	0.3300	1.6869**
	(2.5715)	(2.4455)	(7.6209)	(6.9454)	(0.4575)	(0.6168)	(1.1640)	(0.8419)
Quantile 0.8	-4.9162	-5.2353**	-3.0047	-9.6426	-2.9050***	-2.9412***	0.5453	1.3096**
	(4.5585)	(2.2757)	(5.6123)	(6.2138)	(0.4449)	(0.7467)	(0.9821)	(0.6453)
Quantile 0.9	-1.4302	-4.0000	-5.9689	-5.2492	-1.4302***	-2.7059***	0.4776	0.6685
	(2.4149)	(11.9094)	(4.8326)	(4.1742)	(0.5009)	(0.8479)	(0.8642)	(0.4869)
Observations	12,037	4,424	6,729	17,859	18,338	6,644	10,092	27,598

We control for year, cohort, the age, sex, indigenous status of the study child, mother and father, in addition to the labour force status, immigrant status and educational qualifications of the parents
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.4 Immigrant versus Native Analysis

This study highlighted the role of the quality-quantity trade-off for Australian families. Whist it would make this thesis coherent in theme to investigate immigrant and native differences, the LSAC does not include immigrant children. All study children are required to be born in Australia. Analysis of parent immigrant background and composition is possible, but would be lengthy (both immigrant parents versus one immigrant parent). Due to time constraints we do not explore this relationship. However, this is a research question we have posed for future work.

5.5 Investment in Private Schooling

This study thus far has shown the effects of an additional child in the household on the educational outcomes of young Australians. This section explores the complementary question of investment in child quality. We do this through the analysis of two investment decisions; (1) investigating the probability of the study child being enrolled in private schooling (see for example Caceres-Delpiano, 2006) and; (2) time spent reading or being read to for leisure with the parent.[47]

Furthermore, we investigate the expected negative association with family size and investment in children by applying the IV estimation techniques to the probability of private school enrolments of the children in the LSAC. This analysis allows us to further investigate the presence of the quality quantity trade off in terms of parental choice to invest in child quality. The relationship we estimate is as follows:

$$Private_i = \alpha + \beta_1 \mathbf{X}_i + \beta_2 N_i + \epsilon_i \tag{18}$$

where $Private_i$ is equal to 1 if the study child attends a private or independent school and 0 otherwise. In this case we use the previously outlined instruments and estimate the first stage regression as previously outlines in *Section 5.2.2*. We then

[47]This question comes from the more recent emphasis on the effects of parental time investment (see for example Hanushek, 1992). Particularly on educational activities.

use these fitted values in the estimation of equation (18).

Additionally, the analysis of reading time is used as an indicator of parental effort per child. Additional time spent parenting via educational activities can be an example of effort made to improve child quality. When there are more children in the household, parenting time may be split between children. Therefore, there is an expectation that with an increase in the number of siblings in the household there will be less time spent on such activities with each child. We estimate this relationship using instrumental variables as previously outlined in this study. In this case we are using Time Use Data (TUD) where our measure of parental effort or time investment is the main activity done with the child. The LSAC TUDs precoded 'light' diaries used to collect information on a child's activity patterns in blocks of 15 minutes throughout the day for one weekday and one weekend. Specifically, we use reading or being read to as the main activity as an indicator for increasing child quality as it is well known that reading to children helps child development. If the main activity is reading then the dependent variable takes a value of 1, and 0 otherwise. TUDs from the LSAC is only sufficiently available for Cohort K in 2010 and 2012 due to data issues. This is a significant limitation to the analysis of parental effort investment through reading.

5.5.1 Results

The results for the estimation of private schooling are reported in *Table 5.23*. As can be seen there is no significant impact on the probability of private schooling. There is a small decrease in the probability of attending private school for the fixed effects instrumental variables regression with sex composition being used as an instrument. However, this effect diminishes when we implement both instruments in the regression. Overall we do not find adequate evidence to suggest that an exogenous increase in family size decrease the probability of attendance to private schooling for primary aged students. In this instance there may be additional factors that lead to the decision to enrol a child in private school, as seen in *Table 5.23* that are not observed within the LSAC dataset. This may be due to a higher importance being placed on private schooling for secondary students over primary students.

Table 5.23: Private Schooling

	Twin Instrument			Sex Composition Instrument			Twin Instrument			Sex Composition Instrument		
	(1) Pooled	(2) FE	(3) RE	(1) Pooled	(2) FE	(3) RE	(1) Pooled	(2) FE	(3) RE	(1) Pooled	(2) FE	(3) RE
No. Children	-0.0034	-0.8500	-0.0079	-0.0054	-0.0404*	-0.0046						
	(0.0153)	(0.9052)	(0.0182)	(0.0041)	(0.0207)	(0.0047)						
Two Plus							-0.0065	-23.2306	-0.0149	-0.0095	-0.0692*	-0.0080
							(0.0289)	(267.7070)	(0.0342)	(0.0072)	(0.0355)	(0.0083)
Age SC	0.0036	0.0097	-0.0266***	0.0015	-0.0162***	-0.0259***	0.0037	0.3965	-0.0266***	0.0016	-0.0169***	-0.0260***
	(0.0049)	(0.0282)	(0.0012)	(0.0039)	(0.0040)	(0.0008)	(0.0049)	(4.7535)	(0.0012)	(0.0039)	(0.0039)	(0.0007)
Sex SC	-0.0019	-0.3283	-0.0007	-0.0045	0.1332	-0.0020	-0.0018	-2.1479	-0.0006	-0.0045	0.1315	-0.0019
	(0.0042)	(0.2645)	(0.0048)	(0.0034)	(0.1383)	(0.0039)	(0.0042)	(22.8967)	(0.0047)	(0.0034)	(0.1384)	(0.0039)
2006	-0.0003			0.0016			-0.0004			0.0009		
	(0.0105)			(0.0085)			(0.0104)			(0.0085)		
2008	-0.2649***			-0.2625***			-0.2652***			-0.2635***		
	(0.0211)			(0.0171)			(0.0210)			(0.0170)		
2010	-0.5738***			-0.5602***			-0.5744***			-0.5614***		
	(0.0310)			(0.0252)			(0.0309)			(0.0252)		
2012	-0.0364			-0.0173			-0.0372			-0.0186		
	(0.0400)			(0.0325)			(0.0399)			(0.0325)		
Cohort	-0.1035***			-0.0912***			-0.1040***			-0.0920***		
	(0.0200)			(0.0162)			(0.0200)			(0.0162)		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5.24: Private Schooling with Both Instruments

	Using Twin and Sex Composition Instruments					
	(1) Pooled	(2) FE	(3) RE	(1) Pooled	(2) FE	(3) RE
No. Children	-0.0067	-0.0546**	-0.0064			
	(0.0051)	(0.0265)	(0.0059)			
Two Plus				-0.0105	-0.0822**	-0.0100
				(0.0080)	(0.0398)	(0.0092)
Age SC	0.0008	-0.0173***	-0.0265***	0.0009	-0.0178***	-0.0265***
	(0.0054)	(0.0065)	(0.0011)	(0.0054)	(0.0064)	(0.0010)
Sex SC	-0.0040	-0.0825	-0.0017	-0.0039	-0.0861	-0.0017
	(0.0047)	(0.1616)	(0.0053)	(0.0047)	(0.1617)	(0.0053)
2006	0.0044			0.0043		
	(0.0116)			(0.0116)		
2008	-0.2545***			-0.2550***		
	(0.0234)			(0.0234)		
2010	-0.5546***			-0.5555***		
	(0.0345)			(0.0345)		
2012	-0.0138			-0.0150		
	(0.0446)			(0.0446)		
Cohort	-0.0930***			-0.0938***		
	(0.0223)			(0.0223)		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Time spent in educational reading activities is not impacted by an exogenous increase in family size in any specificat. *Table 5.25* shows no significant positive or negative outcomes on the probability of time spent with the study child. Additionally, when implementing both the twin and sex composition instruments, we still observe no effect as shown in *Table 5.26* This null result may be due to the lack of information contained in the specified TUDs used for this analysis. There are very few observations in total, which is a significant limitation to this analysis.

Table 5.25: Time Investment in Reading

	Twin Instrument			Sex Composition Instrument			Twin Instrument			Sex Composition Instrument		
	(1) Pooled	(2) FE	(3) RE	(1) Pooled	(2) FE	(3) RE	(1) Pooled	(2) FE	(3) RE	(1) Pooled	(2) FE	(3) RE
No. Children	-0.0149	-0.0020	-0.0149	0.0047	0.0344	0.0047						
	(0.0170)	(0.3012)	(0.0206)	(0.0056)	(0.0244)	(0.0053)						
Two Plus							-0.0295		-0.0295	0.0047	0.0344	0.0047
							-0.0313		-0.0406	(0.0056)	(0.0244)	(0.0053)
Age SC	-0.0020	-0.0187**	-0.0014	-0.0020	-0.0105*	-0.0003	-0.0018	-0.0187**	-0.0015	-0.0020	-0.0105*	-0.0003
	(0.0053)	(0.0090)	(0.0023)	(0.0040)	(0.0063)	(0.0017)	-0.0053	-0.009	-0.0023	(0.0040)	(0.0063)	(0.0017)
Sex SC	0.0131***	-0.0040	0.0131***	0.0113***	-0.0022	0.0113***	0.0129***	-0.0039	0.0129**	0.0113***	-0.0022	0.0113***
	(0.0051)	(0.2097)	(0.0051)	(0.0039)	(0.1218)	(0.0039)	-0.005	-0.2094	-0.005	(0.0039)	(0.1218)	(0.0039)
2012	0.0017			0.0043			0.0008			0.0043		
	(0.0129)			(0.0094)			-0.0129			(0.0094)		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5.26: Time Investment in Reading with Both Instruments

	Using Twin and Sex Composition Instruments					
	(1) Pooled	(2) FE	(3) RE	(1) Pooled	(2) FE	(3) RE
No. Siblings	0.0004	-0.0271	0.0004			
	(0.0054)	(0.0256)	(0.0053)			
Two Plus				0.0005	-0.0392	0.0005
				(0.0091)	(0.0370)	(0.0090)
Age SC	-0.0032	0.0039	-0.0025	-0.0032	0.0041	-0.0025
	(0.0045)	(0.0082)	(0.0020)	(0.0045)	(0.0082)	(0.0020)
Sex SC	0.0042	-0.0034	0.0041	0.0041	-0.0037	0.0041
	(0.0044)	(0.1755)	(0.0045)	(0.0044)	(0.1756)	(0.0045)
2012	0.0017			0.0017		
	(0.0101)			(0.0101)		
Constant	-0.0073	0.3571	-0.0141	-0.0065	0.3345	-0.0134
	(0.0458)	(0.3890)	(0.0350)	(0.0452)	(0.3867)	(0.0323)

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Overall we do not find evidence to suggest that investment in child quality decreases when family size increases. Therefore, although there is evidence to suggest that the quality-quantity trade-off exists in educational outcomes in Australia, we are unable to provide evidence to suggest investment in child education decreases when the number of siblings in the household increases.

5.6 Conclusion

This study aimed to provide evidence and contribute to the literature on the quality-quantity trade-off in Australia using a distributional analysis. We apply various econometric estimation techniques to provide a comparison of methodologies. We find sufficient evidence to suggest that educational outcomes are significantly impacted by an increase in family size. We provide evidence to suggest a heterogeneous impact of an increase in family size on children with different levels of ability. This effect is found to be consistent for PPVT scores, especially when sex composition is used as an instrumental variable in an QTE framework, across the entire distribution. Similar results are found for WAI at the higher end of the distribution. Therefore children with a high level of ability have their educational outcomes diminished when additional children are present in the household.

The analysis of health outcomes is inconclusive. This may be due to the universal healthcare system provided by the Australian government which may result in no adverse effect on a child given an increase in the number of children in the household or the relationship between twinning/multiple births and birth order effects which cannot be accounted for.

The shift from child quantity to child quality can help explain the decrease in the total fertility rate. There is a significant amount of discussion on whether we should encourage women to have more children or invest more. Moreover, this study has significant long term implications. Whilst families are choosing to invest in child quality, the population is ageing. Although it is important to encourage this investment as human capital is a driver of growth, issues arise from having an ageing population that will require long-term structural reforms to help support the community. Essentially, Australia is facing its own quality-quantity trade-off; increase the population or increase human capital to sustain economic growth.

Chapter 6 Discussion and Conclusions

6.1 Discussion

This thesis explored various issues surrounding the fertility literature. The aim was to provide an analysis of key policies and issues surrounding demographic composition and fertility. The results of this thesis provided relevant theoretical and empirical analyses for policymakers, which can potentially be used in the development of future population policies. From the determinants of those who bear children, to how to encourage families to have more or less children, the fertility decision is highly complex and provided significant scope for extensive analysis within this thesis. However, this thesis investigated three specific, increasingly important aspects of fertility economics in the context of Australia, which had yet to been explored within the literature. Firstly, the response of women to monetary incentives aimed at increasing the total fertility rate was investigated. Secondly, the relationship between fertility and the labour market, focusing on the role of job stability in the childbearing decision was explored. Finally, the quality-quantity trade-off to determine if the trade-off exists for Australian children with respect to health and educational outcomes was examined.

This thesis began by developing a theoretical model which highlighted the observed fertility differences between immigrants and natives. We found a positive impact of the baby bonus on the fertility decision of both groups. However, we noted than the response was heterogeneous across immigrants and natives. We then investigated the response of women to monetary incentives aimed at increasing the total fertility rate, in an empirical framework. Specifically, a natural experiment involving the baby bonus was used to analyse revealed fertility preferences. The results showed women with a low level of education (below high school) were the primary respondents to the introduction of the baby bonus and a treatment was developed to explore the impact of the baby bonus on the individual level of fertility. We then incorporated this information into our analysis of the baby bonus. As a result, we used both a difference-in-difference and semiparametric difference-in-difference analysis to analyse the fertility response of women immigrant and native women within the HILDA survey. Difference-in-difference analysis was selected as the econometric method in this study as it has wide applications in the literature to evaluate the implementation of public policy, such as monetary incentives. As difference-in-difference requires both the treatment and control groups to follow a common trend before the implementation of a policy, we found this assumption hard to verify within our data. Consequently, we implemented semiparametric difference-in-difference to address this potential flaw in the common trend assumption.

The results of this study provided key insights into the likely respondents to Australia's pro-natal policy incentives. The results show that the implementation of the baby bonus led to an increase in the fertility rate of women with low levels of human capital. The response of immigrant women with low levels of human capital was found to be larger than their native counterparts, but both groups exhibited a statistically significant positive impact on fertility. Therefore, this study showed that although the total fertility rate increased there may have be unintended consequences of the policy in the long-run through the incentivisation of women with low levels of human capital. As women with low levels of human capital are more reliant on the government, there may have been a strain on government resources, which may have been reflected in the removal of the policy in 2014.

The second study focused on unemployment and job stability and their respective impacts on the fertility decision. This study was motivated by the pro-cyclical relationship observed between unemployment and fertility in many developed economies. This analysis explored the issue of low participation rates in the labour market for women with children and identified the key labour market determinants which drive the fertility decision. We postulated that job stability and perceived job stability contributes significantly to the decision to have children. The analysis implemented in this study focused on instrumental variable estimation and propensity score matching to address the endogeneity issue observed between the labour market and fertility decision. Using IV estimation, we found that forced redundancy worked well as an instrument for both unemployment and stability. The use of propensity score matching allowed for the analysis of the effect on fertility given the treatments: unemployment, stability and redundancy respectively.

A major contribution of the second study is through the provision of empirical evidence which highlighted the importance of job stability in the fertility decision. We found evidence of the pro-cyclical theory of fertility within the context of Australia. Perceived job stability was found to have a significant on the fertility decision. We also provided evidence which suggested the role of unemployment on the fertility decision of Australian women is over estimated. We found using unemployment both as an instrument and a treatment leads to an overestimation of its effect on the fertility decision. When we used redundancy in place of unemployment we found a large decrease in the magnitude of the coefficient. Finally, this study emphasised the role of age in the fertility decision. We found using an age-stratified sample for propensity score matching results in a more consistent estimated coefficient for unemployment. The overall results found in this analysis have significant policy implications, as increase perceived job security could be used to increase fertility.

The last study contributed to the literature by providing evidence of the quality-quantity in Australia. Furthermore, this study adds to the limited empirical evidence and overall lack of consensus on the issue both internationally and in the Australian context. We explore the impact of family size on the distribution of child outcomes. We compared and contrasted four different econometric techniques to address the confounding results observed within the literature. Specifically we used instrumental variables (IV), quantile regression (QR), instrumental variables quantile regression (IV-QR) and quantile treatment effects (QTE) in this analysis. The application of IV was conducted to provide comparison to the current literature, which predominantly uses this estimation technique. However, these techniques specifically focus on the effect of an increase in family size on the average child. Quantile regression was used to determine if the impact of an increase in family size was uniform across the distribution of child outcomes, the results suggested it is not consistent across the distribution. This leads to the use of IV-QR and QTE. IV-QR combines IV and QR in the same analysis as it allows for the use of quantile regression when an endogenous variable is present. QTE uses the instruments to determine the assignment of the treatment, in this case the number of children. Using QTE allowed for the analysis of a subpopulation known as compliers, who switch their behaviour based on the treatment assignment. In this case we found consistent results across both methods. However, we lean towards the use of QTE due to the ability to determine the effect of those who switch their decision based on the exogenous shock to fertility.

The final study found a significant effect of the number of children in the household on the educational outcomes of children. Our investigations into health outcomes and investment in child quality were inconclusive. However, we found evidence of the quality-quantity trade-off exhibited in reduced test scores for educational outcomes. We also found this impact on educational outcomes is not uniform across the distribution, suggesting analysis on the average effect may be why the literature has yet to reach a consensus.

6.2 Future Work

There are many potential ways to build on the foundation of this thesis. The first study used the HILDA, which is a significantly large longitudinal dataset. It may be useful to analyse other subpopulations within the HILDA to determine their response to both the baby bonus and other public policies implemented by the Australian government. Furthermore, the semiparametric framework we implement in the first study has yet to be applied in empirically within economic literature. This method of estimation can be used to address potential flaws within datasets where common trend assumption may be hard to verify. As the application of semiparametric difference-in-difference allows for the relaxation of this assumption, this methodology provides significant scope for the application in both natural and field experiments.

The second study could be developed to incorporate alternative instruments in the analysis such as persistent unemployment. However, a limitation to the persistence of unemployment may be sample size. Additionally, it may be of interest to explore the role of firm specific human capital for those women, which was not possible in the HILDA data. This study could also be extended to an analysis of paid maternity leave under the most recent government changes as future waves of data are released.

The third study has a significant scope for future work. Firstly, we can expand the theoretical model developed in the first study to incorporate dual norms into the quality quantity trade-off (see equations (9) and (11) in *Section 3.2*). This would incorporate heterogeneous fertility norms into the choice of child quality and quantity. Secondly, as the children in cohort K of the LSAC ages, we can investigate the private schooling choice to determine if the decision for investment choice for private schooling changes as children approach secondary school. Thirdly, this study does not analyse happiness, life satisfaction and affection that children receive from their parents. Although children may be able to achieve higher educational outcomes when there are no additional siblings in the household, children may be happier if there are. We cannot determine this effect from the analysis provided in this thesis. However, it may be possible to analyse child happiness and family size. The time-use data for the LSAC also provides a significant amount of data for the development of research questions based on the quality-quantity trade-off. Finally, as previously discussed, it is possible to empirically analyse the impact of parental immigrant status on the quality-quantity trade-off.

6.3 Final Conclusion

All three of these studies are strongly interrelated and play an important role, in informing population and demographic policy. For example, the observed decreasing total fertility rates may be a result of the quality-quantity trade-off and a shift towards investment in child quality for many nations. Furthermore, the baby bonus was an attempt to incentivise potential parents to choose to have an additional child by reducing the direct and indirect cost associated with having a child. Another factor that contributes significantly to the fertility decision is job stability. The findings in this thesis showed if women perceived themselves as economically stable, they are more likely to have children. It is important for policymakers to understand the relationship between these three aspects of fertility economics and how they are related to population economics and policy.

Finally, when looking back upon the findings of this thesis, we observe significant differences between subpopulations. To avoid unintended consequences, policymakers need to be aware of the groups they incentivising when implementing policies. This is especially important for immigrant and native subpopulations as shown throughout this thesis, and may also be important for many other subpopulations within a country.

Chapter 7 Appendices

7.1 Study 1 Appendices

Table 7.1: Value of Baby Bonus Payments Over Time

Year	Month	Value
2004	July	$3,000
2004	September	$3,042
2005	March	$3,079
2005	September	$3,119
2006	March	$3,166
2006	July	$4,000
2006	September	$4,100
2007	March	$4,133
2007	July	$4,133
2007	September	$4,187
2008	March	$4,258
2008	July	$5,000
2009	July	$5,185
2010	July	$5,294
2011	July	$5,437
2012	September	$5,000
2013	July	$5000 paid fortnightly for the first child only $3000 for each additional child

7.1.1 Region of birth breakdown

Table 7.2: Countries by Region

Region	**Included Countries**	
Other Oceanic	New Zealand	Fiji
	Papua New Guinea	Samoa
	Nauru	Tonga
	Cook Islands	
North West Europe	United Kingdom	Switzerland
	Ireland	Denmark
	Austria	Finland
	Belgium	Iceland
	France	Norway
	Germany	Sweden
	Netherlands	
Southern And Eastern	Italy	Federal Republic of
Europe	Malta	Yugoslavia
	Portugal	Czech Republic
	Spain	Estonia
	Bosnia and Herzegovina	Hungary
	Bulgaria	Lithuania
	Croatia	Poland
	Cyprus	Russian Federation
	Former Yugoslav Republic of Macedonia	Slovakia
	Greece	Ukraine
	Romania	Belarus
North Africa And	Egypt	Israel
The Middle East	Libya	Kuwait
	Sudan	Lebanon
	Iran	Turkey
	Iraq	
South-East Asia	Burma (Myanmar)	Indonesia
	Cambodia	Malaysia
	Laos	Philippines

Table 7.2: Countries by Region

Region	Included Countries	
South-East Asia	Thailand	Singapore
	Vietnam	East Timor
	Brunei Darussalam	
North-East Asia	China (excludes SARs and Taiwan)	Japan
	Hong Kong (SAR of China)	Democratic People's
	Taiwan	Republic of Korea
	Republic of (South) Korea	
Southern And Central Asia	Bangladesh	Sri Lanka
	India	Afghanistan
	Nepal	Azerbaijan
	Pakistan	
Americas	Canada	Peru
	United States of America	Uruguay
	Argentina	Venezuela
	Brazil	South America, nec
	Chile	Jamaica
	Colombia	Trinidad and Tobago
	Ecuador	
Sub-Saharan Africa	Congo	Mozambique
	Congo, Democratic Republic of	Somalia
	Liberia	South Africa
	Nigeria	Tanzania
	Eritrea	Zambia
	Ethiopia	Zimbabwe
	Kenya	Southern and East Africa
	Mauritius	

7.1.2 Difference-in-Difference Analysis

Difference-in-Difference: Treatment and Time Interaction

$$F_{i,t} = \alpha_0 + \alpha_1 \mathbf{X}_{i,t} + \beta_1 \tau_{i,t} + \beta_2 T_{i,t} + \beta_3 (\tau_{i,t} \times T_{i,t}) + \epsilon_{i,t} \tag{19}$$

Taking the difference-in-difference gives:

$$\begin{aligned} DID =& [E(F_{i,t}|\tau_{i,t} = 1, T_{i,t} = 1) - E(F_{i,t}|\tau_{i,t} = 0, T_{i,t} = 1)] \\ & - [E(F_{i,t}|I_{i,t} = 1, \tau_{i,t} = 0) - E(F_{i,t}|\tau_{i,t} = 0, T_{i,t} = 0)] \end{aligned} \tag{20}$$

The difference in difference estimator is:

$$\begin{aligned} E(F_{i,t}|\tau_{i,t} = 1, T_{i,t} = 1) &= \alpha_0 + \alpha_1 + \beta_1 + \beta_2 + \beta_3 \\ E(F_{i,t}|\tau_{i,t} = 0, T_{i,t} = 1) &= \alpha_0 + \alpha_1 + \beta_2 \\ E(F_{i,t}|\tau_{i,t} = 1, T_{i,t} = 0) &= \alpha_0 + \alpha_1 + \beta_1 \\ E(F_{i,t}|\tau_{i,t} = 0, T_{i,t} = 0) &= \alpha_0 + \alpha_1 \end{aligned}$$

This is the difference between an individual in the treatment group compared to an individual in the control group, adjusted for differences over time.

$$\begin{aligned} DID &= [(\alpha_0 + \alpha_1 + \beta_1 + \beta_2 + \beta_3) - (\alpha_0 + \alpha_1 + \beta_2)] - [(\alpha_0 + \alpha_1 + \beta_1) - (\alpha_0 + \alpha_1)] \\ &= \beta_3 \end{aligned} \tag{21}$$

Triple Interaction Difference-in-Difference: Immigrant, Treatment, and Time interaction.

$$F_{i,t} = \alpha_0+\alpha_1\mathbf{X}_{i,t}+\beta_1 I_{i,t}+\beta_2\tau_{i,t}+\beta_3 T_{i,t}+\beta_4(I_{i,t}\times\tau_{i,t})+\beta_5(I_{i,t}\times T_{i,t})+\beta_6(\tau_{i,t}\times T_{i,t})+\gamma_1(I_{i,t}\times\tau_{i,t}\times T_{i,t})+\epsilon_{i,t} \quad (22)$$

In this case, taking the difference-in-difference of $I_{i,t}$ and $\tau_{i,t}$ first, holding time constant, then take the difference of this over time, $T_{i,t}$ gives the following:

$$\begin{aligned} DID =&[E(F_{i,t}|I_{i,t} = 1, \tau_{i,t} = 1, T_{i,t} = 1) - E(F_{i,t}|I_{i,t} = 0, \tau_{i,t} = 1, T_{i,t} = 1)] \\ &- [E(F_{i,t}|I_{i,t} = 1, \tau_{i,t} = 0, T_{i,t} = 1) - E(F_{i,t}|I_{i,t} = 0, \tau_{i,t} = 0, T_{i,t} = 1)] \\ &- [E(F_{i,t}|I_{i,t} = 1, \tau_{i,t} = 1, T_{i,t} = 0) - E(F_{i,t}|I_{i,t} = 0, \tau_{i,t} = 1, T_{i,t} = 0)] \\ &- [E(F_{i,t}|I_{i,t} = 1, \tau_{i,t} = 0, T_{i,t} = 0) - E(F_{i,t}|I_{i,t} = 0, \tau_{i,t} = 0, T_{i,t} = 0)] \end{aligned} \quad (23)$$

The same analysis described above is then used to obtain the following:

$$\begin{aligned} &E(F_{i,t}|I_{i,t} = 1, \tau_{i,t} = 1, T_{i,t} = 1) = \alpha_0 + \alpha_1 + \beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5 + \beta_6 + \gamma_1 \\ &E(F_{i,t}|I_{i,t} = 0, \tau_{i,t} = 1, T_{i,t} = 1) = \alpha_0 + \alpha_1 + \beta_2 + \beta_3 + \beta_6 \\ &E(F_{i,t}|I_{i,t} = 1, \tau_{i,t} = 0, T_{i,t} = 1)) = \alpha_0 + \alpha_1 + \beta_1 + \beta_3 + \beta_5 \\ &E(F_{i,t}|I_{i,t} = 0, \tau_{i,t} = 0, T_{i,t} = 1) = \alpha_0 + \alpha_1 + \beta_3 \\ &E(F_{i,t}|I_{i,t} = 1, \tau_{i,t} = 1, T_{i,t} = 0) = \alpha_0 + \alpha_1 + \beta_1 + \beta_2 + \beta_4 \\ &E(F_{i,t}|I_{i,t} = 0, \tau_{i,t} = 1, T_{i,t} = 0) = \alpha_0 + \alpha_1 + \beta_2 \\ &E(F_{i,t}|I_{i,t} = 1, \tau_{i,t} = 0, T_{i,t} = 0) = \alpha_0 + \alpha_1 + \beta_1 \\ &E(F_{i,t}|I_{i,t} = 0, \tau_{i,t} = 0, T_{i,t} = 0) = \alpha_0 + \alpha_1 \end{aligned}$$

The difference in difference estimator is therefore

$$\begin{aligned} DID =&[(\alpha_0 + \alpha_1 + \beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5 + \beta_6 + \gamma_1) - (\alpha_0 + \alpha_1 + \beta_2 + \beta_3 + \beta_6)] \\ &- [(\alpha_0 + \alpha_1 + \beta_1 + \beta_3 + \beta_5) - (\alpha_0 + \alpha_1 + \beta_3)] - [(\alpha_0 + \alpha_1 + \beta_1 + \beta_2 + \beta_4) \\ &- (\alpha_0 + \alpha_1 + \beta_2)] - [(\alpha_0 + \alpha_1 + \beta_1) - (\alpha_0 + \alpha_1)] \end{aligned} \quad (24)$$

This simplifies to

$$DID = (\beta_1 + \beta_4 + \beta_5 + \gamma_1) - (\beta_1 + \beta_5) - (\beta_1 + \beta_4) - (\beta_1) = \gamma_1 \quad (25)$$

Where γ_1 is the difference-in-difference estimator of interest in this study. It shows the difference of fertility between immigrants compared to natives in the treatment group, accounting for the change in means for the immigrants in the control group and natives in the treatment group.

Table 7.3: Treatment and Time Interaction $\tau_{i,t} \times T$
Treatment A: $< HS < 25$ Control Variables

	Panel A Control 1 $\geq HS < 25$	**Panel B** Control 2 $< HS \geq 25 < 40$	**Panel C** Control 3 $< HS \geq 25$
	(1)	(2)	(3)
Age	0.0438	0.0060	-0.0195***
	(0.0386)	(0.0105)	(0.0029)
Agesq	-0.1264	-0.0259	0.0174***
	(0.0933)	(0.0164)	(0.0031)
Unemployed	-0.0156	-0.0111	-0.0187*
	(0.0098)	(0.0130)	(0.0096)
Not in LF	0.0587***	0.1010***	0.0510***
	(0.0121)	(0.0126)	(0.0052)
Married/Defacto	0.0407**	0.0637**	0.0310***
	(0.0168)	(0.0279)	(0.0107)
Number of Children	0.2497***	0.0328***	0.0114***
	(0.0182)	(0.0055)	(0.0018)
Religion			
Buddhism	-0.0094	-0.0522	-0.0232
	(0.0065)	(0.0508)	(0.0195)
Hinduism	-0.0062	-0.1116***	-0.0956***
	(0.0112)	(0.0307)	(0.0201)
Islam	0.1362**	0.1744*	0.0776
	(0.0627)	(0.0965)	(0.0506)
Judaism	0.0092	-0.0101	-0.0162
	(0.0106)	(0.0220)	(0.0152)
Other Religion	-0.0169	-0.0042	-0.0033
	(0.0243)	(0.0369)	(0.0168)
No Religion	0.0011	0.0019	0.0047
	(0.0069)	(0.0123)	(0.0056)
Refused Response	-0.0125	-0.0289	-0.0035
	(0.0145)	(0.0241)	(0.0138)
Partner's Qualification			
Postgrad - masters or doctorate	-0.0393	-0.0031	0.0212
	(0.0264)	(0.0966)	(0.0306)
Grad diploma, grad certificate	-0.0341*	-0.0532	-0.0237
	(0.0204)	(0.0530)	(0.0191)
Bachelor or honours	-0.0308	-0.0265	-0.0180
	(0.0255)	(0.0457)	(0.0152)
Adv diploma, diploma	-0.0036	-0.0189	-0.0117
	(0.0473)	(0.0438)	(0.0139)
Cert III or IV	-0.0017	-0.0085	-0.0083
	(0.0258)	(0.0312)	(0.0129)
Cert I or II	-0.0892***	-0.0814*	-0.0392*
	(0.0297)	(0.0473)	(0.0231)
Cert not defined	0.1399	0.7708***	0.0812
	(0.2030)	(0.0514)	(0.0780)
Year 11 and below	-0.0062	-0.0133	-0.0095
	(0.0303)	(0.0316)	(0.0130)
Undetermined/ No Partner in HH	-0.0191	-0.0152	-0.0093
	(0.0250)	(0.0379)	(0.0153)
Partners Labour Force Status			
Unemployed	0.0554	0.0557	0.0314
	(0.0554)	(0.0503)	(0.0266)
Not in the LF	-0.0737	-0.0290	-0.0166**
	(0.0501)	(0.0331)	(0.0069)

Robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.4: Treatment and Time Interaction $\tau_{i,t} \times T$
Treatment B: $< HS < 30$ Control Variables

	Panel A Control 1 $\geq HS < 30$	**Panel B** Control 2 $< HS \geq 30 < 40$	**Panel C** Control 3 $< HS \geq 30$
	(1)	(2)	(3)
Age	0.0020	0.0130*	-0.0074**
	(0.0141)	(0.0076)	(0.0030)
Agesq	-0.0193	-0.0360***	0.0045
	(0.0308)	(0.0136)	(0.0032)
Unemployed	0.0064	-0.0113	-0.0185*
	(0.0120)	(0.0130)	(0.0097)
Not in LF	0.1205***	0.1007***	0.0539***
	(0.0126)	(0.0125)	(0.0053)
Married/Defacto	0.0410***	0.0634**	0.0319***
	(0.0156)	(0.0278)	(0.0107)
Number of Children	0.1194***	0.0330***	0.0122***
	(0.0087)	(0.0055)	(0.0018)
Religion			
Buddhism	-0.0077	-0.0498	-0.0232
	(0.0168)	(0.0508)	(0.0194)
Hinduism	0.0248	-0.1110***	-0.0774***
	(0.0384)	(0.0299)	(0.0148)
Islam	0.0474	0.1737*	0.0728
	(0.0534)	(0.0965)	(0.0496)
Judaism	0.0234*	-0.0041	-0.0144
	(0.0130)	(0.0197)	(0.0182)
Other Religion	-0.0122	-0.0055	-0.0058
	(0.0225)	(0.0368)	(0.0170)
No Religion	0.0016	0.0016	0.0041
	(0.0067)	(0.0123)	(0.0056)
Refused Response	-0.0184	-0.0302	-0.0079
	(0.0147)	(0.0238)	(0.0138)
Partner's Qualification			
Postgrad - masters or doctorate	-0.0510	-0.0045	0.0164
	(0.0367)	(0.0966)	(0.0308)
Grad diploma, grad certificate	0.0030	-0.0542	-0.0255
	(0.0390)	(0.0528)	(0.0191)
Bachelor or honours	-0.0127	-0.0263	-0.0223
	(0.0206)	(0.0456)	(0.0152)
Adv diploma, diploma	0.0227	-0.0183	-0.0133
	(0.0304)	(0.0440)	(0.0140)
Cert III or IV	-0.0088	-0.0086	-0.0103
	(0.0197)	(0.0311)	(0.0129)
Cert I or II	-0.1192**	-0.0817*	-0.0421*
	(0.0486)	(0.0475)	(0.0237)
Cert not defined	0.3017	0.7714***	0.0758
	(0.2279)	(0.0507)	(0.0774)
Year 11 and below	-0.0307	-0.0135	-0.0111
	(0.0236)	(0.0315)	(0.0130)
Undetermined/ No Partner in HH	0.0056	-0.0150	-0.0112
	(0.0433)	(0.0378)	(0.0154)
Partners Labour Force Status			
Unemployed	-0.0200	0.0548	0.0307
	(0.0416)	(0.0504)	(0.0265)
Not in the LF	-0.0514	-0.0294	-0.0150**
	(0.0369)	(0.0332)	(0.0070)

Robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.5: Treatment and Time Interaction $\tau_{i,t} \times T$
Treatment C: $< HS < 35$ Control Variables

	Panel A Control 1 $\geq HS < 35$	**Panel B** Control 2 $< HS \geq 35 < 40$	**Panel C** Control 3 $< HS \geq 35$
	(1)	(2)	(3)
Age	0.0110	0.0145	-0.0007
	(0.0072)	(0.0098)	(0.0024)
Agesq	-0.0311**	-0.0392**	-0.0015
	(0.0142)	(0.0189)	(0.0025)
Unemployed	0.0199*	-0.0111	-0.0185*
	(0.0113)	(0.0132)	(0.0097)
Not in LF	0.1531***	0.1017***	0.0518***
	(0.0110)	(0.0126)	(0.0052)
Married/Defacto	0.0598***	0.0657**	0.0310***
	(0.0140)	(0.0279)	(0.0106)
Number of Children	0.0689***	0.0329***	0.0118***
	(0.0049)	(0.0055)	(0.0018)
Religion			
Buddhism	-0.0154	-0.0487	-0.0202
	(0.0195)	(0.0510)	(0.0197)
Hinduism	-0.0105	-0.1108***	-0.0851***
	(0.0404)	(0.0314)	(0.0219)
Islam	0.0110	0.1745*	0.0717
	(0.0458)	(0.0959)	(0.0498)
Judaism	-0.0047	-0.0076	-0.0101
	(0.0253)	(0.0176)	(0.0158)
Other Religion	-0.0215	-0.0039	-0.0073
	(0.0208)	(0.0369)	(0.0169)
No Religion	-0.0068	0.0017	0.0039
	(0.0064)	(0.0123)	(0.0056)
Refused Response	-0.0152	-0.0308	-0.0095
	(0.0143)	(0.0237)	(0.0137)
Partner's Qualification			
Postgrad - masters or doctorate	0.0387	-0.0052	0.0168
	(0.0318)	(0.0970)	(0.0307)
Grad diploma, grad certificate	0.0190	-0.0588	-0.0255
	(0.0311)	(0.0537)	(0.0189)
Bachelor or honours	-0.0075	-0.0248	-0.0171
	(0.0178)	(0.0458)	(0.0152)
Adv diploma, diploma	-0.0036	-0.0172	-0.0127
	(0.0240)	(0.0440)	(0.0139)
Cert III or IV	-0.0144	-0.0086	-0.0097
	(0.0168)	(0.0311)	(0.0129)
Cert I or II	-0.1094***	-0.0809*	-0.0408*
	(0.0415)	(0.0477)	(0.0235)
Cert not defined	0.2250	0.7771***	0.0812
	(0.1903)	(0.0503)	(0.0788)
Year 11 and below	-0.0398**	-0.0143	-0.0094
	(0.0190)	(0.0315)	(0.0129)
Undetermined/ No Partner in HH	-0.0947***	-0.0141	-0.0100
	(0.0319)	(0.0378)	(0.0153)
Partners Labour Force Status			
Unemployed	-0.0206	0.0538	0.0301
	(0.0346)	(0.0503)	(0.0266)
Not in the LF	-0.0396	-0.0303	-0.0162**
	(0.0288)	(0.0330)	(0.0069)

Robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.6: Treatment and Time Interaction $\tau_{i,t} \times T$
Treatment D: $< HS < 40$ Control Variables

	Panel A Control 1 $\geq HS < 40$	**Panel B** Control 2 $< HS \geq 40$	**Panel C** Control 3 $\geq HS \geq 40$
	(1)	(2)	(3)
Age	0.0250***	-0.0055***	-0.0042**
	(0.0038)	(0.0017)	(0.0016)
Agesq	-0.0523***	0.0041**	0.0028*
	(0.0069)	(0.0018)	(0.0016)
Unemployed	0.0187*	-0.0199**	-0.0219***
	(0.0100)	(0.0097)	(0.0070)
Not in LF	0.1613***	0.0510***	0.0488***
	(0.0091)	(0.0052)	(0.0050)
Married/Defacto	0.0619***	0.0301***	0.0177**
	(0.0114)	(0.0107)	(0.0075)
Number of Children	0.0406***	0.0117***	0.0090***
	(0.0033)	(0.0018)	(0.0014)
Religion			
Buddhism	0.0015	-0.0204	0.0118
	(0.0197)	(0.0190)	(0.0099)
Hinduism	-0.0247	-0.0903***	-0.0146**
	(0.0325)	(0.0135)	(0.0058)
Islam	0.0090	0.0798	0.0886**
	(0.0377)	(0.0496)	(0.0429)
Judaism	0.0438	-0.0118	-0.0010
	(0.0692)	(0.0139)	(0.0042)
Other Religion	-0.0201	-0.0046	0.0033
	(0.0177)	(0.0168)	(0.0102)
No Religion	-0.0013	0.0048	0.0086**
	(0.0057)	(0.0056)	(0.0041)
Refused Response	-0.0216*	-0.0070	-0.0069
	(0.0118)	(0.0138)	(0.0092)
Partner's Qualification			
Postgrad - masters or doctorate	0.0286	0.0205	0.0027
	(0.0259)	(0.0307)	(0.0105)
Grad diploma, grad certificate	-0.0031	-0.0255	-0.0103
	(0.0229)	(0.0192)	(0.0093)
Bachelor or honours	-0.0043	-0.0191	-0.0057
	(0.0154)	(0.0153)	(0.0091)
Adv diploma, diploma	-0.0053	-0.0114	0.0001
	(0.0191)	(0.0140)	(0.0104)
Cert III or IV	-0.0257*	-0.0079	0.0004
	(0.0140)	(0.0130)	(0.0096)
Cert I or II	-0.0870**	-0.0386	-0.0283
	(0.0342)	(0.0237)	(0.0209)
Cert not defined	0.2695	0.0832	0.0750
	(0.1961)	(0.0777)	(0.0623)
Year 11 and below	-0.0361**	-0.0096	-0.0011
	(0.0152)	(0.0131)	(0.0101)
Undetermined/ No Partner in HH	-0.1006***	-0.0099	-0.0019
	(0.0251)	(0.0154)	(0.0109)
Partners Labour Force Status			
Unemployed	-0.0006	0.0307	0.0470*
	(0.0301)	(0.0265)	(0.0281)
Not in the LF	-0.0413**	-0.0158**	-0.0126*
	(0.0207)	(0.0070)	(0.0070)

Robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.7: Three-way Interaction DID $\tau_{i,t} \times I_{i,t} \times T$ Control Variables

	Panel A $< HS < 25$			Panel B $< HS < 30$			Panel C $< HS < 35$			Panel D $< HS < 40$		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Age	-0.0195***	0.0061	0.0442	-0.0078**	0.0127*	0.0025	-0.0008	0.0142	0.0109	-0.0056***	0.0250***	-0.0042**
	(0.0029)	(0.0105)	(0.0386)	(0.0030)	(0.0075)	(0.0142)	(0.0024)	(0.0099)	(0.0071)	(0.0017)	(0.0038)	(0.0016)
Agesq	0.0175***	-0.0263	-0.1271	0.0049	-0.0360***	-0.0205	-0.0014	-0.0386**	-0.0311**	0.0042**	-0.0524***	0.0029*
	(0.0031)	(0.0164)	(0.0931)	(0.0032)	(0.0135)	(0.0308)	(0.0025)	(0.0190)	(0.0142)	(0.0018)	(0.0069)	(0.0017)
Unemployed	-0.0187*	-0.0136	-0.0160*	-0.0188*	-0.0131	0.0062	-0.0194**	-0.0148	0.0190*	-0.0217**	0.0173*	-0.0232***
	(0.0097)	(0.0129)	(0.0097)	(0.0097)	(0.0130)	(0.0120)	(0.0098)	(0.0129)	(0.0114)	(0.0097)	(0.0100)	(0.0070)
Not in LF	0.0510***	0.1008***	0.0589***	0.0540***	0.1001***	0.1213***	0.0520***	0.1018***	0.1530***	0.0515***	0.1611***	0.0490***
	(0.0052)	(0.0127)	(0.0123)	(0.0053)	(0.0126)	(0.0127)	(0.0052)	(0.0125)	(0.0110)	(0.0053)	(0.0091)	(0.0050)
Married/Defacto	0.0319***	0.0652**	0.0418**	0.0338***	0.0675**	0.0420***	0.0323***	0.0674**	0.0604***	0.0310***	0.0623***	0.0181**
	(0.0106)	(0.0280)	(0.0169)	(0.0107)	(0.0278)	(0.0156)	(0.0106)	(0.0278)	(0.0140)	(0.0107)	(0.0114)	(0.0076)
No. of Children	0.0114***	0.0327***	0.2493***	0.0121***	0.0328***	0.1190***	0.0117***	0.0327***	0.0690***	0.0116***	0.0406***	0.0090***
	(0.0018)	(0.0055)	(0.0181)	(0.0018)	(0.0055)	(0.0087)	(0.0018)	(0.0055)	(0.0049)	(0.0018)	(0.0033)	(0.0014)
Religion												
Buddhism	-0.0186	-0.0500	-0.0088	-0.0158	-0.0401	-0.0024	-0.0146	-0.0502	-0.0154	-0.0179	0.0002	0.0129
	(0.0195)	(0.0512)	(0.0086)	(0.0194)	(0.0497)	(0.0176)	(0.0196)	(0.0485)	(0.0197)	(0.0191)	(0.0200)	(0.0098)
Hinduism	-0.0899***	-0.1147***	-0.0070	-0.0711***	-0.1096***	0.0263	-0.0662***	-0.1048***	-0.0126	-0.0911***	-0.0278	-0.0130*
	(0.0210)	(0.0403)	(0.0121)	(0.0177)	(0.0382)	(0.0382)	(0.0254)	(0.0322)	(0.0406)	(0.0254)	(0.0330)	(0.0067)
Islam	0.0771	0.1787*	0.1313**	0.0740	0.1770*	0.0450	0.0751	0.1844*	0.0094	0.0837*	0.0082	0.0902**
	(0.0481)	(0.0945)	(0.0607)	(0.0481)	(0.0957)	(0.0529)	(0.0500)	(0.0978)	(0.0463)	(0.0495)	(0.0380)	(0.0428)
Judaism	-0.0163	-0.0096	0.0100	-0.0157	-0.0062	0.0230*	-0.0107	-0.0092	-0.0052	-0.0127	0.0444	-0.0011
	(0.0150)	(0.0231)	(0.0112)	(0.0181)	(0.0214)	(0.0130)	(0.0164)	(0.0213)	(0.0250)	(0.0138)	(0.0694)	(0.0043)
Other Religion	-0.0027	-0.0019	-0.0170	-0.0058	-0.0047	-0.0135	-0.0066	-0.0009	-0.0218	-0.0046	-0.0208	0.0031
	(0.0170)	(0.0376)	(0.0247)	(0.0173)	(0.0378)	(0.0226)	(0.0170)	(0.0372)	(0.0207)	(0.0169)	(0.0177)	(0.0102)
No Religion	0.0052	0.0024	0.0016	0.0044	0.0014	0.0015	0.0037	0.0004	-0.0071	0.0047	-0.0015	0.0086**
	(0.0056)	(0.0123)	(0.0069)	(0.0056)	(0.0123)	(0.0067)	(0.0056)	(0.0123)	(0.0064)	(0.0056)	(0.0057)	(0.0041)
Refused Response	-0.0034	-0.0305	-0.0127	-0.0088	-0.0330	-0.0196	-0.0098	-0.0306	-0.0156	-0.0077	-0.0222*	-0.0074
	(0.0139)	(0.0243)	(0.0146)	(0.0139)	(0.0240)	(0.0148)	(0.0138)	(0.0239)	(0.0143)	(0.0139)	(0.0118)	(0.0092)
Partner's Qual												
Postgraduate	0.0174	-0.0147	-0.0692	0.0146	-0.0113	-0.0496	0.0170	-0.0043	0.0380	0.0206	0.0278	0.0026
	(0.0311)	(0.0995)	(0.0431)	(0.0311)	(0.0981)	(0.0372)	(0.0313)	(0.0998)	(0.0320)	(0.0310)	(0.0260)	(0.0106)
Grad diploma, grad	-0.0257	-0.0558	-0.0339*	-0.0273	-0.0584	0.0033	-0.0267	-0.0616	0.0183	-0.0261	-0.0037	-0.0108
certificate	(0.0192)	(0.0535)	(0.0204)	(0.0191)	(0.0532)	(0.0389)	(0.0190)	(0.0542)	(0.0312)	(0.0194)	(0.0229)	(0.0094)
Bachelor or honours	-0.0191	-0.0245	-0.0305	-0.0237	-0.0247	-0.0125	-0.0180	-0.0232	-0.0086	-0.0198	-0.0048	-0.0060
	(0.0152)	(0.0456)	(0.0256)	(0.0152)	(0.0454)	(0.0207)	(0.0152)	(0.0457)	(0.0178)	(0.0153)	(0.0154)	(0.0091)
Adv dip, dip	-0.0126	-0.0213	-0.0056	-0.0140	-0.0196	0.0239	-0.0133	-0.0197	-0.0048	-0.0117	-0.0059	-0.0001
	(0.0139)	(0.0438)	(0.0475)	(0.0140)	(0.0439)	(0.0303)	(0.0139)	(0.0440)	(0.0239)	(0.0140)	(0.0191)	(0.0104)
Cert III or IV	-0.0102	-0.0117	-0.0043	-0.0125	-0.0131	-0.0100	-0.0106	-0.0122	-0.0143	-0.0091	-0.0257*	-0.0002
	(0.0129)	(0.0311)	(0.0257)	(0.0129)	(0.0311)	(0.0197)	(0.0128)	(0.0311)	(0.0167)	(0.0130)	(0.0140)	(0.0096)
Cert I or II	-0.0417*	-0.0840*	-0.0899***	-0.0444*	-0.0844*	-0.1184**	-0.0429*	-0.0837*	-0.1103***	-0.0401*	-0.0874**	-0.0288
	(0.0232)	(0.0476)	(0.0297)	(0.0239)	(0.0479)	(0.0486)	(0.0237)	(0.0481)	(0.0416)	(0.0239)	(0.0344)	(0.0211)
Cert not defined	0.0789	0.7763***	0.1402	0.0735	0.7773***	0.3050	0.0799	0.7761***	0.2258	0.0809	0.2706	0.0740
	(0.0788)	(0.0518)	(0.2049)	(0.0784)	(0.0515)	(0.2296)	(0.0792)	(0.0508)	(0.1910)	(0.0782)	(0.1966)	(0.0625)
Year 11 and below	-0.0111	-0.0142	-0.0067	-0.0130	-0.0158	-0.0314	-0.0104	-0.0168	-0.0397**	-0.0105	-0.0359**	-0.0013
	(0.0130)	(0.0318)	(0.0303)	(0.0130)	(0.0316)	(0.0235)	(0.0129)	(0.0315)	(0.0190)	(0.0132)	(0.0152)	(0.0101)
Undetermined/	-0.0098	-0.0158	-0.0187	-0.0109	-0.0146	-0.0006	-0.0099	-0.0163	-0.1061***	-0.0099	-0.1078***	-0.0020
No Partner in HH	(0.0153)	(0.0381)	(0.0251)	(0.0153)	(0.0378)	(0.0434)	(0.0152)	(0.0376)	(0.0371)	(0.0154)	(0.0277)	(0.0109)
Partners LFS												
Unemployed	0.0327	0.0581	0.0559	0.0327	0.0577	-0.0198	0.0308	0.0533	-0.0219	0.0318	-0.0010	0.0474*
	(0.0267)	(0.0503)	(0.0557)	(0.0266)	(0.0504)	(0.0419)	(0.0266)	(0.0504)	(0.0349)	(0.0266)	(0.0303)	(0.0281)
Not in the LF	-0.0159**	-0.0291	-0.0708	-0.0142**	-0.0289	-0.0496	-0.0162**	-0.0325	-0.0407	-0.0157**	-0.0418**	-0.0126*
	(0.0069)	(0.0332)	(0.0503)	(0.0070)	(0.0332)	(0.0369)	(0.0069)	(0.0331)	(0.0288)	(0.0070)	(0.0207)	(0.0070)

Robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

7.2 Study 2 Appendices

7.2.1 Correlation for instrument validity

Table 7.8: Correlation Matrix

	Fertility	Unemployed	Stability	Lagged Unemployment	Redundancy
Fertility	1				
Unemployed	0.01	1			
Stability	0.02	-0.04	1		
Lagged Unemployment	-0.01	0.55	-0.07	1	
Redundancy	-0.01	0.17	-0.09	0.07	1

7.2.2 First Stage Regressions

Table 7.9: First Stage Regressions for Unemployment

	Dependent variable is Unemployment								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) OLS	(2) FE	(3) RE	(1) OLS	(2) FE	(3) RE	(1) OLS	(2) FE	(3) RE
Instruments									
Lagged Unemployment	0.1824***	0.0873***	0.1408***				0.1807***	0.0875***	0.1412***
	(0.0113)	(0.0038)	(0.0107)				(0.0111)	(0.0037)	(0.0105)
Redundancy				0.0996***	0.0855***	0.0918***	0.0957***	0.0857***	0.0928***
				(0.0103)	(0.0039)	(0.0106)	(0.0096)	(0.0038)	(0.0102)
General Covars									
Age	-0.0020***	-0.0036***	-0.0024***	-0.0029***	-0.0049***	-0.0036***	-0.0020***	-0.0035***	-0.0024***
	(0.0004)	(0.0011)	(0.0005)	(0.0004)	(0.0011)	(0.0006)	(0.0004)	(0.0011)	(0.0005)
AgeSq	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000**	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	-0.0046*	0.0003	-0.0049	-0.0063**	0.0017	-0.0055	-0.0034	0.0007	-0.0041
	(0.0025)	(0.0052)	(0.0030)	(0.0026)	(0.0052)	(0.0034)	(0.0025)	(0.0052)	(0.0030)
Defacto	-0.0012	-0.0038	-0.0019	-0.0031	-0.0038	-0.0035	-0.0011	-0.0046	-0.0023
	(0.0027)	(0.0046)	(0.0032)	(0.0028)	(0.0046)	(0.0035)	(0.0027)	(0.0046)	(0.0032)
No.Children	0.0008	0.0044*	0.0017**	0.0019***	0.0063***	0.0034***	0.0011*	0.0044*	0.0020***
	(0.0006)	(0.0024)	(0.0008)	(0.0006)	(0.0024)	(0.0009)	(0.0006)	(0.0024)	(0.0007)
Educational Qualification									
Postgrad	0.0009	-0.0031	0.0003	0.0028	-0.0021	0.0022	0.0011	-0.0030	0.0012
	(0.0030)	(0.0112)	(0.0037)	(0.0032)	(0.0112)	(0.0044)	(0.0029)	(0.0111)	(0.0036)
Grad diploma, grad	-0.0001	0.0075	0.0010	0.0010	0.0064	0.0021	0.0002	0.0056	0.0013
certificate	(0.0023)	(0.0090)	(0.0030)	(0.0024)	(0.0090)	(0.0038)	(0.0023)	(0.0089)	(0.0030)
Bachelor or hons.	-0.0010	-0.0007	-0.0013	-0.0008	-0.0005	-0.0007	-0.0008	-0.0006	-0.0006
	(0.0022)	(0.0060)	(0.0029)	(0.0023)	(0.0060)	(0.0035)	(0.0022)	(0.0059)	(0.0029)
Adv diploma, dip.	-0.0016	-0.0022	-0.0014	-0.0019	-0.0028	-0.0017	-0.0012	-0.0006	-0.0008
	(0.0021)	(0.0081)	(0.0027)	(0.0022)	(0.0081)	(0.0034)	(0.0021)	(0.0080)	(0.0026)
Cert III or IV	-0.0008	0.0088	0.0012	0.0009	0.0106*	0.0041	-0.0007	0.0107**	0.0015
	(0.0023)	(0.0054)	(0.0031)	(0.0024)	(0.0054)	(0.0038)	(0.0023)	(0.0054)	(0.0031)
Cert I or II	-0.0028	0.0165	0.0018	0.0033	0.0197	0.0105	-0.0037	0.0200	0.0017
	(0.0060)	(0.0152)	(0.0093)	(0.0064)	(0.0152)	(0.0117)	(0.0060)	(0.0150)	(0.0093)
Cert not defined	0.0055	0.0283	0.0081	0.0158	0.0109	0.0178*	0.0071	0.0271	0.0098
	(0.0121)	(0.0368)	(0.0105)	(0.0121)	(0.0368)	(0.0107)	(0.0121)	(0.0364)	(0.0104)
Year 11 and below	-0.0013	0.0008	0.0007	0.0026	0.0078	0.0068*	-0.0000	0.0052	0.0023
	(0.0023)	(0.0047)	(0.0031)	(0.0025)	(0.0048)	(0.0038)	(0.0023)	(0.0047)	(0.0031)
Occupation									
Managers	-0.0187***	-0.0103**	-0.0190***	-0.0257***	-0.0088*	-0.0215***	-0.0169***	-0.0083*	-0.0172***
	(0.0038)	(0.0046)	(0.0052)	(0.0042)	(0.0046)	(0.0057)	(0.0038)	(0.0046)	(0.0051)
Professionals	-0.0181***	-0.0136***	-0.0202***	-0.0245***	-0.0128***	-0.0233***	-0.0160***	-0.0117***	-0.0181***
	(0.0040)	(0.0045)	(0.0055)	(0.0044)	(0.0045)	(0.0060)	(0.0039)	(0.0045)	(0.0053)
Technicians and	-0.0171***	-0.0177***	-0.0205***	-0.0241***	-0.0173***	-0.0247***	-0.0158***	-0.0156***	-0.0189***
Trades Workers	(0.0047)	(0.0057)	(0.0061)	(0.0051)	(0.0057)	(0.0067)	(0.0046)	(0.0057)	(0.0060)
Community and	-0.0172***	-0.0126***	-0.0189***	-0.0215***	-0.0115***	-0.0207***	-0.0158***	-0.0109**	-0.0174***
Personal Services	(0.0042)	(0.0044)	(0.0057)	(0.0045)	(0.0044)	(0.0062)	(0.0041)	(0.0043)	(0.0055)
Sales Workers	-0.0143***	-0.0077*	-0.0155***	-0.0211***	-0.0064	-0.0185***	-0.0137***	-0.0062	-0.0147***
	(0.0039)	(0.0043)	(0.0054)	(0.0043)	(0.0043)	(0.0060)	(0.0038)	(0.0043)	(0.0053)
Clerical and Admin	-0.0144***	-0.0084*	-0.0153**	-0.0187***	-0.0081*	-0.0175***	-0.0137***	-0.0074*	-0.0144**
Workers	(0.0045)	(0.0043)	(0.0061)	(0.0049)	(0.0043)	(0.0067)	(0.0044)	(0.0043)	(0.0059)
Machinery Operators	-0.0207***	-0.0101	-0.0201**	-0.0242***	-0.0076	-0.0191**	-0.0192***	-0.0084	-0.0185**
& Drivers	(0.0063)	(0.0087)	(0.0085)	(0.0067)	(0.0087)	(0.0092)	(0.0063)	(0.0086)	(0.0084)
Missing/Refused Occ	0.8500***	0.8777***	0.8652***	0.9388***	0.8875***	0.9088***	0.8433***	0.8695***	0.8578***
Response	(0.0097)	(0.0054)	(0.0107)	(0.0057)	(0.0054)	(0.0089)	(0.0097)	(0.0054)	(0.0106)

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.9: First Stage Regressions for Unemployment Cont.

Dependent variable is Unemployment									
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) OLS	(2) FE	(3) RE	(1) OLS	(2) FE	(3) RE	(1) OLS	(2) FE	(3) RE
Partner's Educ. Qualification									
Postgrad	0.0040	0.0110	0.0059*	0.0070***	0.0153	0.0106***	0.0043	0.0105	0.0064*
	(0.0028)	(0.0115)	(0.0034)	(0.0027)	(0.0116)	(0.0040)	(0.0028)	(0.0114)	(0.0034)
Grad diploma, grad certificate	0.0035	0.0148	0.0060*	0.0077**	0.0187*	0.0113***	0.0048	0.0147	0.0071**
	(0.0030)	(0.0108)	(0.0033)	(0.0032)	(0.0108)	(0.0041)	(0.0030)	(0.0106)	(0.0033)
Bachelor or hons.	0.0034*	0.0045	0.0049*	0.0056***	0.0052	0.0072**	0.0040*	0.0034	0.0053*
	(0.0021)	(0.0086)	(0.0029)	(0.0021)	(0.0086)	(0.0034)	(0.0021)	(0.0085)	(0.0028)
Adv diploma, dip.	0.0026	0.0136	0.0045*	0.0035	0.0116	0.0054	0.0025	0.0126	0.0043
	(0.0023)	(0.0100)	(0.0028)	(0.0022)	(0.0100)	(0.0034)	(0.0022)	(0.0099)	(0.0027)
Cert III or IV	0.0055***	0.0088	0.0072**	0.0072***	0.0098	0.0092***	0.0061***	0.0086	0.0077***
	(0.0020)	(0.0075)	(0.0028)	(0.0021)	(0.0075)	(0.0034)	(0.0020)	(0.0074)	(0.0027)
Cert I or II	0.0032	0.0047	0.0040	0.0053	0.0026	0.0073	0.0022	0.0003	0.0027
	(0.0103)	(0.0167)	(0.0110)	(0.0101)	(0.0167)	(0.0130)	(0.0100)	(0.0165)	(0.0109)
Cert not defined	0.0155	-0.0525	0.0092	0.0179	-0.0538	0.0049	0.0167	-0.0571*	0.0091
	(0.0195)	(0.0328)	(0.0264)	(0.0192)	(0.0328)	(0.0291)	(0.0198)	(0.0325)	(0.0273)
Year 11 and below	0.0058**	-0.0003	0.0076**	0.0072***	-0.0009	0.0089**	0.0061**	-0.0004	0.0077**
	(0.0024)	(0.0085)	(0.0033)	(0.0025)	(0.0085)	(0.0039)	(0.0024)	(0.0084)	(0.0032)
No Partner Info	-0.0103	0.0001	-0.0080	-0.0136	0.0021	-0.0085	-0.0070	0.0052	-0.0037
	(0.0092)	(0.0774)	(0.0101)	(0.0120)	(0.0774)	(0.0114)	(0.0083)	(0.0766)	(0.0102)
Partner's LFS									
Unemployed	0.0303***	0.0121*	0.0262**	0.0383***	0.0127*	0.0287**	0.0283***	0.0131*	0.0260**
	(0.0111)	(0.0069)	(0.0112)	(0.0121)	(0.0069)	(0.0114)	(0.0109)	(0.0069)	(0.0110)
Not in LF	0.0033	0.0032	0.0042	0.0062*	0.0037	0.0066	0.0037	0.0038	0.0048
	(0.0032)	(0.0049)	(0.0038)	(0.0035)	(0.0049)	(0.0041)	(0.0032)	(0.0049)	(0.0038)
No Partner Info	0.0129	0.0053	0.0124	0.0193	0.0041	0.0161	0.0101	-0.0007	0.0084
	(0.0093)	(0.0772)	(0.0102)	(0.0121)	(0.0772)	(0.0114)	(0.0085)	(0.0764)	(0.0103)
Religion									
Buddhism	0.0027	-0.0068	0.0032	0.0045	-0.0040	0.0052	0.0038	-0.0056	0.0039
	(0.0043)	(0.0095)	(0.0056)	(0.0043)	(0.0095)	(0.0064)	(0.0042)	(0.0094)	(0.0053)
Hinduism	-0.0080***	-0.0021	-0.0072**	-0.0067***	-0.0131	-0.0066**	-0.0067**	-0.0076	-0.0068**
	(0.0029)	(0.0260)	(0.0030)	(0.0020)	(0.0261)	(0.0034)	(0.0030)	(0.0258)	(0.0026)
Judaism	-0.0021	-0.0005	0.0005	0.0013	0.0013	0.0100	-0.0045	-0.0002	-0.0006
	(0.0088)	(0.0472)	(0.0114)	(0.0090)	(0.0472)	(0.0145)	(0.0090)	(0.0467)	(0.0114)
Islam	0.0039	0.0691	0.0084	0.0018	0.0569	0.0092	-0.0004	0.0503	0.0039
	(0.0097)	(0.0451)	(0.0130)	(0.0087)	(0.0451)	(0.0128)	(0.0093)	(0.0447)	(0.0094)
Other Religion	0.0149*	0.0173*	0.0185*	0.0178**	0.0194**	0.0225**	0.0134*	0.0188*	0.0178*
	(0.0078)	(0.0098)	(0.0096)	(0.0083)	(0.0098)	(0.0112)	(0.0077)	(0.0097)	(0.0096)
No Religion	0.0022	-0.0001	0.0023	0.0026*	-0.0005	0.0025	0.0021	0.0005	0.0024
	(0.0014)	(0.0032)	(0.0017)	(0.0015)	(0.0032)	(0.0021)	(0.0014)	(0.0032)	(0.0017)
Refused Religious Response	0.0059	-0.0017	0.0033	0.0068*	-0.0018	0.0032	0.0053	-0.0013	0.0031
	(0.0037)	(0.0042)	(0.0039)	(0.0038)	(0.0042)	(0.0042)	(0.0037)	(0.0042)	(0.0039)
Constant	0.0609***		0.0716***	0.0871***		0.0989***	0.0554***		0.0660***
	(0.0085)		(0.0104)	(0.0094)		(0.0124)	(0.0084)		(0.0101)
Observations	30,435	29,701	30,435	30,435	29,701	30,435	30,435	29,701	30,435
R-squared	0.7402	0.6419		0.7179	0.6412		0.7466	0.6490	
Number of HH		5,207	5,941		5,207	5,941		5,207	5,941

The reported first stage for the random effects model comes from implementing a manual IV regression, saving the first stage. The output reported in the main text is from implementing the xtivreg command in Stata 13.
Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.10: First Stage Regressions for Stability

	Dependent variable is Stability								
	Lagged Unemployment			Redundancy			Both Instruments		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Variables	OLS	FE	RE	OLS	FE	RE	OLS	FE	RE
Instruments									
Lagged Unemployment	-0.1287***	-0.0440***	-0.0849***				-0.1198***	-0.0405***	-0.0800***
	(0.0180)	(0.0153)	(0.0174)				(0.0181)	(0.0153)	(0.0174)
Redundancy				-0.2056***	-0.0806***	-0.1288***	-0.2000***	-0.0789***	-0.1255***
				(0.0193)	(0.0148)	(0.0194)	(0.0193)	(0.0148)	(0.0194)
General Covars									
Age	0.0072***	0.0177***	0.0093***	0.0077***	0.0180***	0.0098***	0.0072***	0.0176***	0.0093***
	(0.0013)	(0.0037)	(0.0019)	(0.0013)	(0.0037)	(0.0019)	(0.0013)	(0.0037)	(0.0019)
AgeSq	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0002***	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	0.0125	0.0133	0.0176	0.0119	0.0128	0.0173	0.0106	0.0132	0.0167
	(0.0107)	(0.0176)	(0.0139)	(0.0107)	(0.0176)	(0.0139)	(0.0107)	(0.0176)	(0.0139)
Defacto	0.0044	0.0041	0.0095	0.0052	0.0044	0.0101	0.0043	0.0047	0.0098
	(0.0105)	(0.0157)	(0.0134)	(0.0105)	(0.0157)	(0.0134)	(0.0105)	(0.0157)	(0.0134)
No.Children	-0.0014	-0.0250***	-0.0054*	-0.0021	-0.0251***	-0.0060*	-0.0018	-0.0246***	-0.0056*
	(0.0021)	(0.0087)	(0.0032)	(0.0021)	(0.0087)	(0.0032)	(0.0021)	(0.0087)	(0.0032)
Educational Qualification									
Postgrad	-0.0683***	0.0148	-0.0522**	-0.0703***	0.0130	-0.0553**	-0.0688***	0.0138	-0.0541**
	(0.0138)	(0.0374)	(0.0222)	(0.0137)	(0.0374)	(0.0221)	(0.0137)	(0.0374)	(0.0220)
Grad diploma, grad certificate	-0.0063	0.0016	-0.0089	-0.0083	0.0018	-0.0103	-0.0073	0.0020	-0.0096
	(0.0099)	(0.0298)	(0.0144)	(0.0099)	(0.0298)	(0.0143)	(0.0099)	(0.0298)	(0.0143)
Bachelor or hons.	-0.0123	0.0173	-0.0065	-0.0138*	0.0164	-0.0085	-0.0130	0.0167	-0.0078
	(0.0081)	(0.0202)	(0.0118)	(0.0081)	(0.0202)	(0.0117)	(0.0081)	(0.0202)	(0.0117)
Adv diploma, dip.	-0.0221**	-0.0120	-0.0140	-0.0238***	-0.0118	-0.0151	-0.0233***	-0.0129	-0.0152
	(0.0088)	(0.0273)	(0.0130)	(0.0088)	(0.0273)	(0.0130)	(0.0088)	(0.0273)	(0.0129)
Cert III or IV	-0.0022	0.0122	0.0052	-0.0037	0.0116	0.0038	-0.0026	0.0108	0.0045
	(0.0079)	(0.0187)	(0.0115)	(0.0079)	(0.0187)	(0.0115)	(0.0079)	(0.0187)	(0.0114)
Cert I or II	0.0024	0.0313	0.0002	-0.0004	0.0290	-0.0041	0.0034	0.0280	-0.0008
	(0.0198)	(0.0568)	(0.0296)	(0.0198)	(0.0568)	(0.0294)	(0.0197)	(0.0568)	(0.0292)
Cert not defined	-0.1080***	-0.0791	-0.0916	-0.1147***	-0.0753	-0.0960	-0.1105***	-0.0809	-0.0940
	(0.0403)	(0.1323)	(0.0652)	(0.0398)	(0.1323)	(0.0637)	(0.0402)	(0.1323)	(0.0648)
Year 11 and below	-0.0044	-0.0075	-0.0122	-0.0077	-0.0109	-0.0153	-0.0064	-0.0103	-0.0139
	(0.0072)	(0.0166)	(0.0105)	(0.0072)	(0.0166)	(0.0104)	(0.0072)	(0.0166)	(0.0104)
Occupation									
Managers	0.0990***	0.0722***	0.0955***	0.1010***	0.0720***	0.0969***	0.0971***	0.0712***	0.0944***
	(0.0121)	(0.0168)	(0.0149)	(0.0121)	(0.0168)	(0.0149)	(0.0121)	(0.0168)	(0.0149)
Professionals	0.0960***	0.0579***	0.0882***	0.0974***	0.0581***	0.0896***	0.0935***	0.0571***	0.0870***
	(0.0115)	(0.0163)	(0.0147)	(0.0115)	(0.0163)	(0.0147)	(0.0115)	(0.0163)	(0.0147)
Technicians and Trades Workers	0.0511***	0.0511**	0.0626***	0.0533***	0.0507**	0.0637***	0.0498***	0.0498**	0.0612***
	(0.0150)	(0.0201)	(0.0185)	(0.0151)	(0.0201)	(0.0184)	(0.0150)	(0.0201)	(0.0184)
Community and Personal Services	0.0462***	0.0364**	0.0501***	0.0463***	0.0363**	0.0504***	0.0444***	0.0355**	0.0489***
	(0.0116)	(0.0156)	(0.0145)	(0.0116)	(0.0156)	(0.0145)	(0.0115)	(0.0156)	(0.0145)
Sales Workers	0.0731***	0.0440***	0.0710***	0.0758***	0.0438***	0.0727***	0.0728***	0.0434***	0.0708***
	(0.0107)	(0.0157)	(0.0138)	(0.0107)	(0.0157)	(0.0138)	(0.0107)	(0.0157)	(0.0138)
Clerical and Admin Workers	0.0336***	0.0292*	0.0400***	0.0340***	0.0291*	0.0406***	0.0322***	0.0285*	0.0390***
	(0.0120)	(0.0156)	(0.0147)	(0.0120)	(0.0156)	(0.0147)	(0.0120)	(0.0156)	(0.0147)
Machinery Operators & Drivers	0.0291	-0.0512*	-0.0045	0.0277	-0.0517*	-0.0056	0.0267	-0.0519*	-0.0056
	(0.0241)	(0.0303)	(0.0349)	(0.0242)	(0.0303)	(0.0348)	(0.0241)	(0.0303)	(0.0346)
Missing/Refused Occ Response	-0.0442	-0.0186	-0.0252	-0.0751	-0.0164	-0.0363	-0.0421	-0.0154	-0.0229
	(0.0647)	(0.0546)	(0.0622)	(0.0623)	(0.0545)	(0.0613)	(0.0628)	(0.0545)	(0.0611)

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.10: First Stage Regressions for Stability

Dependent variable is Stability									
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) OLS	(2) FE	(3) RE	(1) OLS	(2) FE	(3) RE	(1) OLS	(2) FE	(3) RE
Partner's Educ. Qualification									
Postgrad	-0.0522***	-0.0049	-0.0395*	-0.0537***	-0.0084	-0.0421*	-0.0527***	-0.0063	-0.0410*
	(0.0146)	(0.0391)	(0.0223)	(0.0146)	(0.0390)	(0.0222)	(0.0146)	(0.0390)	(0.0222)
Grad diploma, grad certificate	-0.0137	-0.0169	-0.0254	-0.0169	-0.0185	-0.0277	-0.0161	-0.0173	-0.0268
	(0.0130)	(0.0361)	(0.0200)	(0.0130)	(0.0361)	(0.0199)	(0.0130)	(0.0361)	(0.0199)
Bachelor or hons.	-0.0399***	-0.0186	-0.0382**	-0.0416***	-0.0188	-0.0394**	-0.0413***	-0.0184	-0.0392**
	(0.0106)	(0.0289)	(0.0155)	(0.0106)	(0.0289)	(0.0154)	(0.0106)	(0.0289)	(0.0154)
Adv diploma, dip.	-0.0185	0.0148	-0.0160	-0.0192*	0.0143	-0.0165	-0.0189*	0.0146	-0.0163
	(0.0115)	(0.0338)	(0.0167)	(0.0114)	(0.0338)	(0.0167)	(0.0114)	(0.0338)	(0.0166)
Cert III or IV	-0.0029	0.0293	0.0013	-0.0044	0.0288	-0.0000	-0.0043	0.0293	0.0001
	(0.0092)	(0.0251)	(0.0129)	(0.0091)	(0.0251)	(0.0129)	(0.0091)	(0.0251)	(0.0128)
Cert I or II	0.0129	-0.0030	-0.0040	0.0130	-0.0015	-0.0046	0.0151	-0.0001	-0.0024
	(0.0296)	(0.0572)	(0.0389)	(0.0289)	(0.0572)	(0.0389)	(0.0290)	(0.0572)	(0.0388)
Cert not defined	0.0797**	-0.0662	0.0291	0.0770**	-0.0668	0.0286	0.0753*	-0.0662	0.0283
	(0.0391)	(0.1220)	(0.0502)	(0.0392)	(0.1220)	(0.0503)	(0.0391)	(0.1220)	(0.0498)
Year 11 and below	-0.0214**	0.0186	-0.0219	-0.0220**	0.0178	-0.0226	-0.0220**	0.0179	-0.0225
	(0.0104)	(0.0289)	(0.0149)	(0.0104)	(0.0288)	(0.0149)	(0.0104)	(0.0288)	(0.0148)
No Partner Info	0.1665***	0.2056	0.1585*	0.1633***	0.2081	0.1599**	0.1600***	0.2053	0.1554*
	(0.0207)	(0.2510)	(0.0812)	(0.0203)	(0.2509)	(0.0789)	(0.0195)	(0.2509)	(0.0793)
Partner's LFS									
Unemployed	-0.0306	-0.0093	-0.0175	-0.0327	-0.0094	-0.0194	-0.0295	-0.0098	-0.0181
	(0.0252)	(0.0246)	(0.0221)	(0.0256)	(0.0246)	(0.0223)	(0.0253)	(0.0245)	(0.0223)
Not in LF	0.0032	0.0061	0.0043	0.0033	0.0066	0.0045	0.0037	0.0065	0.0047
	(0.0119)	(0.0169)	(0.0143)	(0.0119)	(0.0169)	(0.0143)	(0.0118)	(0.0169)	(0.0142)
No Partner Info	-0.2080***	-0.2165	-0.1941**	-0.2067***	-0.2192	-0.1972**	-0.2029***	-0.2158	-0.1919**
	(0.0212)	(0.2503)	(0.0809)	(0.0209)	(0.2502)	(0.0785)	(0.0201)	(0.2502)	(0.0790)
Religion									
Buddhism	-0.0139	0.0220	-0.0079	-0.0163	0.0210	-0.0097	-0.0155	0.0215	-0.0087
	(0.0169)	(0.0316)	(0.0215)	(0.0168)	(0.0316)	(0.0214)	(0.0169)	(0.0316)	(0.0214)
Hinduism	-0.0344	-0.0188	-0.0625	-0.0355	-0.0127	-0.0603	-0.0352	-0.0124	-0.0604
	(0.0331)	(0.0889)	(0.0461)	(0.0330)	(0.0888)	(0.0457)	(0.0330)	(0.0888)	(0.0456)
Judaism	-0.1234***	0.1287	-0.1155*	-0.1225***	0.1280	-0.1172*	-0.1208***	0.1285	-0.1154*
	(0.0381)	(0.1623)	(0.0599)	(0.0381)	(0.1623)	(0.0600)	(0.0381)	(0.1622)	(0.0598)
Islam	-0.0234	0.1549	-0.0088	-0.0208	0.1617	-0.0078	-0.0197	0.1692	-0.0060
	(0.0381)	(0.1659)	(0.0550)	(0.0373)	(0.1658)	(0.0543)	(0.0376)	(0.1658)	(0.0552)
Other Religion	-0.0307	0.0365	-0.0104	-0.0293	0.0359	-0.0109	-0.0282	0.0356	-0.0102
	(0.0202)	(0.0337)	(0.0254)	(0.0201)	(0.0337)	(0.0253)	(0.0201)	(0.0337)	(0.0252)
No Religion	-0.0114**	0.0028	-0.0087	-0.0115**	0.0025	-0.0090	-0.0111**	0.0023	-0.0089
	(0.0050)	(0.0110)	(0.0072)	(0.0050)	(0.0110)	(0.0072)	(0.0050)	(0.0110)	(0.0072)
Refused Religious Response	-0.0314***	-0.0031	-0.0178	-0.0310***	-0.0032	-0.0179	-0.0302**	-0.0033	-0.0177
	(0.0118)	(0.0145)	(0.0127)	(0.0118)	(0.0145)	(0.0127)	(0.0118)	(0.0145)	(0.0127)
Constant	0.6891***		0.6225***	0.6821***		0.6148***	0.6979***		0.6293***
	(0.0285)		(0.0383)	(0.0284)		(0.0382)	(0.0284)		(0.0381)
Observations	27,990	27,231	27,990	27,990	27,231	27,990	27,990	27,231	27,990
R-squared	0.0198	0.0068		0.0239	0.0078		0.0265	0.0081	
Number of HH		4,887	5,646		4,887	5,646		4,887	5,646

The reported first stage for the random effects model comes from implementing a manual IV regression, saving the first stage. The output reported in the main text is from implementing the xtivreg command in Stata 13.
Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

7.2.3 NILF Transition Sample Full Specification

Table 7.11: Unemployment IV Estimation with NILF

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Unemployed	-0.2467***	-0.4271***	-0.2582***	-0.2192***	-0.2245***	-0.2157***	-0.2445***	-0.3448***	-0.2547***
	(0.0170)	(0.0555)	(0.0201)	(0.0373)	(0.0577)	(0.0431)	(0.0162)	(0.0443)	(0.0215)
General Covars									
Age	-0.0037***	-0.0355***	-0.0043***	-0.0036***	-0.0349***	-0.0042***	-0.0037***	-0.0353***	-0.0043***
	(0.0005)	(0.0029)	(0.0005)	(0.0005)	(0.0025)	(0.0007)	(0.0005)	(0.0026)	(0.0005)
AgeSq	0.0000**	0.0003***	0.0000***	0.0000	0.0003***	0.0000**	0.0000**	0.0003***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	0.0329***	0.0857***	0.0347***	0.0338***	0.0886***	0.0364***	0.0330***	0.0869***	0.0349***
	(0.0048)	(0.0115)	(0.0050)	(0.0049)	(0.0080)	(0.0059)	(0.0048)	(0.0108)	(0.0053)
Defacto	0.0364***	0.0469***	0.0357***	0.0371***	0.0496***	0.0366***	0.0365***	0.0480***	0.0358***
	(0.0050)	(0.0092)	(0.0059)	(0.0051)	(0.0070)	(0.0059)	(0.0050)	(0.0089)	(0.0054)
No.Children	0.0131***	0.1400***	0.0157***	0.0133***	0.1473***	0.0163***	0.0131***	0.1430***	0.0158***
	(0.0010)	(0.0111)	(0.0017)	(0.0011)	(0.0121)	(0.0015)	(0.0010)	(0.0077)	(0.0012)
Educational Qualification									
Postgrad	0.0326***	0.1182***	0.0370***	0.0331***	0.1254***	0.0385***	0.0326***	0.1211***	0.0374***
	(0.0071)	(0.0198)	(0.0073)	(0.0071)	(0.0187)	(0.0079)	(0.0071)	(0.0237)	(0.0074)
Grad diploma, grad certificate	0.0352***	0.1044***	0.0376***	0.0355***	0.1113***	0.0386***	0.0352***	0.1072***	0.0379***
	(0.0054)	(0.0164)	(0.0052)	(0.0055)	(0.0162)	(0.0059)	(0.0054)	(0.0139)	(0.0059)
Bachelor or hons.	0.0230***	0.0601***	0.0240***	0.0233***	0.0661***	0.0248***	0.0230***	0.0625***	0.0241***
	(0.0043)	(0.0093)	(0.0046)	(0.0043)	(0.0095)	(0.0041)	(0.0043)	(0.0103)	(0.0042)
Adv diploma, dip.	0.0154***	0.0376***	0.0168***	0.0156***	0.0416***	0.0173***	0.0154***	0.0393***	0.0169***
	(0.0045)	(0.0079)	(0.0056)	(0.0045)	(0.0123)	(0.0045)	(0.0045)	(0.0061)	(0.0056)
Cert III or IV	0.0027	0.0003	0.0022	0.0024	-0.0001	0.0018	0.0027	0.0002	0.0021
	(0.0038)	(0.0063)	(0.0043)	(0.0038)	(0.0125)	(0.0047)	(0.0038)	(0.0078)	(0.0039)
Cert I or II	0.0044	-0.0142	0.0054	0.0034	-0.0152	0.0039	0.0043	-0.0146	0.0053
	(0.0096)	(0.0180)	(0.0087)	(0.0096)	(0.0245)	(0.0108)	(0.0096)	(0.0211)	(0.0125)
Cert not defined	-0.0107	0.0645	-0.0082	-0.0132	0.0446	-0.0119	-0.0109	0.0564	-0.0084
	(0.0152)	(0.0867)	(0.0182)	(0.0155)	(0.0598)	(0.0165)	(0.0152)	(0.0647)	(0.0205)
Year 11 and below	-0.0137***	-0.0500***	-0.0149***	-0.0142***	-0.0566***	-0.0158***	-0.0138***	-0.0527***	-0.0150***
	(0.0032)	(0.0054)	(0.0040)	(0.0033)	(0.0049)	(0.0036)	(0.0032)	(0.0056)	(0.0039)
Occupation									
Managers	-0.0120***	-0.0243***	-0.0152***	-0.0116**	-0.0320***	-0.0151***	-0.0120***	-0.0274***	-0.0154***
	(0.0046)	(0.0086)	(0.0053)	(0.0046)	(0.0112)	(0.0044)	(0.0046)	(0.0085)	(0.0051)
Professionals	-0.0174***	-0.0313***	-0.0203***	-0.0173***	-0.0411***	-0.0206***	-0.0174***	-0.0353***	-0.0205***
	(0.0045)	(0.0090)	(0.0063)	(0.0044)	(0.0118)	(0.0049)	(0.0045)	(0.0094)	(0.0045)
Technicians and Trades Workers	-0.0037	-0.0185**	-0.0059	-0.0031	-0.0222**	-0.0053	-0.0037	-0.0200**	-0.0059
	(0.0059)	(0.0080)	(0.0075)	(0.0060)	(0.0101)	(0.0057)	(0.0059)	(0.0100)	(0.0060)
Community and Personal Services	-0.0117***	-0.0141*	-0.0130**	-0.0111***	-0.0175*	-0.0124***	-0.0116***	-0.0155*	-0.0130***
	(0.0041)	(0.0083)	(0.0050)	(0.0041)	(0.0093)	(0.0042)	(0.0041)	(0.0082)	(0.0048)
Sales Workers	-0.0101***	-0.0245**	-0.0127***	-0.0097***	-0.0325***	-0.0124***	-0.0101***	-0.0278***	-0.0128***
	(0.0037)	(0.0097)	(0.0044)	(0.0037)	(0.0102)	(0.0044)	(0.0037)	(0.0081)	(0.0043)
Clerical and Admin Workers	-0.0160***	-0.0258**	-0.0173***	-0.0154***	-0.0295***	-0.0165***	-0.0160***	-0.0273***	-0.0173***
	(0.0041)	(0.0105)	(0.0047)	(0.0042)	(0.0104)	(0.0042)	(0.0041)	(0.0077)	(0.0044)
Machinery Operators & Drivers	-0.0023	0.0184	-0.0009	-0.0015	0.0162	0.0003	-0.0022	0.0175	-0.0007
	(0.0087)	(0.0131)	(0.0102)	(0.0087)	(0.0156)	(0.0120)	(0.0087)	(0.0145)	(0.0092)
Missing/Refused Occ Response	0.3587***	0.4270***	0.3665***	0.3466***	0.3330***	0.3475***	0.3577***	0.3888***	0.3650***
	(0.0134)	(0.0273)	(0.0138)	(0.0195)	(0.0325)	(0.0224)	(0.0132)	(0.0235)	(0.0144)

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.11: Unemployment IV Estimation with NILF Cont.

Dependent variable is fertility

	Lagged Unemployment			Redundancy			Both Instruments		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Variables	IV	FE IV	RE IV	IV	FE IV	RE IV	IV	FE IV	RE IV
Partner's Educ. Qualification									
Postgrad	-0.0135	-0.0448*	-0.0144	-0.0142	-0.0554*	-0.0156	-0.0136	-0.0491*	-0.0145
	(0.0093)	(0.0268)	(0.0125)	(0.0093)	(0.0283)	(0.0101)	(0.0093)	(0.0279)	(0.0118)
Grad diploma, grad certificate	-0.0322***	-0.0671**	-0.0322***	-0.0327***	-0.0744***	-0.0330***	-0.0322***	-0.0701***	-0.0322***
	(0.0087)	(0.0265)	(0.0074)	(0.0087)	(0.0253)	(0.0102)	(0.0087)	(0.0254)	(0.0113)
Bachelor or hons.	-0.0166**	-0.0078	-0.0162**	-0.0170**	-0.0137	-0.0169**	-0.0166**	-0.0102	-0.0162*
	(0.0073)	(0.0164)	(0.0079)	(0.0074)	(0.0188)	(0.0072)	(0.0073)	(0.0176)	(0.0083)
Adv diploma, dip.	-0.0195**	-0.0092	-0.0192***	-0.0199**	-0.0165	-0.0198**	-0.0196**	-0.0122	-0.0192**
	(0.0077)	(0.0224)	(0.0072)	(0.0078)	(0.0201)	(0.0088)	(0.0077)	(0.0167)	(0.0081)
Cert III or IV	-0.0198***	0.0077	-0.0181***	-0.0204***	0.0038	-0.0189**	-0.0198***	0.0061	-0.0181**
	(0.0065)	(0.0153)	(0.0070)	(0.0066)	(0.0171)	(0.0076)	(0.0066)	(0.0161)	(0.0088)
Cert I or II	-0.0249	-0.0077	-0.0275	-0.0258	-0.0111	-0.0293	-0.0249	-0.0091	-0.0277
	(0.0193)	(0.0590)	(0.0169)	(0.0193)	(0.0537)	(0.0186)	(0.0193)	(0.0374)	(0.0203)
Cert not defined	-0.0117	-0.0676	-0.0127	-0.0135	-0.0810	-0.0161	-0.0118	-0.0730	-0.0131
	(0.0260)	(0.0829)	(0.0316)	(0.0258)	(0.1111)	(0.0307)	(0.0260)	(0.0891)	(0.0278)
Year 11 and below	-0.0234***	0.0040	-0.0215***	-0.0241***	0.0002	-0.0225***	-0.0234***	0.0025	-0.0215***
	(0.0067)	(0.0174)	(0.0058)	(0.0068)	(0.0185)	(0.0071)	(0.0067)	(0.0179)	(0.0071)
No Partner Info	-0.0780***	-0.0241	-0.0774***	-0.0782***	-0.0212	-0.0775***	-0.0780***	-0.0229	-0.0774***
	(0.0159)	(0.0200)	(0.0180)	(0.0161)	(0.0216)	(0.0203)	(0.0159)	(0.0256)	(0.0235)
Partner's LFS									
Unemployed	-0.0131	-0.0102	-0.0125	-0.0150	-0.0133	-0.0150	-0.0133	-0.0114	-0.0127
	(0.0138)	(0.0114)	(0.0137)	(0.0139)	(0.0144)	(0.0112)	(0.0138)	(0.0138)	(0.0146)
Not in LF	-0.0058	0.0105	-0.0046	-0.0062	0.0080	-0.0052	-0.0058	0.0095	-0.0046
	(0.0060)	(0.0132)	(0.0059)	(0.0060)	(0.0078)	(0.0061)	(0.0060)	(0.0098)	(0.0075)
No Partner Info	0.0456***	0.0121	0.0463***	0.0452***	0.0040	0.0455**	0.0456***	0.0088	0.0462**
	(0.0155)	(0.0203)	(0.0172)	(0.0156)	(0.0147)	(0.0195)	(0.0155)	(0.0240)	(0.0206)
Religion									
Buddhism	0.0034	0.0003	0.0055	0.0035	0.0008	0.0057	0.0034	0.0005	0.0056
	(0.0077)	(0.0161)	(0.0081)	(0.0076)	(0.0151)	(0.0090)	(0.0077)	(0.0154)	(0.0066)
Hinduism	0.0050	0.0213	0.0058	0.0046	0.0137	0.0053	0.0049	0.0182	0.0058
	(0.0171)	(0.0584)	(0.0200)	(0.0171)	(0.0651)	(0.0140)	(0.0171)	(0.0487)	(0.0140)
Judaism	-0.0178	-0.1703	-0.0206	-0.0183	-0.1488	-0.0219	-0.0178	-0.1615	-0.0208
	(0.0178)	(0.2735)	(0.0168)	(0.0178)	(0.2697)	(0.0137)	(0.0178)	(0.2589)	(0.0136)
Islam	-0.0127	0.0436***	-0.0127	-0.0134	0.0302***	-0.0138	-0.0128	0.0382***	-0.0128
	(0.0111)	(0.0102)	(0.0132)	(0.0112)	(0.0082)	(0.0151)	(0.0111)	(0.0112)	(0.0137)
Other Religion	-0.0097	0.0084	-0.0076	-0.0104	0.0077	-0.0085	-0.0097	0.0081	-0.0075
	(0.0074)	(0.0187)	(0.0108)	(0.0075)	(0.0169)	(0.0090)	(0.0074)	(0.0189)	(0.0085)
No Religion	-0.0014	0.0002	-0.0011	-0.0015	0.0007	-0.0012	-0.0014	0.0004	-0.0011
	(0.0025)	(0.0069)	(0.0032)	(0.0025)	(0.0068)	(0.0028)	(0.0025)	(0.0062)	(0.0027)
Refused Religious Response	-0.0047	-0.0100	-0.0055	-0.0051	-0.0092	-0.0061	-0.0048	-0.0097	-0.0056
	(0.0051)	(0.0096)	(0.0049)	(0.0051)	(0.0059)	(0.0052)	(0.0051)	(0.0089)	(0.0044)
Constant	0.1454***	0.6699***	0.1546***	0.1424***	0.6548***	0.1514***	0.1451***	0.6638***	0.1548***
	(0.0123)	(0.0644)	(0.0138)	(0.0130)	(0.0519)	(0.0162)	(0.0123)	(0.0498)	(0.0132)
Observations	32,053	32,053	32,053	32,053	32,053	32,053	32,053	32,053	32,053
R-squared	0.1935			0.1940			0.1935		
Number of HH		6,003	6,003		6,003	6,003		6,003	6,003

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.12: Stability IV Estimation with NILF

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1)	(2)	(3)
Stability	0.1714***	0.4378	0.1714***	0.0457**	0.0960	0.0451**	0.0832***	0.1608	0.0850***
	(0.0369)	(0.3756)	(0.0460)	(0.0207)	(0.0664)	(0.0216)	(0.0178)	(0.0985)	(0.0263)
General Covars									
Age	-0.0021***	-0.0264***	-0.0021***	-0.0012***	-0.0201***	-0.0015***	-0.0015***	-0.0213***	-0.0017***
	(0.0005)	(0.0061)	(0.0007)	(0.0004)	(0.0025)	(0.0005)	(0.0004)	(0.0025)	(0.0004)
AgeSq	0.0000	0.0002***	0.0000	-0.0000**	0.0002***	-0.0000	-0.0000	0.0002***	-0.0000
	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	0.0138***	0.0408***	0.0138**	0.0156***	0.0458***	0.0165***	0.0150***	0.0448***	0.0156***
	(0.0041)	(0.0128)	(0.0058)	(0.0037)	(0.0123)	(0.0038)	(0.0037)	(0.0115)	(0.0047)
Defacto	0.0212***	0.0293***	0.0212***	0.0218***	0.0314***	0.0210***	0.0216***	0.0310***	0.0210***
	(0.0043)	(0.0086)	(0.0047)	(0.0040)	(0.0065)	(0.0036)	(0.0041)	(0.0085)	(0.0047)
No.Children	0.0114***	0.1473***	0.0114***	0.0112***	0.1382***	0.0131***	0.0113***	0.1399***	0.0126***
	(0.0009)	(0.0134)	(0.0011)	(0.0008)	(0.0090)	(0.0013)	(0.0008)	(0.0107)	(0.0015)
Educational Qualification									
Postgrad	0.0359***	0.0575	0.0359***	0.0275***	0.0621***	0.0303***	0.0300***	0.0612***	0.0321***
	(0.0070)	(0.0377)	(0.0083)	(0.0061)	(0.0148)	(0.0093)	(0.0062)	(0.0236)	(0.0069)
Grad diploma, grad	0.0143***	0.0578***	0.0143***	0.0135***	0.0577***	0.0152***	0.0138***	0.0577***	0.0149***
certificate	(0.0047)	(0.0195)	(0.0050)	(0.0044)	(0.0120)	(0.0055)	(0.0044)	(0.0142)	(0.0047)
Bachelor or hons.	0.0138***	0.0273**	0.0138***	0.0123***	0.0330***	0.0129***	0.0128***	0.0319***	0.0132***
	(0.0037)	(0.0136)	(0.0039)	(0.0034)	(0.0059)	(0.0029)	(0.0034)	(0.0072)	(0.0037)
Adv diploma, dip.	0.0140***	0.0250	0.0140***	0.0113***	0.0215***	0.0121***	0.0121***	0.0221**	0.0126***
	(0.0040)	(0.0275)	(0.0048)	(0.0036)	(0.0056)	(0.0034)	(0.0037)	(0.0088)	(0.0038)
Cert III or IV	0.0027	-0.0032	0.0027	0.0024	0.0020	0.0017	0.0025	0.0010	0.0019
	(0.0033)	(0.0174)	(0.0035)	(0.0030)	(0.0077)	(0.0028)	(0.0030)	(0.0087)	(0.0031)
Cert I or II	-0.0072	-0.0215	-0.0072	-0.0073	-0.0102	-0.0085	-0.0073	-0.0123	-0.0081
	(0.0064)	(0.0553)	(0.0073)	(0.0055)	(0.0346)	(0.0063)	(0.0057)	(0.0419)	(0.0057)
Cert not defined	0.0156	0.0877	0.0156	0.0015	0.0625	0.0024	0.0057	0.0672	0.0065
	(0.0139)	(0.0981)	(0.0177)	(0.0119)	(0.0472)	(0.0148)	(0.0121)	(0.0671)	(0.0174)
Year 11 and below	-0.0057**	-0.0249**	-0.0057*	-0.0063***	-0.0273***	-0.0072***	-0.0061**	-0.0269***	-0.0067**
	(0.0027)	(0.0097)	(0.0029)	(0.0024)	(0.0038)	(0.0027)	(0.0024)	(0.0038)	(0.0026)
Occupation									
Managers	-0.0127**	-0.0454	-0.0127*	0.0001	-0.0200***	-0.0016	-0.0037	-0.0248*	-0.0052
	(0.0059)	(0.0343)	(0.0072)	(0.0047)	(0.0067)	(0.0068)	(0.0046)	(0.0148)	(0.0052)
Professionals	-0.0153***	-0.0397	-0.0153**	-0.0028	-0.0188***	-0.0039	-0.0065	-0.0227*	-0.0075*
	(0.0055)	(0.0302)	(0.0071)	(0.0042)	(0.0072)	(0.0054)	(0.0042)	(0.0131)	(0.0039)
Technicians and	0.0011	-0.0314	0.0011	0.0078	-0.0135	0.0063	0.0058	-0.0169	0.0045
Trades Workers	(0.0062)	(0.0302)	(0.0061)	(0.0056)	(0.0098)	(0.0080)	(0.0056)	(0.0124)	(0.0069)
Community and	-0.0092**	-0.0277	-0.0092*	-0.0032	-0.0140**	-0.0042	-0.0049	-0.0166	-0.0059
Personal Services	(0.0042)	(0.0174)	(0.0048)	(0.0036)	(0.0069)	(0.0036)	(0.0036)	(0.0115)	(0.0036)
Sales Workers	-0.0131***	-0.0354	-0.0131**	-0.0034	-0.0194***	-0.0044	-0.0063*	-0.0224**	-0.0071*
	(0.0045)	(0.0218)	(0.0052)	(0.0035)	(0.0074)	(0.0037)	(0.0034)	(0.0103)	(0.0041)
Clerical and Admin	-0.0089**	-0.0253	-0.0089	-0.0045	-0.0140*	-0.0048	-0.0058	-0.0161	-0.0062
Workers	(0.0042)	(0.0166)	(0.0057)	(0.0036)	(0.0075)	(0.0032)	(0.0037)	(0.0108)	(0.0041)
Machinery Operators	-0.0001	0.0305	-0.0001	0.0037	0.0140	0.0049	0.0025	0.0171	0.0035
& Drivers	(0.0086)	(0.0226)	(0.0104)	(0.0077)	(0.0131)	(0.0070)	(0.0078)	(0.0176)	(0.0067)
Missing/Refused Occ	0.3378***	0.3069***	0.3378***	0.3334***	0.3145***	0.3309***	0.3347***	0.3131***	0.3326***
Response	(0.0465)	(0.0513)	(0.0470)	(0.0467)	(0.0408)	(0.0515)	(0.0466)	(0.0579)	(0.0574)

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.12: Stability IV Estimation with NILF Cont.

Dependent variable is fertility

	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1)	(2)	(3)
Partner's Educ. Qualification									
Postgrad	-0.0010	0.0045	-0.0010	-0.0077	0.0024	-0.0072	-0.0057	0.0028	-0.0053
	(0.0083)	(0.0402)	(0.0124)	(0.0079)	(0.0265)	(0.0078)	(0.0079)	(0.0218)	(0.0083)
Grad diploma, grad certificate	-0.0153**	0.0157	-0.0153	-0.0172**	0.0102	-0.0146**	-0.0166**	0.0113	-0.0147
	(0.0076)	(0.0225)	(0.0096)	(0.0073)	(0.0147)	(0.0073)	(0.0074)	(0.0184)	(0.0103)
Bachelor or hons.	-0.0069	-0.0015	-0.0069	-0.0120*	-0.0080	-0.0118*	-0.0105*	-0.0068	-0.0102
	(0.0065)	(0.0168)	(0.0082)	(0.0062)	(0.0095)	(0.0067)	(0.0062)	(0.0119)	(0.0079)
Adv diploma, dip.	-0.0088	0.0159	-0.0088	-0.0110*	0.0212	-0.0094	-0.0104	0.0202	-0.0092
	(0.0067)	(0.0235)	(0.0058)	(0.0065)	(0.0158)	(0.0076)	(0.0065)	(0.0171)	(0.0059)
Cert III or IV	-0.0153***	0.0075	-0.0153***	-0.0156***	0.0179	-0.0139***	-0.0155***	0.0159	-0.0143**
	(0.0057)	(0.0133)	(0.0050)	(0.0055)	(0.0118)	(0.0053)	(0.0055)	(0.0098)	(0.0058)
Cert I or II	-0.0107	0.0294	-0.0107	-0.0091	0.0284	-0.0086	-0.0096	0.0286	-0.0092
	(0.0176)	(0.0486)	(0.0164)	(0.0172)	(0.0551)	(0.0274)	(0.0173)	(0.0529)	(0.0232)
Cert not defined	-0.0458***	-0.0687	-0.0458***	-0.0355***	-0.0910	-0.0395***	-0.0385***	-0.0867*	-0.0413***
	(0.0099)	(0.0632)	(0.0108)	(0.0066)	(0.0575)	(0.0128)	(0.0072)	(0.0473)	(0.0112)
Year 11 and below	-0.0146**	0.0249	-0.0146**	-0.0173***	0.0317**	-0.0150**	-0.0164***	0.0304*	-0.0148***
	(0.0058)	(0.0172)	(0.0066)	(0.0056)	(0.0146)	(0.0064)	(0.0056)	(0.0172)	(0.0053)
No Partner Info	-0.0876***	-0.1004	-0.0876***	-0.0663***	-0.0282	-0.0652***	-0.0726***	-0.0419	-0.0721***
	(0.0123)	(0.1125)	(0.0193)	(0.0117)	(0.0226)	(0.0148)	(0.0113)	(0.0474)	(0.0162)
Partner's LFS									
Unemployed	-0.0062	-0.0022	-0.0062	-0.0104	-0.0049	-0.0096	-0.0091	-0.0044	-0.0086
	(0.0104)	(0.0161)	(0.0091)	(0.0095)	(0.0141)	(0.0095)	(0.0096)	(0.0115)	(0.0120)
Not in LF	0.0017	0.0075	0.0017	0.0021	0.0096	0.0028	0.0020	0.0092	0.0025
	(0.0050)	(0.0101)	(0.0062)	(0.0046)	(0.0072)	(0.0057)	(0.0046)	(0.0087)	(0.0055)
No Partner Info	0.0707***	0.1128	0.0707***	0.0442***	0.0376**	0.0445***	0.0521***	0.0519	0.0526***
	(0.0127)	(0.1219)	(0.0188)	(0.0116)	(0.0192)	(0.0171)	(0.0111)	(0.0513)	(0.0167)
Religion	-0.0033	-0.0312	-0.0033	-0.0052	-0.0244*	-0.0048	-0.0046	-0.0257	-0.0043
Buddisim									
	(0.0059)	(0.0199)	(0.0057)	(0.0051)	(0.0140)	(0.0056)	(0.0052)	(0.0185)	(0.0065)
Hinduism	-0.0003	0.0603	-0.0003	-0.0047	0.0552	-0.0003	-0.0034	0.0561	-0.0001
	(0.0147)	(0.1098)	(0.0200)	(0.0133)	(0.0962)	(0.0159)	(0.0136)	(0.0610)	(0.0174)
Judaism	0.0052	-0.0548	0.0052	-0.0114	-0.0116	-0.0123	-0.0064	-0.0198	-0.0067
	(0.0141)	(0.1451)	(0.0119)	(0.0119)	(0.0220)	(0.0110)	(0.0121)	(0.0414)	(0.0137)
Islam	-0.0024	-0.0523	-0.0024	-0.0055	-0.0026	-0.0055	-0.0045	-0.0120	-0.0045
	(0.0118)	(0.2082)	(0.0075)	(0.0101)	(0.0368)	(0.0109)	(0.0104)	(0.0613)	(0.0079)
Other Religion	-0.0020	-0.0171	-0.0020	-0.0060	-0.0050	-0.0055	-0.0048	-0.0073	-0.0045
	(0.0065)	(0.0171)	(0.0079)	(0.0056)	(0.0128)	(0.0048)	(0.0058)	(0.0171)	(0.0083)
No Religion	-0.0006	-0.0012	-0.0006	-0.0022	-0.0003	-0.0018	-0.0017	-0.0005	-0.0014
	(0.0022)	(0.0079)	(0.0022)	(0.0020)	(0.0045)	(0.0023)	(0.0020)	(0.0062)	(0.0026)
Refused Religious Response	0.0007	-0.0030	0.0007	-0.0036	-0.0046	-0.0039	-0.0023	-0.0043	-0.0025
	(0.0047)	(0.0092)	(0.0042)	(0.0042)	(0.0064)	(0.0038)	(0.0042)	(0.0070)	(0.0042)
Constant	-0.0520*	0.0974	-0.0520*	0.0327*	0.2177***	0.0365**	0.0074	0.1949***	0.0089
	(0.0271)	(0.1632)	(0.0295)	(0.0173)	(0.0460)	(0.0169)	(0.0158)	(0.0549)	(0.0251)
Observations	28,090	28,090	28,090	28,090	28,090	28,090	28,090	28,090	28,090
R-squared				0.0423			0.0144		
Number of pid		5,656	5,656		5,656	5,656		5,656	5,656

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

7.2.4 Immigrant Native Analysis Full Specifications

Table 7.13: Unemployment IV Estimation - Native Specification

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Unemployment	-0.0879***	-0.2113**	-0.0901***	-0.0684	-0.0323	-0.0518	-0.0840***	-0.1136**	-0.0814***
	(0.0204)	(0.0929)	(0.0249)	(0.0466)	(0.0655)	(0.0342)	(0.0193)	(0.0511)	(0.0189)
General Covars	-0.0011***	-0.0211***	-0.0016***	-0.0011**	-0.0203***	-0.0016***	-0.0011***	-0.0207***	-0.0016***
Age	-0.0011***	-0.0211***	-0.0016***	-0.0011**	-0.0203***	-0.0016***	-0.0011***	-0.0207***	-0.0016***
	(0.0004)	(0.0019)	(0.0005)	(0.0004)	(0.0021)	(0.0005)	(0.0004)	(0.0015)	(0.0005)
AgeSq	-0.0000***	0.0002***	-0.0000**	-0.0000***	0.0002***	-0.0000**	-0.0000***	0.0002***	-0.0000**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	0.0204***	0.0577***	0.0213***	0.0206***	0.0572***	0.0217***	0.0204***	0.0574***	0.0214***
	(0.0044)	(0.0118)	(0.0054)	(0.0044)	(0.0138)	(0.0044)	(0.0044)	(0.0109)	(0.0049)
Defacto	0.0177***	0.0277***	0.0158**	0.0178***	0.0283***	0.0158***	0.0177***	0.0281***	0.0158***
	(0.0046)	(0.0094)	(0.0063)	(0.0046)	(0.0088)	(0.0045)	(0.0046)	(0.0086)	(0.0053)
No.Children	0.0128***	0.1597***	0.0162***	0.0127***	0.1590***	0.0163***	0.0128***	0.1593***	0.0163***
	(0.0010)	(0.0106)	(0.0011)	(0.0010)	(0.0103)	(0.0014)	(0.0010)	(0.0083)	(0.0014)
Educational Qualification									
Postgrad	0.0261***	0.0728***	0.0325***	0.0261***	0.0735***	0.0328***	0.0261***	0.0732***	0.0328***
	(0.0069)	(0.0195)	(0.0089)	(0.0069)	(0.0138)	(0.0085)	(0.0069)	(0.0196)	(0.0066)
Grad diploma, grad certificate	0.0222***	0.0531***	0.0250***	0.0222***	0.0529***	0.0252***	0.0222***	0.0530***	0.0252***
	(0.0053)	(0.0150)	(0.0067)	(0.0053)	(0.0103)	(0.0055)	(0.0053)	(0.0125)	(0.0057)
Bachelor or hons.	0.0167***	0.0338***	0.0177***	0.0168***	0.0350***	0.0179***	0.0167***	0.0345***	0.0178***
	(0.0040)	(0.0068)	(0.0048)	(0.0040)	(0.0059)	(0.0031)	(0.0040)	(0.0071)	(0.0034)
Adv diploma, dip.	0.0140***	0.0225**	0.0158***	0.0141***	0.0244***	0.0160***	0.0140***	0.0235***	0.0159***
	(0.0044)	(0.0098)	(0.0055)	(0.0044)	(0.0081)	(0.0053)	(0.0044)	(0.0066)	(0.0042)
Cert III or IV	0.0054	0.0024	0.0051*	0.0054	0.0009	0.0050	0.0054	0.0016	0.0050
	(0.0035)	(0.0064)	(0.0029)	(0.0035)	(0.0095)	(0.0041)	(0.0035)	(0.0052)	(0.0040)
Cert I or II	-0.0013	-0.0018	-0.0006	-0.0013	-0.0017	-0.0007	-0.0013	-0.0017	-0.0006
	(0.0070)	(0.0234)	(0.0103)	(0.0070)	(0.0241)	(0.0090)	(0.0070)	(0.0149)	(0.0100)
Cert not defined	0.0028	0.0585	0.0083	0.0024	0.0561	0.0079	0.0027	0.0572	0.0084
	(0.0140)	(0.0733)	(0.0217)	(0.0140)	(0.0563)	(0.0373)	(0.0140)	(0.0591)	(0.0261)
Year 11 and below	-0.0045*	-0.0294***	-0.0054**	-0.0046*	-0.0302***	-0.0056*	-0.0045*	-0.0298***	-0.0055*
	(0.0027)	(0.0055)	(0.0026)	(0.0027)	(0.0055)	(0.0030)	(0.0027)	(0.0031)	(0.0029)
Occupation									
Managers	0.0007	-0.0072	-0.0004	0.0013	-0.0048	0.0008	0.0008	-0.0059	-0.0002
	(0.0047)	(0.0114)	(0.0054)	(0.0049)	(0.0061)	(0.0061)	(0.0047)	(0.0057)	(0.0043)
Professionals	0.0002	-0.0092	-0.0007	0.0008	-0.0075	0.0004	0.0003	-0.0083	-0.0005
	(0.0044)	(0.0079)	(0.0054)	(0.0046)	(0.0058)	(0.0057)	(0.0044)	(0.0077)	(0.0044)
Technicians and Trades Workers	0.0080	-0.0055	0.0065	0.0085	-0.0024	0.0075	0.0081	-0.0038	0.0067
	(0.0063)	(0.0087)	(0.0050)	(0.0065)	(0.0050)	(0.0072)	(0.0063)	(0.0045)	(0.0043)
Community and Personal Services	-0.0034	-0.0059	-0.0034	-0.0029	-0.0034	-0.0024	-0.0033	-0.0045	-0.0031
	(0.0040)	(0.0084)	(0.0046)	(0.0042)	(0.0082)	(0.0045)	(0.0040)	(0.0051)	(0.0053)
Sales Workers	0.0005	-0.0054	0.0003	0.0010	-0.0041	0.0012	0.0006	-0.0047	0.0005
	(0.0037)	(0.0062)	(0.0044)	(0.0039)	(0.0063)	(0.0041)	(0.0037)	(0.0064)	(0.0041)
Clerical and Admin Workers	-0.0067*	-0.0112*	-0.0065	-0.0062	-0.0098	-0.0056	-0.0066*	-0.0104*	-0.0063
	(0.0039)	(0.0067)	(0.0044)	(0.0041)	(0.0069)	(0.0042)	(0.0039)	(0.0061)	(0.0039)
Machinery Operators & Drivers	0.0050	0.0152	0.0071	0.0056	0.0153	0.0082	0.0051	0.0152	0.0074
	(0.0087)	(0.0134)	(0.0091)	(0.0087)	(0.0224)	(0.0081)	(0.0087)	(0.0133)	(0.0081)
Missing/Refused Occ Response	0.1023***	0.1996**	0.1042***	0.0839*	0.0392	0.0685**	0.0986***	0.1121**	0.0961***
	(0.0210)	(0.0813)	(0.0278)	(0.0443)	(0.0615)	(0.0334)	(0.0199)	(0.0443)	(0.0191)

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.13: Unemployment IV Estimation - Native Specification Cont

Dependent variable is fertility

	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Partner's Educ. Qualification									
Postgrad	-0.0199**	-0.0474*	-0.0219***	-0.0201**	-0.0507	-0.0225**	-0.0199**	-0.0492***	-0.0221**
	(0.0101)	(0.0250)	(0.0062)	(0.0102)	(0.0344)	(0.0115)	(0.0101)	(0.0189)	(0.0102)
Grad diploma, grad certificate	-0.0268***	-0.0303	-0.0257**	-0.0269***	-0.0337*	-0.0260**	-0.0268***	-0.0322	-0.0258**
	(0.0092)	(0.0198)	(0.0101)	(0.0092)	(0.0181)	(0.0127)	(0.0092)	(0.0244)	(0.0100)
Bachelor or hons.	-0.0242***	-0.0175	-0.0245***	-0.0243***	-0.0184	-0.0248**	-0.0243***	-0.0180	-0.0246***
	(0.0078)	(0.0155)	(0.0074)	(0.0078)	(0.0149)	(0.0098)	(0.0078)	(0.0162)	(0.0083)
Adv diploma, dip.	-0.0258***	0.0076	-0.0246***	-0.0259***	0.0059	-0.0246**	-0.0258***	0.0067	-0.0245**
	(0.0080)	(0.0172)	(0.0076)	(0.0080)	(0.0183)	(0.0106)	(0.0080)	(0.0198)	(0.0096)
Cert III or IV	-0.0283***	-0.0025	-0.0270***	-0.0284***	-0.0045	-0.0272***	-0.0283***	-0.0036	-0.0270***
	(0.0069)	(0.0106)	(0.0067)	(0.0070)	(0.0117)	(0.0086)	(0.0069)	(0.0128)	(0.0081)
Cert I or II	-0.0070	0.0280	-0.0062	-0.0071	0.0267	-0.0064	-0.0070	0.0273	-0.0062
	(0.0190)	(0.0349)	(0.0218)	(0.0190)	(0.0363)	(0.0272)	(0.0190)	(0.0520)	(0.0296)
Cert not defined	-0.0097	-0.0155	-0.0081	-0.0101	-0.0114	-0.0088	-0.0098	-0.0133	-0.0082
	(0.0274)	(0.0716)	(0.0291)	(0.0273)	(0.0638)	(0.0359)	(0.0274)	(0.1489)	(0.0466)
Year 11 and below	-0.0257***	0.0147	-0.0222***	-0.0258***	0.0145	-0.0223**	-0.0257***	0.0146***	-0.0221***
	(0.0071)	(0.0144)	(0.0081)	(0.0071)	(0.0183)	(0.0105)	(0.0071)	(0.0043)	(0.0081)
No Partner Info	-0.0474***	-0.0229	-0.0452***	-0.0467***	-0.0222	-0.0437***	-0.0472***	-0.0225	-0.0448***
	(0.0137)	(0.0176)	(0.0120)	(0.0134)	(0.0177)	(0.0102)	(0.0136)	(0.0254)	(0.0113)
Partner's LFS									
Unemployed	0.0006	-0.0042	0.0011	-0.0002	-0.0059	-0.0005	0.0005	-0.0051	0.0007
	(0.0123)	(0.0080)	(0.0110)	(0.0122)	(0.0116)	(0.0126)	(0.0122)	(0.0081)	(0.0130)
Not in LF	0.0030	0.0117*	0.0044	0.0029	0.0109	0.0042	0.0029	0.0112	0.0044
	(0.0054)	(0.0062)	(0.0077)	(0.0055)	(0.0088)	(0.0049)	(0.0054)	(0.0142)	(0.0062)
No Partner Info	0.0103	0.0102	0.0091	0.0095	0.0080	0.0075	0.0102	0.0090	0.0087
	(0.0131)	(0.0186)	(0.0120)	(0.0129)	(0.0153)	(0.0081)	(0.0130)	(0.0283)	(0.0111)
Religion									
Buddhism	0.0057	0.0168	0.0094	0.0056	0.0184**	0.0093	0.0057	0.0176	0.0095
	(0.0082)	(0.0139)	(0.0114)	(0.0082)	(0.0083)	(0.0109)	(0.0082)	(0.0158)	(0.0104)
Hinduism	0.0123	0.3460	0.0249	0.0126	0.3479	0.0262	0.0123	0.3470	0.0256
	(0.0438)	(0.3758)	(0.1086)	(0.0438)	(0.3348)	(0.0550)	(0.0438)	(0.2636)	(0.0583)
Judaism	-0.0109	-0.4157	-0.0080	-0.0110	-0.4158	-0.0081	-0.0109	-0.4157	-0.0080
	(0.0188)	(0.2876)	(0.0196)	(0.0187)	(0.2953)	(0.0263)	(0.0188)	(0.4524)	(0.0211)
Islam	-0.0094	0.0274***	-0.0087	-0.0093	0.0269***	-0.0085	-0.0094	0.0271***	-0.0086
	(0.0124)	(0.0049)	(0.0086)	(0.0124)	(0.0072)	(0.0084)	(0.0124)	(0.0069)	(0.0168)
Other Religion	-0.0119***	-0.0073	-0.0116**	-0.0123***	-0.0097	-0.0125**	-0.0120***	-0.0086	-0.0118**
	(0.0039)	(0.0102)	(0.0046)	(0.0041)	(0.0082)	(0.0058)	(0.0039)	(0.0111)	(0.0046)
No Religion	-0.0032	0.0005	-0.0026	-0.0033	0.0006	-0.0026	-0.0032	0.0006	-0.0026
	(0.0022)	(0.0059)	(0.0020)	(0.0023)	(0.0090)	(0.0018)	(0.0022)	(0.0056)	(0.0027)
Refused Religious Response	-0.0065	-0.0029	-0.0062	-0.0067	-0.0017	-0.0064	-0.0065	-0.0022	-0.0062
	(0.0046)	(0.0086)	(0.0053)	(0.0046)	(0.0070)	(0.0047)	(0.0046)	(0.0086)	(0.0044)
Constant	0.0873***	0.3100***	0.0944***	0.0855***	0.2888***	0.0912***	0.0870***	0.2984***	0.0939***
	(0.0118)	(0.0415)	(0.0103)	(0.0125)	(0.0447)	(0.0146)	(0.0118)	(0.0340)	(0.0117)
Observations	24,924	24,924	24,924	24,924	24,924	24,924	24,924	24,924	24,924
R-squared	0.0364			0.0376			0.0367		
Number of HH		4,879	4,879		4,879	4,879		4,879	4,879

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.14: Unemployment IV Estimation Native Specification (with NILF transition)

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Variables	IV	FE IV	RE IV	IV	FE IV	RE IV	IV	FE IV	RE IV
Unemployment	-0.2471***	-0.4456***	-0.2583***	-0.2090***	-0.2241***	-0.2045***	-0.2438***	-0.3461***	-0.2538***
	(0.0186)	(0.0779)	(0.0210)	(0.0413)	(0.0479)	(0.0562)	(0.0178)	(0.0485)	(0.0173)
General Covars									
Age	-0.0038***	-0.0357***	-0.0043***	-0.0036***	-0.0353***	-0.0042***	-0.0037***	-0.0355***	-0.0044***
	(0.0005)	(0.0020)	(0.0006)	(0.0006)	(0.0019)	(0.0006)	(0.0005)	(0.0020)	(0.0006)
AgeSq	0.0000*	0.0003***	0.0000***	0.0000	0.0003***	0.0000**	0.0000*	0.0003***	0.0000**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	0.0345***	0.0868***	0.0362***	0.0359***	0.0901***	0.0386***	0.0346***	0.0883***	0.0366***
	(0.0056)	(0.0139)	(0.0060)	(0.0058)	(0.0117)	(0.0053)	(0.0056)	(0.0141)	(0.0061)
Defacto	0.0330***	0.0446***	0.0322***	0.0339***	0.0482***	0.0334***	0.0331***	0.0462***	0.0323***
	(0.0057)	(0.0093)	(0.0087)	(0.0058)	(0.0045)	(0.0067)	(0.0057)	(0.0104)	(0.0058)
No.Children	0.0135***	0.1452***	0.0161***	0.0137***	0.1547***	0.0170***	0.0135***	0.1495***	0.0163***
	(0.0012)	(0.0091)	(0.0015)	(0.0012)	(0.0080)	(0.0018)	(0.0012)	(0.0067)	(0.0015)
Educational Qualification									
Postgrad	0.0353***	0.1170***	0.0404***	0.0362***	0.1258***	0.0429***	0.0354***	0.1209***	0.0410***
	(0.0082)	(0.0208)	(0.0093)	(0.0083)	(0.0171)	(0.0083)	(0.0082)	(0.0171)	(0.0080)
Grad diploma, grad certificate	0.0396***	0.0974***	0.0421***	0.0400***	0.1063***	0.0433***	0.0396***	0.1014***	0.0423***
	(0.0062)	(0.0149)	(0.0077)	(0.0063)	(0.0147)	(0.0069)	(0.0062)	(0.0144)	(0.0070)
Bachelor or hons.	0.0238***	0.0609***	0.0251***	0.0243***	0.0688***	0.0261***	0.0239***	0.0645***	0.0253***
	(0.0048)	(0.0078)	(0.0056)	(0.0049)	(0.0068)	(0.0057)	(0.0048)	(0.0073)	(0.0046)
Adv diploma, dip.	0.0145***	0.0359**	0.0159***	0.0147***	0.0413***	0.0165**	0.0145***	0.0384***	0.0161***
	(0.0051)	(0.0146)	(0.0055)	(0.0052)	(0.0085)	(0.0067)	(0.0051)	(0.0103)	(0.0058)
Cert III or IV	0.0057	0.0004	0.0050	0.0054	-0.0005	0.0043	0.0057	-0.0000	0.0049
	(0.0043)	(0.0133)	(0.0039)	(0.0043)	(0.0121)	(0.0044)	(0.0043)	(0.0106)	(0.0036)
Cert I or II	0.0076	-0.0051	0.0091	0.0062	-0.0021	0.0071	0.0075	-0.0037	0.0090
	(0.0111)	(0.0236)	(0.0139)	(0.0111)	(0.0272)	(0.0136)	(0.0111)	(0.0262)	(0.0139)
Cert not defined	-0.0065	0.0800	-0.0029	-0.0102	0.0524	-0.0076	-0.0068	0.0676	-0.0032
	(0.0176)	(0.0865)	(0.0185)	(0.0180)	(0.0653)	(0.0224)	(0.0176)	(0.0532)	(0.0232)
Year 11 and below	-0.0128***	-0.0503***	-0.0139***	-0.0135***	-0.0576***	-0.0154***	-0.0128***	-0.0536***	-0.0141***
	(0.0036)	(0.0062)	(0.0035)	(0.0037)	(0.0072)	(0.0035)	(0.0036)	(0.0063)	(0.0040)
Occupation									
Managers	-0.0150***	-0.0246***	-0.0180***	-0.0145***	-0.0327***	-0.0180**	-0.0150***	-0.0282**	-0.0182***
	(0.0052)	(0.0082)	(0.0064)	(0.0052)	(0.0115)	(0.0071)	(0.0052)	(0.0119)	(0.0055)
Professionals	-0.0194***	-0.0270***	-0.0220***	-0.0193***	-0.0394***	-0.0226***	-0.0194***	-0.0326***	-0.0222***
	(0.0052)	(0.0086)	(0.0056)	(0.0051)	(0.0095)	(0.0056)	(0.0052)	(0.0082)	(0.0059)
Technicians and Trades Workers	-0.0056	-0.0180*	-0.0078	-0.0049	-0.0233	-0.0074	-0.0055	-0.0204	-0.0079
	(0.0068)	(0.0097)	(0.0082)	(0.0068)	(0.0144)	(0.0075)	(0.0068)	(0.0125)	(0.0068)
Community and Personal Services	-0.0135***	-0.0109	-0.0140***	-0.0128***	-0.0146*	-0.0132***	-0.0134***	-0.0126**	-0.0140**
	(0.0046)	(0.0084)	(0.0052)	(0.0046)	(0.0082)	(0.0051)	(0.0046)	(0.0063)	(0.0054)
Sales Workers	-0.0109**	-0.0183**	-0.0128***	-0.0103**	-0.0274***	-0.0125**	-0.0108**	-0.0224**	-0.0129**
	(0.0043)	(0.0091)	(0.0044)	(0.0043)	(0.0094)	(0.0057)	(0.0043)	(0.0104)	(0.0053)
Clerical and Admin Workers	-0.0183***	-0.0233***	-0.0190***	-0.0174***	-0.0277***	-0.0180***	-0.0182***	-0.0253***	-0.0189***
	(0.0045)	(0.0080)	(0.0061)	(0.0046)	(0.0080)	(0.0060)	(0.0045)	(0.0066)	(0.0048)
Machinery Operators & Drivers	-0.0015	0.0253**	0.0005	-0.0004	0.0215*	0.0022	-0.0014	0.0236	0.0008
	(0.0095)	(0.0124)	(0.0083)	(0.0095)	(0.0122)	(0.0099)	(0.0095)	(0.0215)	(0.0095)
Missing/Refused Occ Response	0.3589***	0.4352***	0.3667***	0.3426***	0.3330***	0.3434***	0.3575***	0.3893***	0.3649***
	(0.0146)	(0.0462)	(0.0177)	(0.0211)	(0.0252)	(0.0249)	(0.0143)	(0.0272)	(0.0151)

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.14: Unemployment IV Estimation Native Specification (with NILF transition) Cont.

Dependent variable is fertility									
	Lagged Unemployment			Redundancy			Both Instruments		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Variables	IV	FE IV	RE IV	IV	FE IV	RE IV	IV	FE IV	RE IV
Partner's Educ. Qualification									
Postgrad	-0.0188*	-0.0523	-0.0203	-0.0200*	-0.0650	-0.0224	-0.0189*	-0.0580	-0.0206*
	(0.0112)	(0.0335)	(0.0133)	(0.0114)	(0.0397)	(0.0158)	(0.0112)	(0.0356)	(0.0120)
Grad diploma, grad certificate	-0.0327***	-0.0811**	-0.0332**	-0.0335***	-0.0902**	-0.0346***	-0.0327***	-0.0852**	-0.0334***
	(0.0105)	(0.0319)	(0.0134)	(0.0105)	(0.0416)	(0.0130)	(0.0105)	(0.0338)	(0.0119)
Bachelor or hons.	-0.0237***	-0.0141	-0.0236**	-0.0247***	-0.0225	-0.0251**	-0.0238***	-0.0179	-0.0237***
	(0.0086)	(0.0251)	(0.0099)	(0.0087)	(0.0254)	(0.0112)	(0.0086)	(0.0231)	(0.0082)
Adv diploma, dip.	-0.0322***	-0.0099	-0.0317***	-0.0329***	-0.0184	-0.0326***	-0.0323***	-0.0137	-0.0317***
	(0.0090)	(0.0243)	(0.0077)	(0.0091)	(0.0307)	(0.0112)	(0.0090)	(0.0310)	(0.0105)
Cert III or IV	-0.0259***	0.0083	-0.0240***	-0.0269***	0.0021	-0.0251***	-0.0260***	0.0055	-0.0240***
	(0.0077)	(0.0194)	(0.0091)	(0.0078)	(0.0272)	(0.0097)	(0.0077)	(0.0228)	(0.0080)
Cert I or II	-0.0287	0.0047	-0.0296	-0.0304	0.0001	-0.0322	-0.0288	0.0026	-0.0299
	(0.0218)	(0.0672)	(0.0239)	(0.0219)	(0.0660)	(0.0274)	(0.0218)	(0.0472)	(0.0217)
Cert not defined	-0.0174	-0.0471	-0.0170	-0.0199	-0.0599	-0.0210	-0.0177	-0.0529	-0.0174
	(0.0265)	(0.1263)	(0.0160)	(0.0262)	(0.1109)	(0.0292)	(0.0264)	(0.1359)	(0.0301)
Year 11 and below	-0.0285***	0.0077	-0.0258**	-0.0298***	0.0014	-0.0272***	-0.0286***	0.0049	-0.0258***
	(0.0080)	(0.0257)	(0.0111)	(0.0081)	(0.0280)	(0.0100)	(0.0080)	(0.0233)	(0.0078)
No Partner Info	-0.0632***	-0.0285	-0.0620**	-0.0625***	-0.0276	-0.0603***	-0.0632***	-0.0281	-0.0617***
	(0.0224)	(0.0224)	(0.0253)	(0.0215)	(0.0320)	(0.0190)	(0.0223)	(0.0232)	(0.0223)
Partner's LFS									
Unemployed	0.0012	-0.0050	0.0008	-0.0017	-0.0065	-0.0030	0.0010	-0.0057	0.0004
	(0.0173)	(0.0148)	(0.0174)	(0.0174)	(0.0156)	(0.0148)	(0.0173)	(0.0139)	(0.0142)
Not in LF	-0.0007	0.0175**	0.0009	-0.0013	0.0154	0.0003	-0.0007	0.0166	0.0010
	(0.0070)	(0.0078)	(0.0080)	(0.0070)	(0.0123)	(0.0057)	(0.0070)	(0.0131)	(0.0070)
No Partner Info	0.0248	0.0151	0.0251	0.0230	0.0073	0.0220	0.0246	0.0116	0.0248
	(0.0220)	(0.0219)	(0.0231)	(0.0211)	(0.0165)	(0.0176)	(0.0219)	(0.0233)	(0.0212)
Religion									
Buddhism	0.0155	0.0228*	0.0187	0.0149	0.0263	0.0183	0.0155	0.0244**	0.0188
	(0.0099)	(0.0120)	(0.0159)	(0.0098)	(0.0167)	(0.0128)	(0.0098)	(0.0124)	(0.0135)
Hinduism	0.0086	0.1982	0.0130	0.0068	0.1580	0.0109	0.0085	0.1801	0.0131
	(0.0414)	(0.2874)	(0.0434)	(0.0412)	(0.2069)	(0.0639)	(0.0414)	(0.2278)	(0.0601)
Judaism	-0.0446**	-0.6013**	-0.0460	-0.0462**	-0.5878*	-0.0490	-0.0447**	-0.5953*	-0.0464
	(0.0212)	(0.2925)	(0.0342)	(0.0209)	(0.3283)	(0.0303)	(0.0212)	(0.3137)	(0.0297)
Islam	-0.0111	0.0428***	-0.0117	-0.0119	0.0456***	-0.0130	-0.0112	0.0441***	-0.0118
	(0.0145)	(0.0083)	(0.0231)	(0.0147)	(0.0081)	(0.0195)	(0.0145)	(0.0053)	(0.0139)
Other Religion	-0.0085	0.0222	-0.0053	-0.0099	0.0232	-0.0066	-0.0086	0.0226	-0.0052
	(0.0088)	(0.0147)	(0.0100)	(0.0089)	(0.0177)	(0.0113)	(0.0088)	(0.0180)	(0.0090)
No Religion	-0.0005	0.0013	-0.0003	-0.0007	0.0016	-0.0005	-0.0005	0.0015	-0.0003
	(0.0028)	(0.0081)	(0.0034)	(0.0028)	(0.0079)	(0.0029)	(0.0028)	(0.0063)	(0.0026)
Refused Religious Response	-0.0027	-0.0087	-0.0034	-0.0032	-0.0073	-0.0041	-0.0028	-0.0081	-0.0035
	(0.0057)	(0.0095)	(0.0044)	(0.0058)	(0.0105)	(0.0050)	(0.0057)	(0.0079)	(0.0060)
Constant	0.1511***	0.6702***	0.1595***	0.1472***	0.6572***	0.1559***	0.1507***	0.6644***	0.1598***
	(0.0138)	(0.0368)	(0.0157)	(0.0145)	(0.0526)	(0.0161)	(0.0138)	(0.0467)	(0.0155)
Observations	26,266	26,266	26,266	26,266	26,266	26,266	26,266	26,266	26,266
R-squared	0.1950			0.1957			0.1952		
Number of HH		4,933	4,933		4,933	4,933		4,933	4,933

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.15: Unemployment IV Estimation- Immigrant Specification

Dependent variable is fertility

	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Unemployment	-0.0506	-0.2137***	-0.0799	-0.0816	0.0942	-0.0113	-0.0545	-0.1460**	-0.0732
	(0.0471)	(0.0688)	(0.0508)	(0.1141)	(0.3088)	(0.1378)	(0.0451)	(0.0720)	(0.0602)
General Covars									
Age	-0.0027**	-0.0138**	-0.0031*	-0.0028**	-0.0114	-0.0031	-0.0027**	-0.0133	-0.0031***
	(0.0011)	(0.0067)	(0.0018)	(0.0011)	(0.0078)	(0.0028)	(0.0011)	(0.0085)	(0.0010)
AgeSq	0.0000	0.0001*	0.0000	0.0000	0.0001	0.0000	0.0000	0.0001	0.0000
	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0000)
Married	0.0077	0.0415	0.0121	0.0076	0.0429*	0.0138	0.0077	0.0418**	0.0122
	(0.0065)	(0.0350)	(0.0082)	(0.0065)	(0.0227)	(0.0116)	(0.0065)	(0.0209)	(0.0076)
Defacto	0.0262***	0.0319**	0.0280***	0.0260***	0.0318***	0.0286**	0.0261***	0.0319***	0.0281**
	(0.0080)	(0.0131)	(0.0098)	(0.0080)	(0.0123)	(0.0126)	(0.0080)	(0.0117)	(0.0116)
No.Children	0.0114***	0.1029***	0.0157***	0.0114***	0.0986***	0.0175**	0.0114***	0.1020***	0.0158***
	(0.0017)	(0.0076)	(0.0030)	(0.0017)	(0.0192)	(0.0078)	(0.0017)	(0.0303)	(0.0019)
Educational Qualification									
Postgrad	0.0223*	0.1000	0.0251	0.0225*	0.0938***	0.0260	0.0223*	0.0986	0.0252
	(0.0122)	(0.0639)	(0.0213)	(0.0123)	(0.0320)	(0.0239)	(0.0122)	(0.0602)	(0.0229)
Grad diploma, grad certificate	0.0001	0.0953***	0.0026	0.0002	0.0800*	0.0038	0.0001	0.0919***	0.0026
	(0.0090)	(0.0141)	(0.0125)	(0.0090)	(0.0471)	(0.0201)	(0.0090)	(0.0304)	(0.0105)
Bachelor or hons.	0.0115	0.0354***	0.0096	0.0116	0.0236	0.0089	0.0115	0.0328***	0.0096
	(0.0075)	(0.0027)	(0.0081)	(0.0075)	(0.0200)	(0.0099)	(0.0075)	(0.0110)	(0.0109)
Adv diploma, dip.	0.0147*	0.0186**	0.0147	0.0147*	0.0073	0.0147	0.0147*	0.0161	0.0147
	(0.0080)	(0.0086)	(0.0097)	(0.0080)	(0.0262)	(0.0091)	(0.0080)	(0.0152)	(0.0091)
Cert III or IV	-0.0090	-0.0042***	-0.0105	-0.0088	-0.0100	-0.0111*	-0.0090	-0.0054	-0.0106
	(0.0060)	(0.0013)	(0.0069)	(0.0059)	(0.0205)	(0.0065)	(0.0060)	(0.0196)	(0.0071)
Cert I or II	-0.0136**	-0.1275***	-0.0180*	-0.0130**	-0.1740	-0.0233**	-0.0136**	-0.1377	-0.0184
	(0.0061)	(0.0103)	(0.0098)	(0.0063)	(0.5809)	(0.0109)	(0.0060)	(0.0875)	(0.0134)
Cert not defined	-0.0131	-0.0699***	-0.0172	-0.0132	-0.0952	-0.0188	-0.0131	-0.0754	-0.0172
	(0.0081)	(0.0031)	(0.0153)	(0.0082)	(0.6118)	(0.0145)	(0.0081)	(0.0474)	(0.0179)
Year 11 and below	-0.0137**	-0.0257***	-0.0157***	-0.0138**	-0.0173	-0.0160***	-0.0137**	-0.0239	-0.0157**
	(0.0053)	(0.0001)	(0.0060)	(0.0054)	(0.0234)	(0.0062)	(0.0053)	(0.0188)	(0.0077)
Occupation									
Managers	0.0108	0.0038	0.0088	0.0104	0.0048	0.0092	0.0107	0.0040	0.0089
	(0.0090)	(0.0247)	(0.0108)	(0.0093)	(0.0116)	(0.0119)	(0.0090)	(0.0203)	(0.0097)
Professionals	0.0009	-0.0071	0.0004	0.0003	0.0029	0.0020	0.0008	-0.0049	0.0005
	(0.0077)	(0.0056)	(0.0090)	(0.0078)	(0.0079)	(0.0120)	(0.0077)	(0.0204)	(0.0088)
Technicians and Trades Workers	0.0049	-0.0157***	0.0018	0.0042	-0.0066	0.0026	0.0048	-0.0137	0.0019
	(0.0104)	(0.0004)	(0.0077)	(0.0104)	(0.0089)	(0.0105)	(0.0104)	(0.0181)	(0.0111)
Community and Personal Services	0.0006	-0.0053	-0.0047	0.0001	-0.0034	-0.0046	0.0005	-0.0049	-0.0046
	(0.0079)	(0.0049)	(0.0088)	(0.0079)	(0.0105)	(0.0089)	(0.0079)	(0.0139)	(0.0058)
Sales Workers	-0.0023	-0.0276**	-0.0080	-0.0026	-0.0238	-0.0089	-0.0024	-0.0268	-0.0080
	(0.0067)	(0.0133)	(0.0104)	(0.0067)	(0.0226)	(0.0101)	(0.0067)	(0.0220)	(0.0087)
Clerical and Admin Workers	0.0052	0.0139	0.0073	0.0047	0.0199***	0.0095	0.0051	0.0152	0.0075
	(0.0098)	(0.0099)	(0.0128)	(0.0099)	(0.0049)	(0.0163)	(0.0098)	(0.0130)	(0.0134)
Machinery Operators & Drivers	0.0014	0.0036	0.0007	0.0007	0.0182	0.0032	0.0013	0.0068	0.0009
	(0.0206)	(0.0054)	(0.0280)	(0.0207)	(0.0416)	(0.0199)	(0.0206)	(0.0479)	(0.0150)
Missing/Refused Occ Response	0.0750	0.2195***	0.1024*	0.1049	-0.0560	0.0380	0.0788*	0.1588*	0.0961
	(0.0456)	(0.0554)	(0.0585)	(0.1108)	(0.2961)	(0.1300)	(0.0440)	(0.0842)	(0.0602)

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.15: Unemployment IV Estimation

	Lagged Unemployment			Redundancy			Both Instruments		
Dependent variable is fertility									
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Partner's Educ. Qualification									
Postgrad	0.0148	0.0424**	0.0208	0.0147	0.0409	0.0235	0.0148	0.0421*	0.0209
	(0.0141)	(0.0182)	(0.0163)	(0.0141)	(0.0353)	(0.0191)	(0.0141)	(0.0254)	(0.0170)
Grad diploma, grad certificate	-0.0127	0.0106***	-0.0101	-0.0128	0.0074	-0.0093	-0.0128	0.0099	-0.0101
	(0.0124)	(0.0022)	(0.0218)	(0.0124)	(0.0194)	(0.0151)	(0.0124)	(0.0187)	(0.0113)
Bachelor or hons.	0.0023	-0.0071**	0.0028	0.0023	-0.0076	0.0027	0.0023	-0.0072	0.0028
	(0.0108)	(0.0036)	(0.0118)	(0.0108)	(0.0315)	(0.0151)	(0.0108)	(0.0227)	(0.0117)
Adv diploma, dip.	0.0192	0.0188***	0.0196	0.0193	0.0130	0.0196	0.0192	0.0176	0.0196*
	(0.0125)	(0.0007)	(0.0125)	(0.0125)	(0.0219)	(0.0130)	(0.0125)	(0.0237)	(0.0109)
Cert III or IV	-0.0024	0.0170	-0.0004	-0.0019	0.0186*	-0.0008	-0.0023	0.0173	-0.0004
	(0.0097)	(0.0135)	(0.0093)	(0.0099)	(0.0113)	(0.0106)	(0.0097)	(0.0220)	(0.0088)
Cert I or II	-0.0260***	-0.0685***	-0.0469	-0.0264***	-0.0661	-0.0528	-0.0260***	-0.0680	-0.0473**
	(0.0093)	(0.0073)	(0.0369)	(0.0094)	(0.0674)	(0.0486)	(0.0093)	(0.1055)	(0.0229)
Cert not defined	-0.0428**	-0.1288***	-0.0621**	-0.0423**	-0.0310	-0.0558*	-0.0428**	-0.1073***	-0.0615*
	(0.0195)	(0.0177)	(0.0311)	(0.0195)	(0.0951)	(0.0307)	(0.0195)	(0.0409)	(0.0340)
Year 11 and below	-0.0104	0.0110	-0.0121	-0.0101	0.0176	-0.0127	-0.0103	0.0125	-0.0121
	(0.0095)	(0.0072)	(0.0107)	(0.0096)	(0.0227)	(0.0116)	(0.0095)	(0.0325)	(0.0112)
No Partner Info	-0.0729***		-0.0786***	-0.0732***		-0.0798***	-0.0730***	0.0121	-0.0787***
	(0.0147)		(0.0204)	(0.0148)		(0.0265)	(0.0147)	(0.0119)	(0.0254)
Partner's LFS									
Unemployed	-0.0184	-0.0052**	-0.0121	-0.0175	-0.0095	-0.0125	-0.0183	-0.0062	-0.0122
	(0.0122)	(0.0025)	(0.0098)	(0.0133)	(0.0264)	(0.0126)	(0.0123)	(0.0077)	(0.0135)
Not in LF	-0.0045	0.0065***	-0.0030	-0.0043	0.0069	-0.0024	-0.0044	0.0065	-0.0030
	(0.0075)	(0.0022)	(0.0077)	(0.0076)	(0.0143)	(0.0119)	(0.0075)	(0.0152)	(0.0075)
No Partner Info	0.0541***	0.0115	0.0638***	0.0545***	0.0142	0.0663**	0.0542***		0.0639***
	(0.0137)	(0.0103)	(0.0203)	(0.0139)	(0.0174)	(0.0260)	(0.0137)		(0.0208)
Religion									
Buddhism	-0.0164*	-0.0723	-0.0199**	-0.0164*	-0.0739*	-0.0219	-0.0164*	-0.0727***	-0.0200*
	(0.0092)	(0.0443)	(0.0101)	(0.0092)	(0.0448)	(0.0162)	(0.0092)	(0.0281)	(0.0102)
Hinduism	-0.0046	-0.0065	0.0018	-0.0049	-0.0071	0.0050	-0.0046	-0.0067	0.0020
	(0.0144)	(0.0127)	(0.0188)	(0.0144)	(0.0359)	(0.0218)	(0.0144)	(0.0539)	(0.0143)
Judaism	-0.0163	-0.0070	-0.0228*	-0.0162	-0.0089	-0.0252*	-0.0163	-0.0074	-0.0230
	(0.0156)	(0.0123)	(0.0135)	(0.0155)	(0.0316)	(0.0149)	(0.0156)	(0.0115)	(0.0186)
Islam	-0.0223***	0.0010	-0.0215*	-0.0214***	-0.0371	-0.0240	-0.0222***	-0.0073	-0.0217**
	(0.0066)	(0.0042)	(0.0117)	(0.0074)	(0.0949)	(0.0206)	(0.0066)	(0.0207)	(0.0108)
Other Religion	-0.0156	-0.0429**	-0.0179	-0.0154	-0.0525	-0.0196**	-0.0156	-0.0450	-0.0181
	(0.0117)	(0.0216)	(0.0143)	(0.0117)	(0.0347)	(0.0094)	(0.0117)	(0.0476)	(0.0141)
No Religion	-0.0089*	-0.0153	-0.0086	-0.0088*	-0.0139**	-0.0083	-0.0089*	-0.0150	-0.0086*
	(0.0047)	(0.0288)	(0.0062)	(0.0047)	(0.0062)	(0.0067)	(0.0047)	(0.0141)	(0.0045)
Refused Religious Response	-0.0121	-0.0214	-0.0142	-0.0119	-0.0260	-0.0156	-0.0121	-0.0224	-0.0143
	(0.0091)	(0.0155)	(0.0119)	(0.0091)	(0.0307)	(0.0103)	(0.0091)	(0.0154)	(0.0091)
Constant	0.1106***	0.1919	0.1169***	0.1138***	0.1342	0.1118**	0.1110***	0.1792	0.1162***
	(0.0260)	(0.1598)	(0.0372)	(0.0284)	(0.1760)	(0.0467)	(0.0260)	(0.2015)	(0.0286)
Observations	5,511	5,511	5,511	5,511	5,511	5,511	5,511	5,511	5,511
R-squared	0.0449			0.0430			0.0447		
Number of HH		1,062	1,062		1,062	1,062		1,062	1,062

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.16: Unemployment IV Estimation Immigrant Specification (with NILF transition)

Dependent variable is fertility									
	Lagged Unemployment			Redundancy			Both Instruments		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Variables	IV	FE IV	RE IV	IV	FE IV	RE IV	IV	FE IV	RE IV
Unemployment	-0.2444***	-0.3415***	-0.2582***	-0.2659***	-0.2665***	-0.2760**	-0.2459***	-0.3214***	-0.2595***
	(0.0417)	(0.1027)	(0.0427)	(0.0887)	(0.0733)	(0.1188)	(0.0401)	(0.1026)	(0.0558)
General Covars									
Age	-0.0049***	-0.0343***	-0.0056***	-0.0049***	-0.0338***	-0.0060***	-0.0049***	-0.0342***	-0.0056***
	(0.0014)	(0.0120)	(0.0019)	(0.0014)	(0.0084)	(0.0015)	(0.0014)	(0.0069)	(0.0021)
AgeSq	0.0000*	0.0003***	0.0000	0.0000*	0.0003***	0.0000*	0.0000*	0.0003***	0.0000
	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0000)
Married	0.0266***	0.0783***	0.0288***	0.0259***	0.0791**	0.0295***	0.0265***	0.0785***	0.0288***
	(0.0087)	(0.0226)	(0.0102)	(0.0090)	(0.0313)	(0.0070)	(0.0087)	(0.0276)	(0.0083)
Defacto	0.0486***	0.0618***	0.0493***	0.0481***	0.0618***	0.0492***	0.0485***	0.0618**	0.0492***
	(0.0109)	(0.0214)	(0.0101)	(0.0109)	(0.0136)	(0.0104)	(0.0109)	(0.0257)	(0.0101)
No.Children	0.0110***	0.1161***	0.0138***	0.0108***	0.1167**	0.0151***	0.0110***	0.1163***	0.0138***
	(0.0021)	(0.0203)	(0.0026)	(0.0021)	(0.0468)	(0.0031)	(0.0021)	(0.0415)	(0.0030)
Educational Qualification									
Postgrad	0.0238*	0.1400**	0.0257*	0.0236	0.1412***	0.0262**	0.0238*	0.1403***	0.0257***
	(0.0143)	(0.0614)	(0.0151)	(0.0144)	(0.0009)	(0.0114)	(0.0143)	(0.0376)	(0.0098)
Grad diploma, grad certificate	0.0164	0.1476***	0.0183*	0.0160	0.1483***	0.0191*	0.0164	0.1478**	0.0183*
	(0.0115)	(0.0380)	(0.0110)	(0.0116)	(0.0316)	(0.0103)	(0.0115)	(0.0574)	(0.0105)
Bachelor or hons.	0.0166*	0.0608**	0.0165	0.0163*	0.0613*	0.0163	0.0166*	0.0610***	0.0165**
	(0.0094)	(0.0252)	(0.0108)	(0.0096)	(0.0343)	(0.0133)	(0.0094)	(0.0224)	(0.0079)
Adv diploma, dip.	0.0161*	0.0438**	0.0174*	0.0160*	0.0432**	0.0178	0.0161*	0.0436***	0.0174**
	(0.0095)	(0.0197)	(0.0092)	(0.0096)	(0.0173)	(0.0122)	(0.0095)	(0.0128)	(0.0077)
Cert III or IV	-0.0155*	0.0112	-0.0147	-0.0154*	0.0119	-0.0144	-0.0155*	0.0114	-0.0147**
	(0.0080)	(0.0172)	(0.0121)	(0.0080)	(0.0136)	(0.0116)	(0.0080)	(0.0120)	(0.0072)
Cert I or II	-0.0069	-0.0963	-0.0082	-0.0060	-0.1083	-0.0086	-0.0069	-0.0995	-0.0082
	(0.0127)	(0.1207)	(0.0086)	(0.0128)	(0.1352)	(0.0132)	(0.0127)	(0.0763)	(0.0103)
Cert not defined	-0.0291**	-0.0631	-0.0316	-0.0277*	-0.0696*	-0.0318	-0.0290**	-0.0648	-0.0315
	(0.0148)	(0.0557)	(0.0263)	(0.0148)	(0.0421)	(0.0308)	(0.0147)	(0.0458)	(0.0479)
Year 11 and below	-0.0199***	-0.0433***	-0.0211*	-0.0198***	-0.0463***	-0.0216*	-0.0199***	-0.0441**	-0.0211***
	(0.0072)	(0.0149)	(0.0112)	(0.0072)	(0.0178)	(0.0124)	(0.0072)	(0.0197)	(0.0069)
Occupation									
Managers	-0.0014	-0.0251	-0.0053	-0.0016	-0.0279***	-0.0068	-0.0014	-0.0259	-0.0053
	(0.0100)	(0.0516)	(0.0119)	(0.0101)	(0.0018)	(0.0148)	(0.0100)	(0.0167)	(0.0078)
Professionals	-0.0136	-0.0487	-0.0181***	-0.0138	-0.0500***	-0.0200	-0.0136	-0.0490**	-0.0181**
	(0.0090)	(0.0506)	(0.0068)	(0.0091)	(0.0064)	(0.0127)	(0.0090)	(0.0220)	(0.0088)
Technicians and Trades Workers	-0.0002	-0.0169	-0.0015	-0.0009	-0.0161***	-0.0025	-0.0002	-0.0167	-0.0016
	(0.0121)	(0.0520)	(0.0135)	(0.0124)	(0.0012)	(0.0128)	(0.0121)	(0.0234)	(0.0167)
Community and Personal Services	-0.0064	-0.0326	-0.0122	-0.0068	-0.0339***	-0.0143	-0.0065	-0.0330***	-0.0123
	(0.0090)	(0.0422)	(0.0118)	(0.0092)	(0.0112)	(0.0111)	(0.0090)	(0.0119)	(0.0083)
Sales Workers	-0.0093	-0.0529	-0.0153*	-0.0096	-0.0554***	-0.0177	-0.0093	-0.0536***	-0.0153**
	(0.0079)	(0.0400)	(0.0088)	(0.0080)	(0.0126)	(0.0147)	(0.0079)	(0.0193)	(0.0076)
Clerical and Admin Workers	-0.0072	-0.0356	-0.0112	-0.0076	-0.0360	-0.0129	-0.0073	-0.0357**	-0.0113*
	(0.0107)	(0.0537)	(0.0100)	(0.0109)	(0.0243)	(0.0189)	(0.0107)	(0.0163)	(0.0064)
Machinery Operators & Drivers	-0.0113	-0.0047	-0.0124	-0.0120	-0.0034	-0.0129	-0.0114	-0.0043	-0.0124
	(0.0211)	(0.0434)	(0.0206)	(0.0213)	(0.0689)	(0.0346)	(0.0211)	(0.0363)	(0.0324)
Missing/Refused Occ Response	0.3501***	0.3840***	0.3589***	0.3607***	0.3480***	0.3686***	0.3508***	0.3744***	0.3596***
	(0.0339)	(0.0811)	(0.0418)	(0.0504)	(0.0543)	(0.0811)	(0.0333)	(0.0770)	(0.0391)

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.16: Unemployment IV Estimation

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Partner's Educ. Qualification									
Postgrad	0.0069	0.0029	0.0088	0.0068	0.0038	0.0098	0.0069	0.0031	0.0089
	(0.0160)	(0.0703)	(0.0200)	(0.0160)	(0.0371)	(0.0194)	(0.0160)	(0.0430)	(0.0201)
Grad diploma, grad certificate	-0.0286**	-0.0063	-0.0256**	-0.0287**	-0.0045	-0.0242	-0.0287**	-0.0058	-0.0255
	(0.0144)	(0.0472)	(0.0118)	(0.0144)	(0.0086)	(0.0184)	(0.0144)	(0.0701)	(0.0217)
Bachelor or hons.	0.0085	0.0303	0.0111	0.0082	0.0339**	0.0121	0.0085	0.0312	0.0111
	(0.0131)	(0.0330)	(0.0136)	(0.0132)	(0.0138)	(0.0141)	(0.0131)	(0.0361)	(0.0159)
Adv diploma, dip.	0.0213	-0.0022	0.0218	0.0213	-0.0015	0.0220	0.0213	-0.0020	0.0218
	(0.0144)	(0.0356)	(0.0210)	(0.0144)	(0.0088)	(0.0137)	(0.0144)	(0.0485)	(0.0205)
Cert III or IV	0.0005	0.0133	0.0021	0.0008	0.0187	0.0030	0.0005	0.0148	0.0022
	(0.0116)	(0.0434)	(0.0131)	(0.0117)	(0.0227)	(0.0108)	(0.0116)	(0.0531)	(0.0179)
Cert I or II	-0.0227*	-0.1302**	-0.0404	-0.0234*	-0.1284	-0.0480*	-0.0227*	-0.1297	-0.0406**
	(0.0131)	(0.0657)	(0.0354)	(0.0133)	(0.2278)	(0.0254)	(0.0130)	(0.1370)	(0.0183)
Cert not defined	-0.1119***	-0.2530***	-0.1440***	-0.1021**	-0.2601***	-0.1512***	-0.1112***	-0.2549***	-0.1438***
	(0.0265)	(0.0220)	(0.0405)	(0.0451)	(0.0152)	(0.0393)	(0.0260)	(0.0588)	(0.0261)
Year 11 and below	-0.0071	-0.0234	-0.0091	-0.0071	-0.0176	-0.0096	-0.0071	-0.0218	-0.0091
	(0.0118)	(0.0194)	(0.0117)	(0.0118)	(0.0242)	(0.0146)	(0.0118)	(0.0741)	(0.0148)
No Partner Info	-0.0804***	0.0053	-0.0812***	-0.0803***		-0.0811***	-0.0804***	0.0062	-0.0812***
	(0.0165)	(0.0375)	(0.0210)	(0.0165)		(0.0117)	(0.0165)	(0.0509)	(0.0109)
Partner's LFS									
Unemployed	-0.0536***	-0.0308	-0.0505**	-0.0529***	-0.0337***	-0.0487**	-0.0536***	-0.0315	-0.0504***
	(0.0182)	(0.0271)	(0.0203)	(0.0186)	(0.0037)	(0.0204)	(0.0182)	(0.0353)	(0.0184)
Not in LF	-0.0243**	-0.0152	-0.0245*	-0.0241**	-0.0167***	-0.0242*	-0.0243**	-0.0156	-0.0244*
	(0.0111)	(0.0378)	(0.0136)	(0.0112)	(0.0064)	(0.0147)	(0.0111)	(0.0196)	(0.0131)
No Partner Info	0.0676***		0.0699***	0.0674***	0.0084	0.0707***	0.0675***		0.0699***
	(0.0153)		(0.0175)	(0.0153)	(0.0454)	(0.0094)	(0.0153)		(0.0134)
Religion									
Buddhism	-0.0129	-0.0457	-0.0130	-0.0135	-0.0474***	-0.0134	-0.0129	-0.0462	-0.0130
	(0.0123)	(0.0371)	(0.0155)	(0.0124)	(0.0120)	(0.0118)	(0.0122)	(0.0428)	(0.0098)
Hinduism	0.0118	-0.0410	0.0095	0.0116	-0.0417	0.0084	0.0118	-0.0412	0.0095
	(0.0192)	(0.0443)	(0.0154)	(0.0192)	(0.0908)	(0.0196)	(0.0192)	(0.0259)	(0.0123)
Judaism	-0.0040	0.1109**	-0.0088	-0.0043	0.1213	-0.0107	-0.0040	0.1137	-0.0089
	(0.0230)	(0.0490)	(0.0222)	(0.0231)	(0.2080)	(0.0204)	(0.0230)	(0.1039)	(0.0228)
Islam	-0.0272**	0.0252	-0.0254	-0.0266**	0.0166	-0.0240	-0.0272**	0.0229	-0.0254***
	(0.0106)	(0.0360)	(0.0171)	(0.0111)	(0.0216)	(0.0276)	(0.0106)	(0.0383)	(0.0094)
Other Religion	-0.0146	-0.0352	-0.0158	-0.0145	-0.0374	-0.0161	-0.0146	-0.0358	-0.0158
	(0.0142)	(0.0385)	(0.0181)	(0.0142)	(0.0490)	(0.0214)	(0.0142)	(0.0429)	(0.0155)
No Religion	-0.0079	-0.0065	-0.0072	-0.0080	-0.0056	-0.0068	-0.0079	-0.0062	-0.0072*
	(0.0058)	(0.0102)	(0.0075)	(0.0058)	(0.0279)	(0.0068)	(0.0058)	(0.0217)	(0.0040)
Refused Religious Response	-0.0137	-0.0238***	-0.0152	-0.0135	-0.0242	-0.0157	-0.0136	-0.0239	-0.0152*
	(0.0110)	(0.0085)	(0.0107)	(0.0110)	(0.0338)	(0.0105)	(0.0110)	(0.0245)	(0.0078)
Constant	0.1609***	0.6672***	0.1746***	0.1631***	0.6540***	0.1825***	0.1611***	0.6637***	0.1749***
	(0.0338)	(0.2001)	(0.0472)	(0.0350)	(0.0922)	(0.0352)	(0.0338)	(0.1666)	(0.0505)
Observations	5,787	5,787	5,787	5,787	5,787	5,787	5,787	5,787	5,787
R-squared	0.1940			0.1933			0.1939		
Number of HH		1,070	1,070		1,070	1,070		1,070	1,070

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.17: Stability IV Estimation - Native Specification

Dependent variable is fertility									
	Lagged Unemployment			Redundancy			Both Instruments		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Variables	IV	FE IV	RE IV	IV	FE IV	RE IV	IV	FE IV	RE IV
Stability	0.1489***	0.3903	0.1489***	0.0400*	0.1041**	0.0390	0.0664***	0.1583***	0.0672***
	(0.0345)	(0.5280)	(0.0474)	(0.0226)	(0.0471)	(0.0250)	(0.0188)	(0.0262)	(0.0123)
General Covars									
Age	-0.0022***	-0.0243***	-0.0022***	-0.0012***	-0.0197***	-0.0015**	-0.0014***	-0.0206***	-0.0016***
	(0.0005)	(0.0088)	(0.0008)	(0.0004)	(0.0014)	(0.0007)	(0.0004)	(0.0014)	(0.0005)
AgeSq	0.0000	0.0002***	0.0000	-0.0000*	0.0002***	-0.0000	-0.0000	0.0002***	-0.0000
	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	0.0148***	0.0430**	0.0148***	0.0166***	0.0440***	0.0170***	0.0162***	0.0439***	0.0164***
	(0.0045)	(0.0180)	(0.0056)	(0.0042)	(0.0089)	(0.0059)	(0.0042)	(0.0074)	(0.0046)
Defacto	0.0170***	0.0263	0.0170***	0.0183***	0.0269***	0.0173***	0.0180***	0.0268***	0.0173***
	(0.0047)	(0.0180)	(0.0055)	(0.0045)	(0.0050)	(0.0053)	(0.0045)	(0.0046)	(0.0060)
No.Children	0.0118***	0.1462***	0.0118***	0.0112***	0.1403***	0.0129***	0.0113***	0.1414***	0.0125***
	(0.0010)	(0.0127)	(0.0018)	(0.0009)	(0.0100)	(0.0016)	(0.0010)	(0.0139)	(0.0012)
Educational Qualification									
Postgrad	0.0305***	0.0535	0.0305***	0.0239***	0.0532***	0.0266***	0.0255***	0.0533***	0.0273***
	(0.0074)	(0.0406)	(0.0107)	(0.0066)	(0.0162)	(0.0079)	(0.0067)	(0.0166)	(0.0071)
Grad diploma, grad certificate	0.0193***	0.0532**	0.0193***	0.0175***	0.0500***	0.0190***	0.0179***	0.0506***	0.0189***
	(0.0053)	(0.0236)	(0.0073)	(0.0050)	(0.0077)	(0.0052)	(0.0050)	(0.0148)	(0.0064)
Bachelor or hons.	0.0149***	0.0240	0.0149***	0.0136***	0.0301***	0.0142***	0.0139***	0.0290***	0.0143***
	(0.0040)	(0.0236)	(0.0048)	(0.0038)	(0.0051)	(0.0027)	(0.0038)	(0.0083)	(0.0049)
Adv diploma, dip.	0.0124***	0.0254	0.0124***	0.0104**	0.0210***	0.0112***	0.0109***	0.0218***	0.0114***
	(0.0044)	(0.0315)	(0.0041)	(0.0041)	(0.0047)	(0.0039)	(0.0041)	(0.0069)	(0.0038)
Cert III or IV	0.0070*	-0.0036	0.0070	0.0057*	-0.0011	0.0051*	0.0060*	-0.0016	0.0056
	(0.0036)	(0.0116)	(0.0054)	(0.0033)	(0.0072)	(0.0030)	(0.0034)	(0.0081)	(0.0047)
Cert I or II	0.0019	-0.0306	0.0019	-0.0004	-0.0175	-0.0009	0.0002	-0.0200	-0.0001
	(0.0074)	(0.0546)	(0.0109)	(0.0067)	(0.0401)	(0.0063)	(0.0068)	(0.0404)	(0.0086)
Cert not defined	0.0122	0.1157	0.0122	0.0044	0.0909*	0.0059	0.0063	0.0956	0.0073
	(0.0143)	(0.0993)	(0.0228)	(0.0132)	(0.0535)	(0.0283)	(0.0132)	(0.0816)	(0.0175)
Year 11 and below	-0.0010	-0.0241***	-0.0010	-0.0024	-0.0241***	-0.0030	-0.0021	-0.0241***	-0.0024
	(0.0029)	(0.0078)	(0.0039)	(0.0026)	(0.0036)	(0.0026)	(0.0027)	(0.0056)	(0.0024)
Occupation									
Managers	-0.0083	-0.0320*	-0.0083	0.0019	-0.0106*	0.0009	-0.0006	-0.0147	-0.0014
	(0.0058)	(0.0185)	(0.0075)	(0.0050)	(0.0062)	(0.0052)	(0.0049)	(0.0093)	(0.0051)
Professionals	-0.0107*	-0.0255	-0.0107	-0.0002	-0.0087	-0.0005	-0.0028	-0.0119***	-0.0031
	(0.0055)	(0.0167)	(0.0073)	(0.0047)	(0.0072)	(0.0055)	(0.0046)	(0.0034)	(0.0048)
Technicians and Trades Workers	0.0030	-0.0221	0.0030	0.0104	-0.0031	0.0096*	0.0086	-0.0067**	0.0079
	(0.0070)	(0.0367)	(0.0085)	(0.0065)	(0.0087)	(0.0054)	(0.0065)	(0.0029)	(0.0077)
Community and Personal Services	-0.0065	-0.0199	-0.0065	-0.0014	-0.0072	-0.0015	-0.0026	-0.0096	-0.0028
	(0.0044)	(0.0150)	(0.0052)	(0.0040)	(0.0076)	(0.0044)	(0.0039)	(0.0064)	(0.0047)
Sales Workers	-0.0089**	-0.0203	-0.0089*	-0.0007	-0.0072	-0.0006	-0.0026	-0.0097*	-0.0027
	(0.0045)	(0.0135)	(0.0053)	(0.0039)	(0.0088)	(0.0044)	(0.0038)	(0.0058)	(0.0044)
Clerical and Admin Workers	-0.0084*	-0.0173	-0.0084*	-0.0044	-0.0094	-0.0043	-0.0054	-0.0109	-0.0054
	(0.0043)	(0.0131)	(0.0044)	(0.0039)	(0.0082)	(0.0052)	(0.0039)	(0.0070)	(0.0045)
Machinery Operators & Drivers	0.0043	0.0388	0.0043	0.0055	0.0191*	0.0069	0.0052	0.0229	0.0063
	(0.0089)	(0.0429)	(0.0072)	(0.0082)	(0.0098)	(0.0091)	(0.0083)	(0.0239)	(0.0098)
Missing/Refused Occ Response	0.0403	0.0489	0.0403	0.0277	0.0360*	0.0271	0.0308	0.0384	0.0303
	(0.0285)	(0.0485)	(0.0321)	(0.0271)	(0.0206)	(0.0323)	(0.0272)	(0.0511)	(0.0308)

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.17: Stability IV Estimation - Native Specification Cont

Dependent variable is fertility

	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Partner's Educ. Qualification									
Postgrad	-0.0068	-0.0051	-0.0068	-0.0105	-0.0037	-0.0103	-0.0096	-0.0040	-0.0094
	(0.0099)	(0.0242)	(0.0099)	(0.0097)	(0.0046)	(0.0086)	(0.0097)	(0.0291)	(0.0088)
Grad diploma, grad certificate	-0.0188**	-0.0095	-0.0188**	-0.0194**	-0.0035	-0.0173	-0.0193**	-0.0047	-0.0178**
	(0.0089)	(0.0187)	(0.0093)	(0.0086)	(0.0181)	(0.0114)	(0.0087)	(0.0252)	(0.0089)
Bachelor or hons.	-0.0136*	-0.0090	-0.0136**	-0.0177**	-0.0109	-0.0176***	-0.0167**	-0.0106	-0.0165**
	(0.0075)	(0.0238)	(0.0062)	(0.0074)	(0.0155)	(0.0055)	(0.0073)	(0.0107)	(0.0079)
Adv diploma, dip.	-0.0150*	0.0132	-0.0150**	-0.0177**	0.0198	-0.0161***	-0.0170**	0.0186	-0.0160*
	(0.0077)	(0.0251)	(0.0072)	(0.0076)	(0.0179)	(0.0054)	(0.0076)	(0.0140)	(0.0089)
Cert III or IV	-0.0217***	0.0039	-0.0217***	-0.0210***	0.0135	-0.0194***	-0.0212***	0.0117	-0.0201**
	(0.0066)	(0.0200)	(0.0068)	(0.0064)	(0.0109)	(0.0062)	(0.0065)	(0.0146)	(0.0088)
Cert I or II	-0.0038	0.0220	-0.0038	-0.0015	0.0348	-0.0001	-0.0021	0.0324	-0.0011
	(0.0198)	(0.0663)	(0.0281)	(0.0196)	(0.0416)	(0.0196)	(0.0196)	(0.0586)	(0.0154)
Cert not defined	-0.0493***	-0.0710	-0.0493***	-0.0402***	-0.0868**	-0.0435***	-0.0424***	-0.0838***	-0.0445***
	(0.0099)	(0.0640)	(0.0134)	(0.0073)	(0.0356)	(0.0084)	(0.0076)	(0.0279)	(0.0119)
Year 11 and below	-0.0167**	0.0287	-0.0167**	-0.0184***	0.0358	-0.0156**	-0.0180***	0.0345*	-0.0161*
	(0.0068)	(0.0366)	(0.0079)	(0.0067)	(0.0234)	(0.0068)	(0.0067)	(0.0189)	(0.0085)
No Partner Info	-0.0697***	-0.0899	-0.0697***	-0.0474***	-0.0286	-0.0449***	-0.0528***	-0.0402	-0.0512***
	(0.0164)	(0.1701)	(0.0184)	(0.0132)	(0.0245)	(0.0139)	(0.0134)	(0.0316)	(0.0116)
Partner's LFS									
Unemployed	0.0034	0.0013	0.0034	-0.0005	-0.0040	-0.0006	0.0005	-0.0030	0.0004
	(0.0134)	(0.0279)	(0.0122)	(0.0127)	(0.0172)	(0.0085)	(0.0128)	(0.0060)	(0.0135)
Not in LF	0.0047	0.0087	0.0047	0.0045	0.0096	0.0051	0.0045	0.0094	0.0050
	(0.0058)	(0.0127)	(0.0067)	(0.0054)	(0.0115)	(0.0061)	(0.0055)	(0.0060)	(0.0057)
No Partner Info	0.0478***	0.0973	0.0478**	0.0218*	0.0331	0.0205	0.0281**	0.0452*	0.0273**
	(0.0166)	(0.1835)	(0.0194)	(0.0131)	(0.0253)	(0.0131)	(0.0133)	(0.0272)	(0.0128)
Religion									
Buddhism	0.0088	-0.0060	0.0088	0.0035	0.0026	0.0045	0.0048	0.0010	0.0054
	(0.0081)	(0.0306)	(0.0080)	(0.0070)	(0.0080)	(0.0079)	(0.0072)	(0.0148)	(0.0072)
Hinduism	0.0338	0.3223	0.0338	0.0286	0.3441	0.0379	0.0298	0.3400	0.0360
	(0.0510)	(0.2348)	(0.0480)	(0.0504)	(0.4250)	(0.1448)	(0.0504)	(0.4877)	(0.0956)
Judaism	-0.0087	-0.2630	-0.0087	-0.0190***	-0.0839***	-0.0189**	-0.0165***	-0.1178***	-0.0163
	(0.0112)	(0.3465)	(0.0148)	(0.0047)	(0.0268)	(0.0080)	(0.0059)	(0.0117)	(0.0110)
Islam	0.0013	0.2333	0.0013	-0.0028	0.0803***	-0.0027	-0.0018	0.1092***	-0.0018
	(0.0147)	(0.2870)	(0.0158)	(0.0134)	(0.0256)	(0.0079)	(0.0135)	(0.0120)	(0.0106)
Other Religion	-0.0030	-0.0175	-0.0030	-0.0076*	-0.0137	-0.0077	-0.0065	-0.0144*	-0.0066
	(0.0057)	(0.0262)	(0.0073)	(0.0044)	(0.0088)	(0.0055)	(0.0046)	(0.0083)	(0.0057)
No Religion	-0.0000	0.0012	-0.0000	-0.0012	0.0019	-0.0008	-0.0009	0.0017	-0.0006
	(0.0023)	(0.0127)	(0.0025)	(0.0022)	(0.0035)	(0.0026)	(0.0022)	(0.0043)	(0.0024)
Refused Religious Response	-0.0009	0.0040	-0.0009	-0.0042	0.0025	-0.0040	-0.0034	0.0028	-0.0033
	(0.0049)	(0.0073)	(0.0039)	(0.0045)	(0.0076)	(0.0047)	(0.0045)	(0.0043)	(0.0042)
Constant	-0.0339	0.0890	-0.0339	0.0369**	0.1996***	0.0402**	0.0197	0.1787***	0.0211
	(0.0254)	(0.2205)	(0.0353)	(0.0186)	(0.0652)	(0.0186)	(0.0168)	(0.0384)	(0.0158)
Observations	22,967	22,967	22,967	22,967	22,967	22,967	22,967	22,967	22,967
R-squared		4,645	4,645		4,645	4,645		4,645	4,645
Number of HH				0.0252			0.0096		

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.18: Stability IV Estimation Native Specification (with NILF transition)

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Stability	0.1846***	0.4485*	0.1846***	0.0489**	0.1274	0.0490	0.0842***	0.1819***	0.0854***
	(0.0466)	(0.2476)	(0.0434)	(0.0231)	(0.0967)	(0.0342)	(0.0205)	(0.0535)	(0.0189)
General Covars									
Age	-0.0026***	-0.0266***	-0.0026***	-0.0014***	-0.0213***	-0.0017***	-0.0017***	-0.0222***	-0.0019***
	(0.0006)	(0.0037)	(0.0008)	(0.0005)	(0.0030)	(0.0005)	(0.0005)	(0.0032)	(0.0005)
AgeSq	0.0000	0.0002***	0.0000	-0.0000	0.0002***	-0.0000	-0.0000	0.0002***	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	0.0151***	0.0463***	0.0151***	0.0174***	0.0474***	0.0179***	0.0168***	0.0472***	0.0171***
	(0.0047)	(0.0106)	(0.0054)	(0.0043)	(0.0089)	(0.0040)	(0.0043)	(0.0103)	(0.0048)
Defacto	0.0182***	0.0276***	0.0182***	0.0195***	0.0285***	0.0186***	0.0192***	0.0283***	0.0186***
	(0.0050)	(0.0073)	(0.0059)	(0.0045)	(0.0061)	(0.0051)	(0.0046)	(0.0053)	(0.0060)
No.Children	0.0122***	0.1466***	0.0122***	0.0115***	0.1399***	0.0130***	0.0117***	0.1410***	0.0126***
	(0.0011)	(0.0147)	(0.0011)	(0.0010)	(0.0109)	(0.0014)	(0.0010)	(0.0096)	(0.0013)
Educational Qualification									
Postgrad	0.0322***	0.0557**	0.0322***	0.0241***	0.0550***	0.0265***	0.0262***	0.0551***	0.0277***
	(0.0078)	(0.0279)	(0.0093)	(0.0066)	(0.0175)	(0.0077)	(0.0068)	(0.0165)	(0.0060)
Grad diploma, grad certificate	0.0210***	0.0592**	0.0210***	0.0188***	0.0549**	0.0203***	0.0194***	0.0556***	0.0203***
	(0.0055)	(0.0250)	(0.0061)	(0.0051)	(0.0225)	(0.0059)	(0.0052)	(0.0081)	(0.0056)
Bachelor or hons.	0.0147***	0.0255	0.0147***	0.0131***	0.0321***	0.0137***	0.0135***	0.0310***	0.0139***
	(0.0042)	(0.0214)	(0.0055)	(0.0039)	(0.0070)	(0.0037)	(0.0039)	(0.0094)	(0.0030)
Adv diploma, dip.	0.0127***	0.0273***	0.0127***	0.0103**	0.0224***	0.0110***	0.0109***	0.0233**	0.0113***
	(0.0045)	(0.0081)	(0.0039)	(0.0041)	(0.0067)	(0.0042)	(0.0042)	(0.0092)	(0.0044)
Cert III or IV	0.0070*	-0.0032	0.0070	0.0055	0.0003	0.0049*	0.0059*	-0.0003	0.0055
	(0.0038)	(0.0198)	(0.0053)	(0.0034)	(0.0086)	(0.0028)	(0.0035)	(0.0106)	(0.0038)
Cert I or II	0.0003	-0.0278	0.0003	-0.0026	-0.0130	-0.0031	-0.0019	-0.0155	-0.0021
	(0.0080)	(0.0291)	(0.0079)	(0.0069)	(0.0419)	(0.0067)	(0.0071)	(0.0499)	(0.0070)
Cert not defined	0.0111	0.0990	0.0111	0.0013	0.0710	0.0024	0.0039	0.0757	0.0045
	(0.0155)	(0.0751)	(0.0112)	(0.0136)	(0.0740)	(0.0169)	(0.0138)	(0.0733)	(0.0193)
Year 11 and below	-0.0015	-0.0289**	-0.0015	-0.0034	-0.0285***	-0.0040	-0.0029	-0.0286***	-0.0032
	(0.0031)	(0.0116)	(0.0031)	(0.0027)	(0.0032)	(0.0030)	(0.0028)	(0.0064)	(0.0020)
Occupation									
Managers	-0.0125*	-0.0431*	-0.0125*	0.0001	-0.0187***	-0.0012	-0.0032	-0.0228**	-0.0041
	(0.0067)	(0.0228)	(0.0068)	(0.0051)	(0.0066)	(0.0057)	(0.0051)	(0.0090)	(0.0054)
Professionals	-0.0156**	-0.0367*	-0.0156**	-0.0025	-0.0170**	-0.0032	-0.0059	-0.0203**	-0.0064
	(0.0065)	(0.0211)	(0.0077)	(0.0048)	(0.0067)	(0.0042)	(0.0048)	(0.0095)	(0.0040)
Technicians and Trades Workers	-0.0008	-0.0333*	-0.0008	0.0083	-0.0124	0.0071	0.0059	-0.0160	0.0051
	(0.0075)	(0.0198)	(0.0104)	(0.0066)	(0.0107)	(0.0078)	(0.0066)	(0.0138)	(0.0070)
Community and Personal Services	-0.0089*	-0.0263	-0.0089*	-0.0026	-0.0114	-0.0029	-0.0042	-0.0139	-0.0045
	(0.0049)	(0.0177)	(0.0050)	(0.0041)	(0.0077)	(0.0045)	(0.0041)	(0.0124)	(0.0037)
Sales Workers	-0.0127**	-0.0295	-0.0127**	-0.0025	-0.0141**	-0.0028	-0.0051	-0.0167	-0.0054**
	(0.0053)	(0.0221)	(0.0057)	(0.0040)	(0.0065)	(0.0043)	(0.0039)	(0.0139)	(0.0022)
Clerical and Admin Workers	-0.0109**	-0.0242*	-0.0109**	-0.0060	-0.0147*	-0.0062	-0.0073*	-0.0163	-0.0074*
	(0.0048)	(0.0139)	(0.0050)	(0.0040)	(0.0082)	(0.0054)	(0.0040)	(0.0104)	(0.0042)
Machinery Operators & Drivers	0.0029	0.0401	0.0029	0.0045	0.0190	0.0056	0.0040	0.0226***	0.0049
	(0.0094)	(0.0292)	(0.0110)	(0.0082)	(0.0152)	(0.0095)	(0.0084)	(0.0085)	(0.0090)
Missing/Refused Occ Response	0.3179***	0.2958***	0.3179***	0.3087***	0.2888***	0.3064***	0.3111***	0.2900***	0.3095***
	(0.0501)	(0.0739)	(0.0548)	(0.0501)	(0.0590)	(0.0557)	(0.0500)	(0.0741)	(0.0357)

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.18: Stability IV Estimation Native Specification (with NILF transition) Cont

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Partner's Educ. Qualification									
Postgrad	-0.0071	-0.0035	-0.0071	-0.0117	-0.0018	-0.0113	-0.0105	-0.0021	-0.0102
	(0.0101)	(0.0298)	(0.0132)	(0.0096)	(0.0194)	(0.0108)	(0.0097)	(0.0209)	(0.0105)
Grad diploma, grad certificate	-0.0201**	-0.0078	-0.0201**	-0.0210**	-0.0008	-0.0188**	-0.0208**	-0.0020	-0.0194*
	(0.0091)	(0.0175)	(0.0102)	(0.0087)	(0.0196)	(0.0091)	(0.0088)	(0.0214)	(0.0100)
Bachelor or hons.	-0.0112	-0.0048	-0.0112	-0.0162**	-0.0070	-0.0158*	-0.0149**	-0.0066	-0.0146
	(0.0077)	(0.0174)	(0.0112)	(0.0074)	(0.0168)	(0.0081)	(0.0074)	(0.0106)	(0.0091)
Adv diploma, dip.	-0.0152*	0.0128	-0.0152	-0.0183**	0.0203	-0.0167**	-0.0175**	0.0191	-0.0166*
	(0.0079)	(0.0229)	(0.0098)	(0.0076)	(0.0183)	(0.0076)	(0.0076)	(0.0144)	(0.0096)
Cert III or IV	-0.0208***	0.0086	-0.0208**	-0.0198***	0.0198*	-0.0180***	-0.0201***	0.0179**	-0.0190**
	(0.0067)	(0.0161)	(0.0088)	(0.0065)	(0.0118)	(0.0061)	(0.0065)	(0.0081)	(0.0096)
Cert I or II	-0.0114	0.0219	-0.0114	-0.0081	0.0364	-0.0068	-0.0090	0.0339	-0.0082
	(0.0203)	(0.0627)	(0.0207)	(0.0199)	(0.0635)	(0.0270)	(0.0199)	(0.0721)	(0.0279)
Cert not defined	-0.0526***	-0.0683	-0.0526***	-0.0412***	-0.0857**	-0.0439***	-0.0442***	-0.0827**	-0.0457***
	(0.0113)	(0.0619)	(0.0204)	(0.0075)	(0.0342)	(0.0115)	(0.0080)	(0.0351)	(0.0125)
Year 11 and below	-0.0170**	0.0284	-0.0170*	-0.0191***	0.0369***	-0.0165**	-0.0186***	0.0355**	-0.0170*
	(0.0070)	(0.0328)	(0.0092)	(0.0067)	(0.0138)	(0.0075)	(0.0067)	(0.0162)	(0.0096)
No Partner Info	-0.0804***	-0.1019	-0.0804***	-0.0524***	-0.0328	-0.0503***	-0.0597***	-0.0445	-0.0584***
	(0.0197)	(0.1008)	(0.0128)	(0.0149)	(0.0228)	(0.0146)	(0.0155)	(0.0301)	(0.0169)
Partner's LFS									
Unemployed	0.0006	0.0031	0.0006	-0.0043	-0.0027	-0.0042	-0.0030	-0.0017	-0.0030
	(0.0141)	(0.0165)	(0.0130)	(0.0130)	(0.0117)	(0.0148)	(0.0132)	(0.0154)	(0.0135)
Not in LF	0.0048	0.0099	0.0048	0.0045	0.0109	0.0050	0.0046	0.0107	0.0049
	(0.0061)	(0.0073)	(0.0072)	(0.0056)	(0.0121)	(0.0070)	(0.0057)	(0.0153)	(0.0057)
No Partner Info	0.0589***	0.1126	0.0589***	0.0262*	0.0404**	0.0255	0.0347**	0.0526*	0.0343*
	(0.0203)	(0.1106)	(0.0152)	(0.0149)	(0.0189)	(0.0171)	(0.0154)	(0.0307)	(0.0178)
Religion									
Buddhism	0.0099	-0.0086	0.0099	0.0033	0.0008	0.0041	0.0050	-0.0008	0.0055
	(0.0088)	(0.0260)	(0.0129)	(0.0072)	(0.0099)	(0.0088)	(0.0074)	(0.0147)	(0.0066)
Hinduism	0.0317	0.1333	0.0317	0.0263	0.1531	0.0318	0.0277	0.1497	0.0309
	(0.0492)	(0.2471)	(0.0533)	(0.0478)	(0.4192)	(0.0637)	(0.0479)	(0.2107)	(0.2071)
Judaism	-0.0116	-0.3087**	-0.0116	-0.0246***	-0.1086	-0.0251**	-0.0212**	-0.1426***	-0.0214*
	(0.0160)	(0.1565)	(0.0180)	(0.0092)	(0.0671)	(0.0110)	(0.0104)	(0.0408)	(0.0114)
Islam	0.0026	0.2648**	0.0026	-0.0024	0.0929*	-0.0022	-0.0011	0.1220***	-0.0010
	(0.0155)	(0.1224)	(0.0130)	(0.0134)	(0.0522)	(0.0112)	(0.0137)	(0.0286)	(0.0121)
Other Religion	0.0015	-0.0060	0.0015	-0.0042	-0.0019	-0.0038	-0.0027	-0.0026	-0.0025
	(0.0074)	(0.0275)	(0.0088)	(0.0059)	(0.0171)	(0.0068)	(0.0061)	(0.0238)	(0.0088)
No Religion	0.0008	0.0001	0.0008	-0.0007	0.0007	-0.0004	-0.0003	0.0006	-0.0001
	(0.0025)	(0.0095)	(0.0028)	(0.0022)	(0.0050)	(0.0026)	(0.0023)	(0.0052)	(0.0029)
Refused Religious Response	0.0007	0.0016	0.0007	-0.0036	-0.0006	-0.0035	-0.0025	-0.0002	-0.0025
	(0.0053)	(0.0114)	(0.0042)	(0.0047)	(0.0105)	(0.0052)	(0.0047)	(0.0071)	(0.0040)
Constant	-0.0523	0.1006	-0.0523*	0.0360*	0.2211***	0.0388	0.0130	0.2007**	0.0140
	(0.0330)	(0.1355)	(0.0281)	(0.0190)	(0.0338)	(0.0278)	(0.0179)	(0.0815)	(0.0211)
Observations	23,054	23,054	23,054	23,054	23,054	23,054	23,054	23,054	23,054
R-squared		4,659	4,659		4,659	4,659		4,659	4,659
Number of HH				0.0394			0.0141		

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.19: Stability IV Estimation- Immigrant Specification

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Stability	0.1194***	0.3617	0.1254*	0.0325	-0.0696	0.0098	0.0729**	0.0721	0.0793*
	(0.0390)	(21.7307)	(0.0754)	(0.0471)	(0.4138)	(0.0443)	(0.0302)	(0.1017)	(0.0441)
General Covars									
Age	-0.0030**	-0.0218	-0.0032*	-0.0026**	-0.0099	-0.0033*	-0.0028**	-0.0138***	-0.0040***
	(0.0012)	(1.0421)	(0.0020)	(0.0011)	(0.0134)	(0.0020)	(0.0011)	(0.0037)	(0.0014)
AgeSq	0.0000	0.0002	0.0000	0.0000	0.0001	0.0000	0.0000	0.0001***	0.0000
	(0.0000)	(0.0114)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	0.0035	-0.0021	0.0043	0.0047	0.0284	0.0106	0.0041	0.0184	0.0088
	(0.0073)	(2.1537)	(0.0131)	(0.0069)	(0.0476)	(0.0105)	(0.0070)	(0.0181)	(0.0080)
Defacto	0.0265***	0.0281	0.0273**	0.0258***	0.0331	0.0282***	0.0261***	0.0314*	0.0282***
	(0.0088)	(2.0489)	(0.0126)	(0.0083)	(0.0323)	(0.0089)	(0.0084)	(0.0167)	(0.0076)
No.Children	0.0098***	0.1507	0.0108***	0.0107***	0.1271***	0.0172**	0.0103***	0.1348***	0.0166***
	(0.0018)	(0.5287)	(0.0036)	(0.0018)	(0.0363)	(0.0080)	(0.0018)	(0.0317)	(0.0062)
Educational Qualification									
Postgrad	0.0392***	0.0661	0.0406*	0.0319**	0.1016	0.0353*	0.0353**	0.0900	0.0404*
	(0.0145)	(1.6895)	(0.0216)	(0.0141)	(0.0831)	(0.0190)	(0.0140)	(0.0760)	(0.0236)
Grad diploma, grad certificate	-0.0066	0.0602	-0.0060	-0.0050	0.0823**	-0.0006	-0.0058	0.0750**	-0.0009
	(0.0090)	(1.6192)	(0.0172)	(0.0086)	(0.0332)	(0.0136)	(0.0087)	(0.0346)	(0.0118)
Bachelor or hons.	0.0094	0.0384	0.0093	0.0082	0.0309	0.0081	0.0087	0.0334**	0.0091
	(0.0075)	(1.3730)	(0.0096)	(0.0071)	(0.0281)	(0.0077)	(0.0073)	(0.0135)	(0.0072)
Adv diploma, dip.	0.0187**	0.0087	0.0192*	0.0158*	0.0164	0.0171**	0.0172**	0.0139	0.0190
	(0.0085)	(0.9112)	(0.0115)	(0.0082)	(0.0303)	(0.0086)	(0.0082)	(0.0098)	(0.0130)
Cert III or IV	-0.0113*	0.0082	-0.0114	-0.0086	0.0187	-0.0081	-0.0098*	0.0152	-0.0097*
	(0.0061)	(0.1114)	(0.0081)	(0.0059)	(0.0273)	(0.0053)	(0.0058)	(0.0114)	(0.0055)
Cert I or II	-0.0151*	0.0607	-0.0156	-0.0089	0.0015	-0.0068	-0.0118*	0.0209	-0.0123
	(0.0078)	(0.3546)	(0.0107)	(0.0063)	(0.1562)	(0.0075)	(0.0064)	(0.0332)	(0.0141)
Cert not defined	0.0412*	0.0038	0.0429	0.0084	0.0197	-0.0028	0.0237	0.0145	0.0218
	(0.0220)	(0.8155)	(0.0398)	(0.0192)	(0.0385)	(0.0229)	(0.0160)	(0.0254)	(0.0169)
Year 11 and below	-0.0158***	0.0471	-0.0162*	-0.0136***	-0.0258	-0.0155**	-0.0146***	-0.0018	-0.0163***
	(0.0054)	(6.0428)	(0.0088)	(0.0050)	(0.0870)	(0.0069)	(0.0050)	(0.0278)	(0.0052)
Occupation									
Managers	-0.0082	-0.0416	-0.0095	0.0028	-0.0156	0.0015	-0.0023	-0.0241	-0.0064
	(0.0107)	(0.5724)	(0.0126)	(0.0116)	(0.0160)	(0.0123)	(0.0104)	(0.0221)	(0.0109)
Professionals	-0.0107	-0.0401	-0.0119	-0.0018	-0.0169	-0.0025	-0.0059	-0.0245	-0.0095
	(0.0092)	(1.2865)	(0.0100)	(0.0088)	(0.0187)	(0.0113)	(0.0083)	(0.0255)	(0.0116)
Technicians and Trades Workers	0.0051	-0.0131	0.0039	0.0032	-0.0201	-0.0009	0.0040	-0.0178	-0.0007
	(0.0103)	(1.8970)	(0.0109)	(0.0095)	(0.0268)	(0.0148)	(0.0097)	(0.0133)	(0.0092)
Community and Personal Services	-0.0068	-0.0263	-0.0090	-0.0022	-0.0272	-0.0099	-0.0044	-0.0269	-0.0129
	(0.0085)	(0.4775)	(0.0132)	(0.0080)	(0.0355)	(0.0103)	(0.0080)	(0.0167)	(0.0117)
Sales Workers	-0.0127	-0.0531	-0.0147	-0.0065	-0.0385	-0.0125	-0.0094	-0.0433**	-0.0176**
	(0.0077)	(0.9476)	(0.0123)	(0.0073)	(0.0251)	(0.0101)	(0.0071)	(0.0191)	(0.0084)
Clerical and Admin Workers	-0.0016	-0.0177	-0.0022	0.0012	0.0018	0.0029	-0.0001	-0.0046	-0.0006
	(0.0102)	(0.0258)	(0.0193)	(0.0097)	(0.0243)	(0.0125)	(0.0098)	(0.0168)	(0.0100)
Machinery Operators & Drivers	-0.0105	0.0184	-0.0101	0.0002	0.0245	0.0070	-0.0048	0.0225	0.0002
	(0.0217)	(5.6286)	(0.0291)	(0.0217)	(0.0545)	(0.0355)	(0.0212)	(0.0345)	(0.0160)
Missing/Refused Occ Response	-0.0453***	-0.1144	-0.0454**	-0.0240	0.0119	-0.0135	-0.0339**	-0.0296	-0.0308*
	(0.0154)	(13.2945)	(0.0224)	(0.0159)	(0.2186)	(0.0157)	(0.0136)	(0.0438)	(0.0183)

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.19: Stability IV Estimation- Immigrant Specification Cont.

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Partner's Educ. Qualification									
Postgrad	0.0126	0.0517	0.0129	0.0061	0.0057	0.0072	0.0091	0.0208	0.0117
	(0.0134)	(0.8364)	(0.0231)	(0.0126)	(0.0740)	(0.0172)	(0.0127)	(0.0230)	(0.0172)
Grad diploma, grad certificate	-0.0018	0.0954	-0.0005	-0.0048	0.0066	-0.0010	-0.0034	0.0358	0.0031
	(0.0130)	(3.4990)	(0.0207)	(0.0127)	(0.0853)	(0.0186)	(0.0127)	(0.0368)	(0.0216)
Bachelor or hons.	0.0067	0.0396	0.0065	0.0028	-0.0165	0.0007	0.0046	0.0019	0.0033
	(0.0107)	(1.1065)	(0.0130)	(0.0106)	(0.0599)	(0.0170)	(0.0105)	(0.0320)	(0.0082)
Adv diploma, dip.	0.0147	0.0471	0.0149	0.0147	0.0184	0.0171	0.0147	0.0278	0.0171
	(0.0123)	(1.7567)	(0.0183)	(0.0120)	(0.0329)	(0.0163)	(0.0121)	(0.0233)	(0.0146)
Cert III or IV	0.0034	0.0128	0.0032	-0.0009	-0.0094	-0.0029	0.0011	-0.0021	-0.0001
	(0.0099)	(0.0607)	(0.0094)	(0.0098)	(0.0189)	(0.0116)	(0.0097)	(0.0212)	(0.0098)
Cert I or II	-0.0152	0.0790	-0.0188	-0.0231**	-0.1049	-0.0548	-0.0194*	-0.0444	-0.0436
	(0.0134)	(6.2572)	(0.0423)	(0.0100)	(0.1887)	(0.0340)	(0.0107)	(0.0764)	(0.0334)
Cert not defined	-0.0070	0.0207	-0.0078	-0.0108	-0.0088	-0.0151	-0.0090	0.0009	-0.0122
	(0.0089)	(2.7274)	(0.0126)	(0.0087)	(0.0331)	(0.0109)	(0.0086)	(0.0312)	(0.0097)
Year 11 and below	-0.0938***	0.0302	-0.0970***	-0.0791***	0.0023	-0.0828***	-0.0860***	0.0115	-0.0945***
	(0.0182)	(1.0581)	(0.0180)	(0.0180)	(0.0287)	(0.0256)	(0.0172)	(0.0178)	(0.0300)
No Partner Info									
Partner's LFS									
Unemployed	-0.0231***	-0.0135	-0.0226**	-0.0252***	-0.0053	-0.0211***	-0.0242***	-0.0080	-0.0205***
	(0.0073)	(0.2287)	(0.0095)	(0.0049)	(0.0105)	(0.0060)	(0.0057)	(0.0102)	(0.0062)
Not in LF	-0.0086	-0.0051	-0.0086	-0.0069	0.0046	-0.0043	-0.0077	0.0015	-0.0058
	(0.0069)	(1.3093)	(0.0098)	(0.0058)	(0.0250)	(0.0067)	(0.0062)	(0.0197)	(0.0084)
No Partner Info	0.0859***		0.0897***	0.0662***		0.0723***	0.0754***		0.0874***
	(0.0186)		(0.0167)	(0.0191)		(0.0258)	(0.0174)		(0.0232)
Religion									
Buddhism	-0.0226***	-0.0793	-0.0232	-0.0192**	-0.0677*	-0.0226**	-0.0208**	-0.0715***	-0.0249*
	(0.0086)	(0.7610)	(0.0149)	(0.0080)	(0.0371)	(0.0112)	(0.0081)	(0.0243)	(0.0133)
Hinduism	-0.0103	0.0199	-0.0089	-0.0108	0.0145	-0.0038	-0.0105	0.0163	-0.0020
	(0.0139)	(0.6018)	(0.0187)	(0.0125)	(0.0647)	(0.0178)	(0.0131)	(0.0711)	(0.0172)
Judaism	0.0005	-0.0215	-0.0006	-0.0109	-0.0080	-0.0235**	-0.0057	-0.0124	-0.0148
	(0.0161)	(0.2683)	(0.0196)	(0.0159)	(0.0196)	(0.0095)	(0.0153)	(0.0245)	(0.0160)
Islam	-0.0135	-0.2596	-0.0140	-0.0152**	0.0316	-0.0196*	-0.0144**	-0.0641	-0.0196
	(0.0087)	(20.7393)	(0.0141)	(0.0059)	(0.2435)	(0.0106)	(0.0066)	(0.1039)	(0.0172)
Other Religion	-0.0066	-0.0492	-0.0067	-0.0074	0.0183	-0.0052	-0.0070	-0.0039	-0.0059
	(0.0132)	(2.8969)	(0.0116)	(0.0126)	(0.0543)	(0.0147)	(0.0128)	(0.0417)	(0.0133)
No Religion	-0.0074	-0.0075	-0.0073	-0.0088*	-0.0018	-0.0083*	-0.0082*	-0.0036	-0.0070
	(0.0047)	(0.8005)	(0.0058)	(0.0045)	(0.0135)	(0.0048)	(0.0045)	(0.0152)	(0.0055)
Refused Religious Response	-0.0045	-0.0276	-0.0058	-0.0074	-0.0234	-0.0147	-0.0061	-0.0247	-0.0132
	(0.0099)	(0.4881)	(0.0095)	(0.0094)	(0.0261)	(0.0106)	(0.0095)	(0.0188)	(0.0123)
Constant	0.0150	0.0002	0.0150	0.0756*	0.1366	0.1048**	0.0474	0.0918	0.0636
	(0.0356)	(4.8956)	(0.0594)	(0.0419)	(0.1842)	(0.0498)	(0.0322)	(0.0934)	(0.0454)
Observations	5,023	5,023	5,023	5,023	5,023	5,023	5,023	5,023	5,023
R-squared		1,001	1,001		1,001	1,001		1,001	1,001
Number of HH				0.0337					

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.20: Stability IV Estimation Immigrant Specification (with NILF transition)

	Dependent variable is fertility								
	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Stability	0.1493***	0.3385***	0.1691***	0.0327	-0.0549	0.0197	0.0865**	0.0773	0.1014*
	(0.0534)	(0.0905)	(0.0636)	(0.0474)	(0.4375)	(0.0607)	(0.0337)	(0.1446)	(0.0519)
General Covars									
Age	-0.0030**	-0.0220***	-0.0037*	-0.0024**	-0.0107	-0.0031**	-0.0027**	-0.0145*	-0.0040**
	(0.0013)	(0.0051)	(0.0020)	(0.0011)	(0.0117)	(0.0013)	(0.0012)	(0.0074)	(0.0018)
AgeSq	0.0000	0.0002***	0.0000	0.0000	0.0001	0.0000	0.0000	0.0001	0.0000
	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0000)
Married	0.0054	0.0099	0.0075	0.0073	0.0417	0.0136*	0.0064	0.0310	0.0119
	(0.0081)	(0.0204)	(0.0143)	(0.0074)	(0.0424)	(0.0071)	(0.0076)	(0.0331)	(0.0095)
Defacto	0.0305***	0.0357	0.0320*	0.0297***	0.0443	0.0325***	0.0301***	0.0414	0.0324***
	(0.0098)	(0.0300)	(0.0185)	(0.0092)	(0.0313)	(0.0108)	(0.0094)	(0.0273)	(0.0113)
No.Children	0.0098***	0.1473***	0.0127**	0.0110***	0.1234***	0.0170***	0.0104***	0.1315***	0.0175***
	(0.0019)	(0.0141)	(0.0059)	(0.0018)	(0.0341)	(0.0050)	(0.0018)	(0.0236)	(0.0041)
Educational Qualification									
Postgrad	0.0417***	0.0745	0.0457**	0.0328**	0.1068	0.0379	0.0369***	0.0959	0.0438**
	(0.0152)	(0.0775)	(0.0213)	(0.0142)	(0.0784)	(0.0249)	(0.0143)	(0.0974)	(0.0187)
Grad diploma, grad certificate	-0.0082	0.0630	-0.0057	-0.0056	0.0836	-0.0010	-0.0068	0.0767**	-0.0008
	(0.0096)	(0.0593)	(0.0148)	(0.0088)	(0.0517)	(0.0152)	(0.0090)	(0.0390)	(0.0082)
Bachelor or hons.	0.0084	0.0403**	0.0089	0.0074	0.0333	0.0083	0.0079	0.0356***	0.0093
	(0.0078)	(0.0203)	(0.0080)	(0.0073)	(0.0286)	(0.0111)	(0.0075)	(0.0113)	(0.0105)
Adv diploma, dip.	0.0168*	0.0083	0.0177	0.0134	0.0148	0.0144**	0.0150*	0.0126	0.0163**
	(0.0088)	(0.0247)	(0.0115)	(0.0083)	(0.0445)	(0.0059)	(0.0084)	(0.0123)	(0.0067)
Cert III or IV	-0.0149**	0.0066	-0.0152**	-0.0108*	0.0166	-0.0103	-0.0127**	0.0132	-0.0125
	(0.0068)	(0.0504)	(0.0076)	(0.0062)	(0.0282)	(0.0073)	(0.0062)	(0.0124)	(0.0085)
Cert I or II	-0.0105	0.0480	-0.0134	-0.0017	-0.0054	-0.0019	-0.0058	0.0125	-0.0090
	(0.0121)	(0.1187)	(0.0154)	(0.0105)	(0.1224)	(0.0077)	(0.0106)	(0.0489)	(0.0100)
Cert not defined	0.0516*	0.0035	0.0564	0.0080	0.0187	0.0006	0.0281	0.0135	0.0283
	(0.0279)	(0.0484)	(0.0387)	(0.0192)	(0.0266)	(0.0266)	(0.0179)	(0.0186)	(0.0293)
Year 11 and below	-0.0200***	0.0286	-0.0211**	-0.0165***	-0.0368	-0.0190***	-0.0181***	-0.0148	-0.0206***
	(0.0060)	(0.0398)	(0.0101)	(0.0054)	(0.0417)	(0.0058)	(0.0055)	(0.0367)	(0.0059)
Occupation									
Managers	-0.0150	-0.0553***	-0.0202	-0.0004	-0.0315	-0.0058	-0.0071	-0.0395***	-0.0158
	(0.0121)	(0.0173)	(0.0123)	(0.0118)	(0.0515)	(0.0126)	(0.0109)	(0.0133)	(0.0143)
Professionals	-0.0167	-0.0567***	-0.0222	-0.0049	-0.0350	-0.0103	-0.0104	-0.0423***	-0.0192**
	(0.0104)	(0.0177)	(0.0158)	(0.0092)	(0.0472)	(0.0134)	(0.0089)	(0.0136)	(0.0084)
Technicians and Trades Workers	0.0027	-0.0317**	-0.0025	0.0003	-0.0358	-0.0065	0.0014	-0.0344**	-0.0073
	(0.0111)	(0.0161)	(0.0109)	(0.0098)	(0.0291)	(0.0077)	(0.0101)	(0.0160)	(0.0090)
Community and Personal Services	-0.0107	-0.0411***	-0.0177*	-0.0046	-0.0413	-0.0151*	-0.0074	-0.0412***	-0.0198**
	(0.0093)	(0.0112)	(0.0092)	(0.0083)	(0.0298)	(0.0086)	(0.0084)	(0.0121)	(0.0081)
Sales Workers	-0.0175**	-0.0642***	-0.0245**	-0.0090	-0.0504	-0.0176**	-0.0130*	-0.0550***	-0.0249***
	(0.0088)	(0.0198)	(0.0109)	(0.0077)	(0.0357)	(0.0086)	(0.0077)	(0.0161)	(0.0095)
Clerical and Admin Workers	-0.0053	-0.0281	-0.0081	-0.0014	-0.0087	-0.0019	-0.0032	-0.0152	-0.0062
	(0.0109)	(0.0222)	(0.0142)	(0.0101)	(0.0382)	(0.0090)	(0.0102)	(0.0124)	(0.0128)
Machinery Operators & Drivers	-0.0179	0.0075	-0.0175	-0.0032	0.0140	-0.0001	-0.0100	0.0118	-0.0077
	(0.0228)	(0.0377)	(0.0177)	(0.0220)	(0.0605)	(0.0339)	(0.0216)	(0.0297)	(0.0199)
Missing/Refused Occ Response	0.4421***	0.3726*	0.4363***	0.4577***	0.4708*	0.4592***	0.4505***	0.4378***	0.4453***
	(0.1229)	(0.2133)	(0.0643)	(0.1220)	(0.2454)	(0.1161)	(0.1222)	(0.1205)	(0.1067)

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7.20: Stability IV Estimation Immigrant Specification (with NILF transition) Cont.

Dependent variable is fertility

	Lagged Unemployment			Redundancy			Both Instruments		
Variables	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV	(1) IV	(2) FE IV	(3) RE IV
Partner's Educ. Qualification									
Postgrad	0.0105	0.0422	0.0118	0.0015	0.0040	0.0031	0.0057	0.0168	0.0091
	(0.0140)	(0.0956)	(0.0222)	(0.0127)	(0.0451)	(0.0167)	(0.0129)	(0.0317)	(0.0153)
Grad diploma, grad certificate	-0.0034	0.0876***	0.0013	-0.0074	0.0094	-0.0031	-0.0055	0.0357	0.0026
	(0.0136)	(0.0338)	(0.0238)	(0.0130)	(0.0946)	(0.0132)	(0.0131)	(0.0583)	(0.0190)
Bachelor or hons.	0.0065	0.0221	0.0057	0.0009	-0.0264	-0.0016	0.0034	-0.0101	0.0013
	(0.0112)	(0.0392)	(0.0124)	(0.0108)	(0.0443)	(0.0134)	(0.0108)	(0.0453)	(0.0142)
Adv diploma, dip.	0.0125	0.0389	0.0129	0.0125	0.0164	0.0145	0.0125	0.0239	0.0148
	(0.0126)	(0.0316)	(0.0171)	(0.0121)	(0.0436)	(0.0117)	(0.0123)	(0.0316)	(0.0181)
Cert III or IV	0.0027	0.0008	0.0022	-0.0033	-0.0136	-0.0049	-0.0005	-0.0087	-0.0017
	(0.0105)	(0.0247)	(0.0146)	(0.0099)	(0.0305)	(0.0117)	(0.0099)	(0.0287)	(0.0093)
Cert I or II	-0.0172	0.0538***	-0.0247	-0.0277**	-0.1116	-0.0554*	-0.0228*	-0.0561	-0.0453
	(0.0162)	(0.0201)	(0.0375)	(0.0111)	(0.2132)	(0.0316)	(0.0124)	(0.1768)	(0.0491)
Cert not defined	-0.0093	-0.0047	-0.0119	-0.0146	-0.0311	-0.0203**	-0.0122	-0.0223	-0.0172*
	(0.0096)	(0.0218)	(0.0165)	(0.0091)	(0.0709)	(0.0081)	(0.0090)	(0.0425)	(0.0103)
Year 11 and below	-0.1029***	0.0275	-0.1115***	-0.0837***	0.0094	-0.0889***	-0.0926***	0.0155	-0.1030***
	(0.0196)	(0.0381)	(0.0292)	(0.0181)	(0.0401)	(0.0254)	(0.0177)	(0.0224)	(0.0208)
No Partner Info									
Partner's LFS									
Unemployed	-0.0229***	-0.0128	-0.0218**	-0.0256***	-0.0050	-0.0217***	-0.0243***	-0.0076	-0.0207***
	(0.0086)	(0.0116)	(0.0097)	(0.0049)	(0.0229)	(0.0068)	(0.0062)	(0.0117)	(0.0067)
Not in LF	-0.0118	-0.0027	-0.0110	-0.0093	0.0064	-0.0059	-0.0104	0.0034	-0.0073
	(0.0078)	(0.0037)	(0.0080)	(0.0063)	(0.0166)	(0.0067)	(0.0068)	(0.0120)	(0.0095)
No Partner Info	0.0966***		0.1070***	0.0707***		0.0793***	0.0827***		0.0976***
	(0.0204)		(0.0322)	(0.0192)		(0.0241)	(0.0178)		(0.0238)
Religion									
Buddhism	-0.0243***	-0.0889***	-0.0267**	-0.0198**	-0.0771**	-0.0238***	-0.0218***	-0.0811**	-0.0274
	(0.0090)	(0.0170)	(0.0126)	(0.0080)	(0.0329)	(0.0088)	(0.0082)	(0.0383)	(0.0170)
Hinduism	-0.0103	0.0196	-0.0056	-0.0116	0.0144	-0.0052	-0.0110	0.0161	-0.0017
	(0.0152)	(0.0609)	(0.0220)	(0.0137)	(0.0780)	(0.0192)	(0.0142)	(0.0782)	(0.0177)
Judaism	0.0045	-0.0221	0.0043	-0.0121	-0.0113	-0.0203	-0.0045	-0.0150	-0.0092
	(0.0190)	(0.0147)	(0.0216)	(0.0173)	(0.0397)	(0.0193)	(0.0171)	(0.0181)	(0.0219)
Islam	-0.0131	-0.2427***	-0.0147	-0.0152**	0.0221	-0.0187	-0.0142*	-0.0669	-0.0195
	(0.0105)	(0.0730)	(0.0197)	(0.0061)	(0.3300)	(0.0137)	(0.0073)	(0.0904)	(0.0134)
Other Religion	-0.0107	-0.0490*	-0.0110	-0.0117	0.0125	-0.0092	-0.0113	-0.0082	-0.0096
	(0.0142)	(0.0263)	(0.0110)	(0.0132)	(0.1105)	(0.0154)	(0.0135)	(0.0560)	(0.0102)
No Religion	-0.0073	-0.0071	-0.0065	-0.0093**	-0.0018	-0.0085*	-0.0084*	-0.0036	-0.0066
	(0.0048)	(0.0153)	(0.0054)	(0.0046)	(0.0215)	(0.0046)	(0.0046)	(0.0102)	(0.0041)
Refused Religious Response	-0.0018	-0.0270***	-0.0057	-0.0060	-0.0246	-0.0129*	-0.0040	-0.0254	-0.0117
	(0.0105)	(0.0048)	(0.0131)	(0.0096)	(0.0278)	(0.0079)	(0.0098)	(0.0198)	(0.0112)
Constant	-0.0050	0.0569	-0.0040	0.0767*	0.1655	0.0987**	0.0390	0.1290	0.0533
	(0.0437)	(0.1408)	(0.0466)	(0.0427)	(0.1926)	(0.0483)	(0.0342)	(0.1581)	(0.0471)
Observations	5,044	5,044	5,044	5,044	5,044	5,044	5,044	5,044	5,044
R-squared		1,002	1,002		1,002	1,002		1,002	1,002
Number of HH				0.0720			0.0248		

Robust standard errors in parentheses
FE & RE report the bootstrapped VCE with 100 reps
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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